Digital Atmosphere

User Manual
January 2023 edition

WEATHER GRAPHICS TECHNOLOGIES

Contents

HIGHLIGHTS OF DIGITAL ATMOSPHERE

* A self-contained realtime weather data plotting system
* Access to surface charts, upper air plots, and soundings 15-45 minutes before they're available on Internet sites
* Creates maps even when Internet map sources aren't working
* Contains a worldwide geography dataset with 2-mile resolution
* Automatic retrieval of datasets and graphical weather products through the Internet
* Global terrain data with 30-mile resolution (half-mile resolution easily available with planetary maps)
* Detailed county/parish geography, highway, and road data for the United States
* A master listing of over 30,000 weather stations across the globe, which can be modified by the user
* Lightning-fast ability to import surface airways (SAO), METAR, synoptic, ship synoptic, and AIREP code
* Easily-customized surface and upper-air plots
* A powerful array of analysis and contouring tools; complete with vorticity, divergence, and advection derivatives
* Quick plotting of national radar composites and site radar images
* Plotting of NEXRAD dual-polarization products
* Limited handling of non-US radar sources and compositing with other surface data
* Graphing, plotting, and contouring of climatology for over 2,000 stations worldwide
* Instantly delete or modify erroneous reports with an easy-to-use quality control panel

1 / About this software

Since the 1990s, Digital Atmosphere has served as the leading operational weather analysis tool for Windows. Even as we approach 2020, it enjoys a dedicated following, allowing users to "roll their own" weather maps in a way not possible anywhere else on the Internet. Nearly all programs that are available nowadays focus mostly on satellite, radar, or model data, and not on the broad swath of realtime data.

As of 2020 the majority of Internet weather maps are also low resolution, generally below 1024 x 768, compared to the high-resolution capability of home printers and 4K displays. Digital Atmosphere caters to all of these higher-resolution devices.

Digital Atmosphere also solves what is still a widespread problem of charts perishing from web servers as soon as newer data arrives, which can make it extremely difficult to reconstruct case studies. The software allows old data from many types of historical sources to be plotted again in full detail with ease.

Digital Atmosphere's story begins in the late 1980s, as a weather analysis program took shape on the Commodore 128. This was developed into the PC program RadarScan in 1992, which started as an MDR RAREP data viewer, and then into WeatherGraphix in 1993, the first true plotting program.

The idea was to provide powerful capabilities for the desktop similar to the National Weather Service's AFOS system. In 1995 the code base was ported to Windows 95 and released as Digital Atmosphere on January 7, 1996. A succession of updates and expansions then followed over the years. The program is written in Object Pascal, and supports Windows 7, 8, and 10 as well as older Windows versions since it's still a 32-bit program, and is optimized where it doesn't need 64-bit power.

Digital Atmosphere is used by certain National Weather Service, Air Force, and Navy offices, dozens of television stations and consulting firms, and hundreds of amateurs and hobbyists. Its powerful and rapidly expanding capabilities will let you monitor developing weather anywhere on Earth — around the globe, or right in your own local area.

The maps and other products you create with Digital Atmosphere are fully customizable. You can define the geographic area you wish to map and specify the map's resolution. You decide how much detail you want shown in your maps. You can select for example country borders only, or rendered topography with county lines and roads overlaid. You choose what weather data you want displayed, how the data is displayed, and in many cases what algorithms are used to analyze the data. Whatever your meteorological graphics needs, Digital Atmosphere can create exactly the map you desire, using the parameters you choose.

1.1. Supported datasets

Digital Atmosphere supports the following data formats, most of which are automatically downloaded from the Internet:

- Land synoptic (WMO FM-12 SYNOP)
- Ship synoptic (WMO FM-13 SHIP)
- METAR (WMO FM-15 METAR)
- Buoy (WMO FM-18 BUOY)
- Upper air (WMO FM-35 TEMP)
- Aircraft data report (ACARS) (WMO FM-42 AMDAR)
- NMC frontal depiction interchange format (NOAA/NCEP ASUS1)
- Gridded binary (GRIB) (WMO FM-92-IX). As of 2020, support has been added for GRIB2
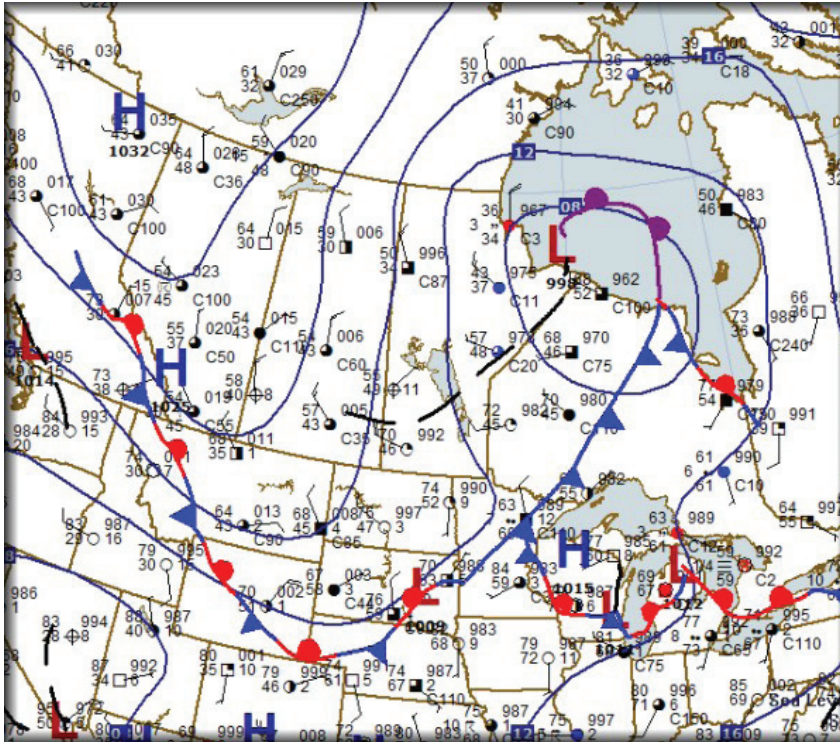
FIGURE 1-1: Surface analysis for Canada, June 2015.

and are working on the full implementation problem.

1.3. System requirements

Digital Atmosphere runs under Windows 7, 8, and 10; and Windows Vista, XP, and 2000. It is still written as a 32-bit (x86) application as the algorithms are not particularly processor-intensive. Nevertheless, it runs normally under all current 64-bit versions of Windows, including Windows 10. There is no minimum hardware requirement. It is strongly recommended to have an Internet connection when running the software, but this is not necessary if users are supplying their own data sources or are using data archives.

data but full implementation is still incomplete due to the varying structures of the data.

■ NEXRAD Level III WSR-88D NEXRAD format

■ Australian AXF comma-delimited observational data and similar formats

■ NHC Hurricane Warning bulletins

1.2. How it fits in

It should be pointed out that Digital Atmosphere is an *analysis tool*, designed for weather systems that are being observed in real time (or with historical datasets). It is expected that the forecaster will use Digital Atmosphere as a tool to diagnose and understand weather systems being depicted, in order to develop a conceptual understanding of what is happening, and integrate that information into a proper forecast process.

Digital Atmosphere is not designed to directly display forecast or model fields, though as of 2020 we have constructed support for forecast model download and display,

1.4. Registering the software

Your Digital Atmosphere copy is a fully-functional version. There are no separate "registered" and "demo" versions, and there's nothing else to download or install! However, you must register Digital Atmosphere Workstation within 30 days of installing it. If you don't do this, at the 30-day point the software will disable certain features such as quality control, scripting, climatology, and loading/saving of maps.

The software is written and maintained by Tim Vasquez. *Your registration is vital* for helping continue to invest countless hours into this program. As of October 2018, the project consisted of 233,000 lines of computer source code, which is typical of a very large

project. A coding session may take as long as 16 hours. Your registration literally helps pay the bills and keep the lights on. If you want to contribute extra support to the project, visit www.weathergraphics.com/pay and you might receive some extra VIP perks and privileges.

Anytime you register Digital Atmosphere, you will receive a key number that you enter into Digital Atmosphere. This prevents it from expiring and restores expired copies. All of this can be handled conveniently via the Web, and we can get you up and running in many cases in less than 24 hours.

We also hope that our low price and our commitment to continued development work is an incentive to register. We've served weather enthusiasts for over 20 years with affordable prices and personalized service directly from the author, rather than inflated markups and non-existent tech support, which is the norm in the software industry.

Your registration is greatly appreciated!

1.5. Your rights

You own all maps you create in Digital Atmosphere. There are no restrictions, no licensing requirements, and no royalties on graphics produced by Digital Atmosphere. The graphics can for example be used in commercial packages, published in books, uploaded to your website, or sold for profit.

You are also entitled to activate the version of Digital Atmosphere Standard you originally purchased at any time in the future, regardless of our upgrade policies. Your registration of the version you originally purchased is good forever. Though a newer upgrade may not be available to you for free, we do not force users into upgrading as some large software companies do, however we do encourage doing so to support our software and get access to newly developed features. We are continuing development even in 2018 largely because people are buying and supporting the software.

1.6. Pricing and ordering

If you haven't already purchased the software, here's what you need to know. The sole source for Digital Atmosphere is the Weather Graphics website at:

www.weathergraphics.com

Pricing and registration is available on the website. If you have questions, contact servicedesk@weathergraphics.com.

European Union and German users are encouraged to register through our official partner, MeteoSoft, and receive German-language assistance, at:

www.meteosoft.de

1.7. Standard vs. Professional

For quite some time we have needed to raise prices to cover the costs of continued development. However we also recognize the need to provide an economical version of Digital Atmosphere. Therefore we provide two versions: a Standard and a Professional version.

Here are the differences between the two versions. Note that a program can be upgraded from Standard to Professional simply for the difference in price.

Standard version

* *Maps*: Limited to vector-mapped workcharts (same as in previous versions of Digital Atmosphere). New York City aeronautical coverage only.
* *Menu scripts*: Limited to a maximum of 30 dynamic scripts in your menu.
* *Registration*: We send you a key for the program to continue working beyond 30 days. Without a key, various functions of Digital Atmosphere will cease working, even after reinstallation.

Professional version

* *Cross sections*: Essential for visualizing the 3-D structure of the atmosphere.

Menu scripts: Unlimited scripts in your menu.

Maps: Includes CD packed with 4 scales of aeronautical charts for the United States at 1:500K, 1:1M, 1:2M, and 1:5M. These highly detailed charts fill a CD-ROM and are an outstanding complement to our radar modules. In the Standard version you can view a sample of them by generating a chart for the New York City area and changing the Projection. to one of the Raster maps.

Registration: No key is required. This gears it toward corporate, government, and university environments, as well as military applications, where serial/key validation procedures are unacceptable and a pre-unlocked solution is required.

1.8. A quick walkthrough

Now we present a quick tutorial to help you get up and running. We suggest printing out these pages or viewing them on a tablet or second monitor and following along.

Loading a little data

Digital Atmosphere comes with a set of prepackaged data for 1800 UTC, April 9, 2015, the date of a major tornado outbreak in Illinois. To load this data, go to the top menu and choose "File > Import Specific File". Select "sample.txt" from the "tutorial" folder in your Digital Atmosphere application data folder. If you're not sure where this folder is, see "Help > About" and noting the application data path.

After you select "sample.txt", Digital Atmosphere will import all the weather data in that file (it contains METAR surface observations). On a Pentium III it takes about 15 seconds. That's all there is to it! Now you can plot the data, analyze it, or perform other operations.

Make sure we're at the surface

For our first activity, we want to make sure we're looking at data at the surface, so check the toolbar and make sure Level Selection shows "Primary - Surface". Digital Atmosphere usually starts with this by default.

Looking at the big picture

Meteorologists usually like to get their first look at a weather chart using isobars (lines of equal pressure). To display these, choose "Analysis > Pressure > Sea level pressure (mb)". Congratulations -- you've made your first weather map, and it was incredibly easy.

You'll notice a deep low over Iowa and northern Missouri, with a Pacific high dominating the Rockies.

Generating a new base map

We don't always want to look at the same location all the time. Let's zoom in for a better view of the Midwest. First choose "Map > Generate Base Map". Make sure "Projection" is set to "Orthographic" (this is always the best one to use; others may not work as well).

Set "Latitude" to "39" and "Longitude" to "-92" (note the minus sign; a negative longitude is always in the western hemisphere). You can type these in or use the slider bars. Set the "Scale" to "1000" miles. You can change the image size if you want to; if you feel like it, go right ahead. We suggest a width of 1200 and height of 900 for most monitors. Note that you can set it much, much higher if you have fancy displays or want a publication-quality graphic.

Now, press "OK" at the bottom to generate the map. Wait about 5 to 15 seconds for the map to render. During this time you will see the map drawn. Watch for a "Map drawing completed" in the status window to the left, and for the cursor to change from an hourglass to a pointer. Is it done? Good.

Let's save this map for future use. Pick "Map > Save Base Map" and in the File window type "midwest". Take careful note of the folder you're saving it in; if you want, you can pick your own location to save this file in. Now

FIGURE 1-2: Surface chart for the sample dataset, with altimeter setting (barometric pressure) overlaid. This can be accessed via Analysis > Altimeter Setting. The altimeter setting differs from sea level pressure in that it is reported in inches of mercury (in Hg) and it is a raw reading with no temperature or climatological-based corrections.
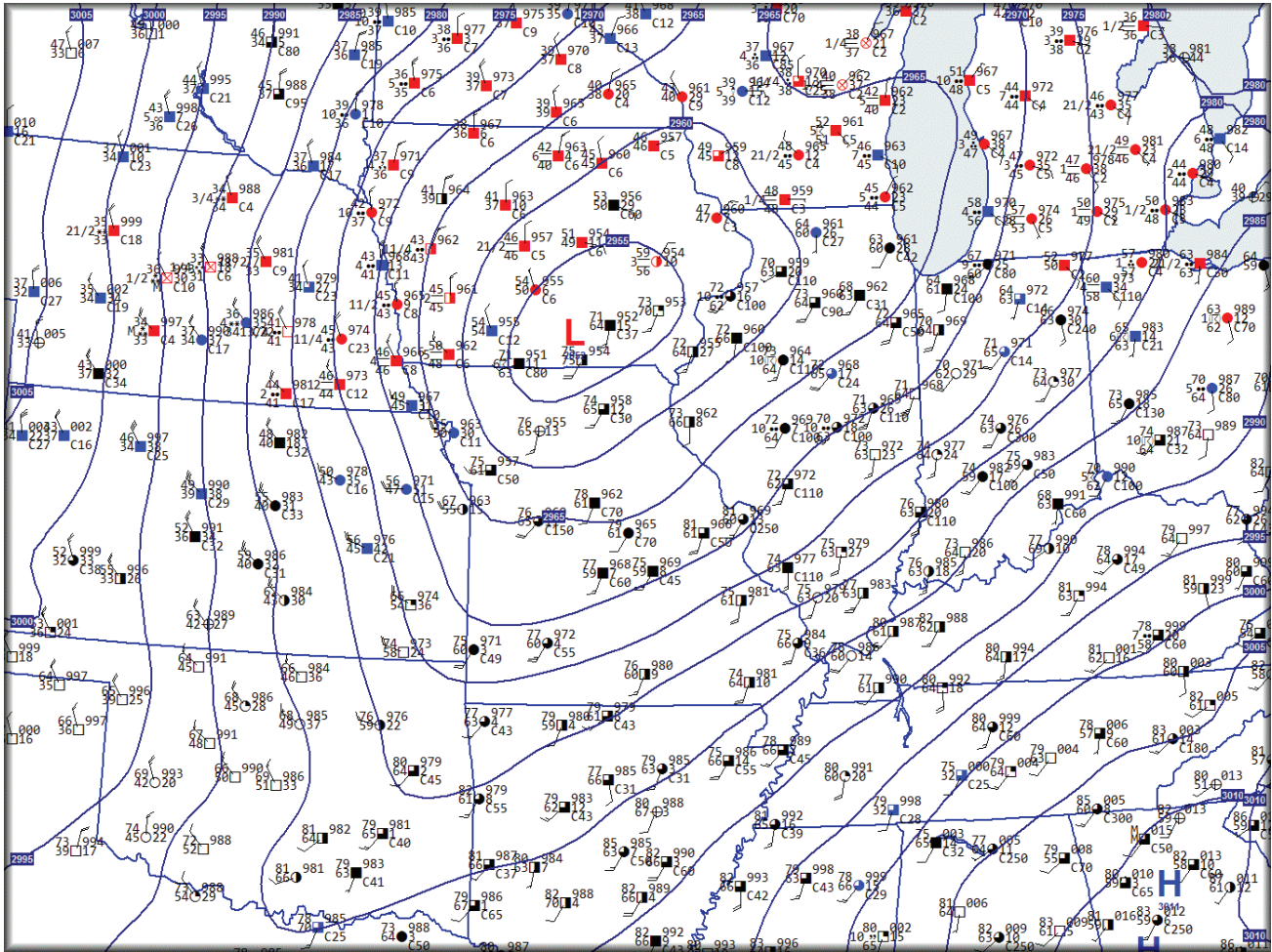
press "OK". You can retrieve this same map instantly at any time in the future!

PRO TIP: Never save any files to the "Program Files" or "Windows" folder hierarchies. These are protected locations and Windows will prevent the file from being saved here. Most other folders on your hard drive are acceptable, including any folders you create under c:\ (the top level) or from your desktop (which is equivalent to c:\Users\[username]\Desktop. If you choose to use your desktop for Digital Atmosphere maps and data, we recommend creating a dedicated folder for that purpose.

Recentering the map

Centering the map on a new location is easy. Right-click on the most southerly tip of Illinois and in the popup menu choose "Recenter Map". If you wait briefly you'll see a new map drawn,

centered on the Ohio River region! When it's finished, however, let's load the original map again.

Now let's go to "Map > Load Base Map" and reload the "midwest" file. Press "OK".

Easy map operations

Did you know you can measure distances with Digital Atmosphere? Simply put the cursor over a certain spot on the map, and hold down the left mouse button as you move the mouse around. Notice that you see a "marching ants"

box and a line that moves with you. The line helps show you the *path* between your two points, while the box defines an *area*, which is often used to lasso a group of observations and quality check them.

At the bottom of the window, note that the status bar is displaying the latitude and longitude of each point, and the bearing and distance between the two! The line drawn on the map is actually a great circle line, and on global map views you will notice that it forms an arc rather than a line. This arc is *always* the shortest distance between the two points (i.e., as the crow flies), even if it looks slightly curved. Now you know how to measure distances and get latitude-longitude information.

Looking at station plots

Station plots are little meteorological "packets" of data that appear on the map at various locations, showing the actual observed conditions at that location. Plotting them in Digital Atmosphere is a snap.

To do this, just click on Data > Data plots. Instantly the map is filled with a smorgasbord of information. Each plot contains a temperature value at the top left and a dewpoint value at the bottom left. We can't predict what exactly you'll see since this depends on the image size of your map and what the clutter filter is set to, but you can decode any plot by using any station plot reference found on the Internet. The format is universal. Just go to images.google.com and in the search box put in "weather station plot". You'll notice there are simple versions, with just temperature, dewpoint, and pressure, and much more detailed formats with cloud type, pressure tendency, and other values.

The long shaft sticking out from each plot is the wind direction. It always sticks INTO the wind. The feathers on the shaft indicate the wind speed. Each long barb represents 10 mph; each short one represents 5 mph. On

rare occasion you may see a thick flag, which represents 50 mph.

In the center circle, the amount of shading indicates the amount of cloud cover. A completely shaded circle means it's overcast. You'll also note that some stations have a square; this means the observation was made by an automated station.

Some stations (not in this particular example) have a red color; this means bad (IFR) weather, while some are blue which means marginal (MVFR) weather. This coloring is determined strictly by visibility and cloud height and is more for the use of pilots and experienced meteorologists, though they can clue you in on where significant weather is happening.

Cutting down on crowding

Soem users may want their plots more cluttered but yielding more information, while others may want fewer plots and a much "cleaner" chart. Let's adjust the plot crowding. On the left side tool bar, change the "Data Plot Crowding" to 50%. To enable the change, go to "Map > Erase" map, and choose "Data > Data Plots". You'll notice a lot of stations have disappeared, but it makes the chart easier to read.

Now change the "Data Plot Crowding" to 100%. Replot by going to "Map > Erase" map, and choosing "Data > Data Plots". Every single available station will now plot. That's a lot of data! More data is good, but you'll want to play around with this slider in your day-to-day forecasting to get it just the way you want it.

The NMC font

Let's check out one cool feature the software offers. First, use the "Data Plot Crowding" slider and set it to 80%. Now go to the main menu and click "File > Font Mode >

NMC/NCEP Raster". Replot by going to "Map > Erase" map, and choosing "Data > Data Plots".

What you're seeing is station plots drawn in a special font which was developed by the ESSA (NOAA) National Meteorological Center in the late 1960s for use on their CDC 6600 mainframe computers to produce weather charts. The printouts were made on large electrolytic fax printers. It's one of the earliest examples of high-resolution digital printing systems. With Digital Atmosphere, you get to use the actual fonts! We extracted them from the original FORTRAN source code.

Why is it good to know about this font? It's designed for high-contrast graphics where readability is important. Also as a raster rather than a vector font, it does not suffer from scaling artifacts that may affect precipitation symbols used in station plots. They should also be used when legibility of weather symbols (precipitation and cloud types) are essential. The NCEP raster font works best for large basemaps (larger than 2000 x 2000 pixels) and especially when printed to a printer, and is not recommended for low-resolution maps.

FIGURE 1-3. Sample heights and vorticity chart for 500 hPa (500 mb) for Europe, showing a channel jet over Switzerland, upper lift associated with the left front quadrant of the jet over the Czech Republic, and a series of short wave troughs west of St Petersburg, Russia; over the British Midlands, over northeast Poland, and over the western English Channel.
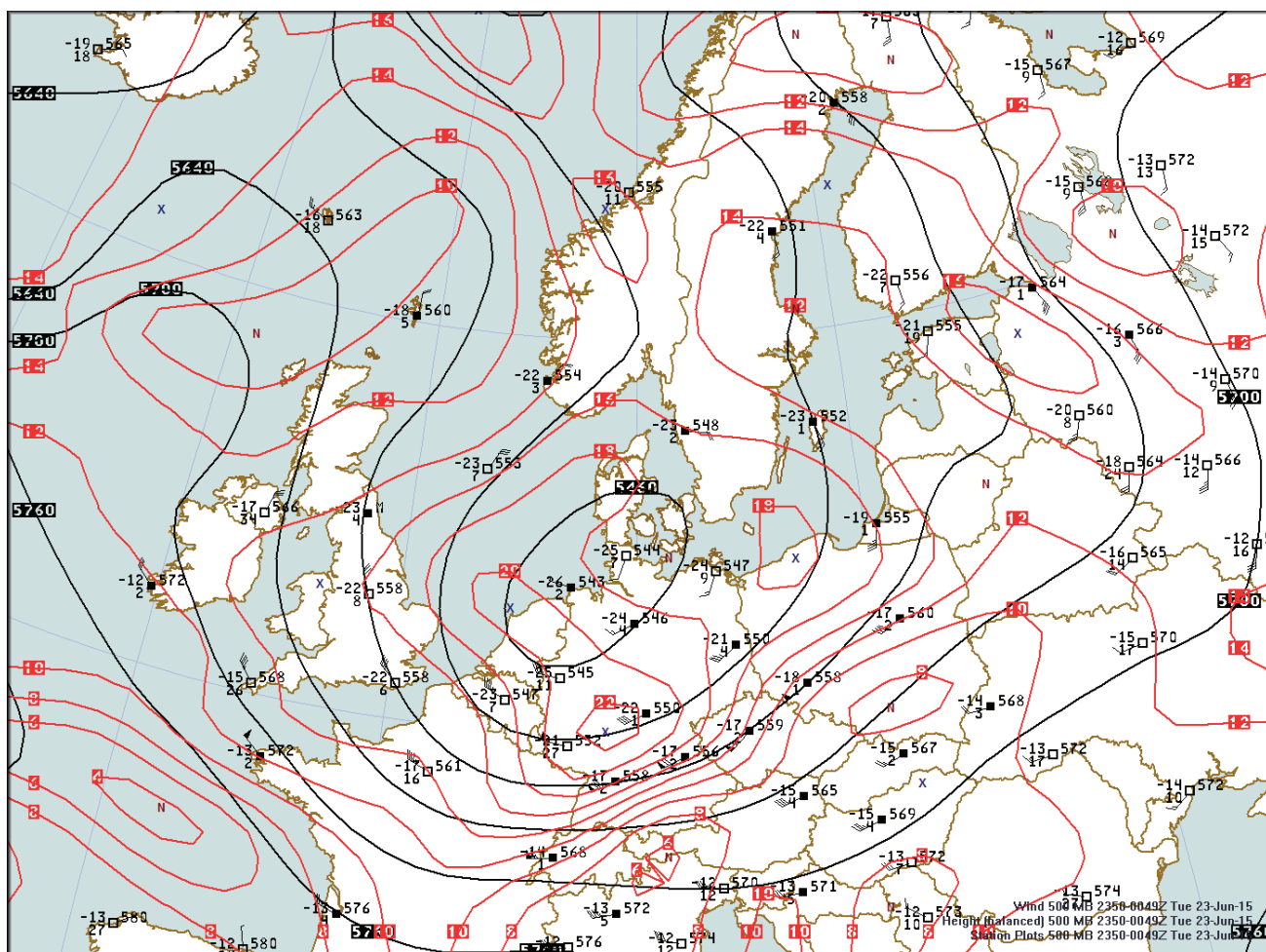
Overlaying more contours

Now choose Analysis > Pressure/Height > Sea level pressure. Nice! You just added the same isobar field seen earlier in this tutorial on top of the map. This illustrates how you can view different meteorological fields at the same time.

Seeing the wind flow

It is possible to visualize the wind field in a couple of different ways. Go ahead and click on Map > Erase map. Now choose Analysis > Wind > Wind speed (barbs). You'll see a pretty cool gridded array of wind patterns! It's the ideal thing to depict how the air is moving.

Next, try Map > Erase map. Then select Analysis > Wind > Streamlines. This shows the wind like rivers of air. The low pressure center in Iowa is instantly identifable, and fronts can be found where the streamlines tend to bunch up, as in western Missouri and western Pennsylvania.

Looking at isotherms

Remember how you overlaid isobars on the map? It's easy to overlay other fields, such as isotherms (lines of equal temperature). Just go to Analysis > Temperature > Temperature (deg F).

Get new weather data

Now it's time to get real data! Make sure you're connected to the Internet. Now go to Internet > Retrieve Data. Press Uncheck All to make sure we start with a blank "shopping list". Now check METAR from COD. This makes sure we retrieve surface (METAR) data from College of DuPage's server. Now press Retrieve. The data will be loaded in just a matter of seconds and is ready to view (if you have any error messages please see our FAQ elsewhere in this guide, or on the website). Now go to Map > Erase Map and choose Data > Data plots. You're looking at current weather!

* * *

That completes the quick tour of Digital Atmosphere. This tour was only intended to give you a feel for how Digital Atmosphere works. You've covered all of the basic functions, and now you can build on your knowledge by playing around with the software and reading through this help guide. There's no way you can "break" Digital Atmosphere just by experimenting. Have fun!

2 / The main window

Before we continue, let's look at the major components of the Digital Atmosphere screen in the illustration below. It's important to be familiar with each of these parts, since we will refer to them occasionally through the manual. This chapter discusses each component in detail.

The main menu is where you issue most commands for Digital Atmosphere. This drop-down menu structure works just like most other Windows programs. Each main menu command will be described in the following chapters in this manual, so we won't discuss them in detail at this time.

2.1. Speed buttons

The speed buttons in the top horizontal toolbar provide you with a convenient way of accessing some of the most common Digital Atmosphere commands, such as downloading data from the Internet. You can find the meaning of each one by simply resting the cursor on a button (a popup hint will appear). Each button corresponds to a main menu command, summarized as follows (going left to right). To get more information, go to the following chapters to see what the main menu command does.

FIGURE 2-1. Components of the main window interface.
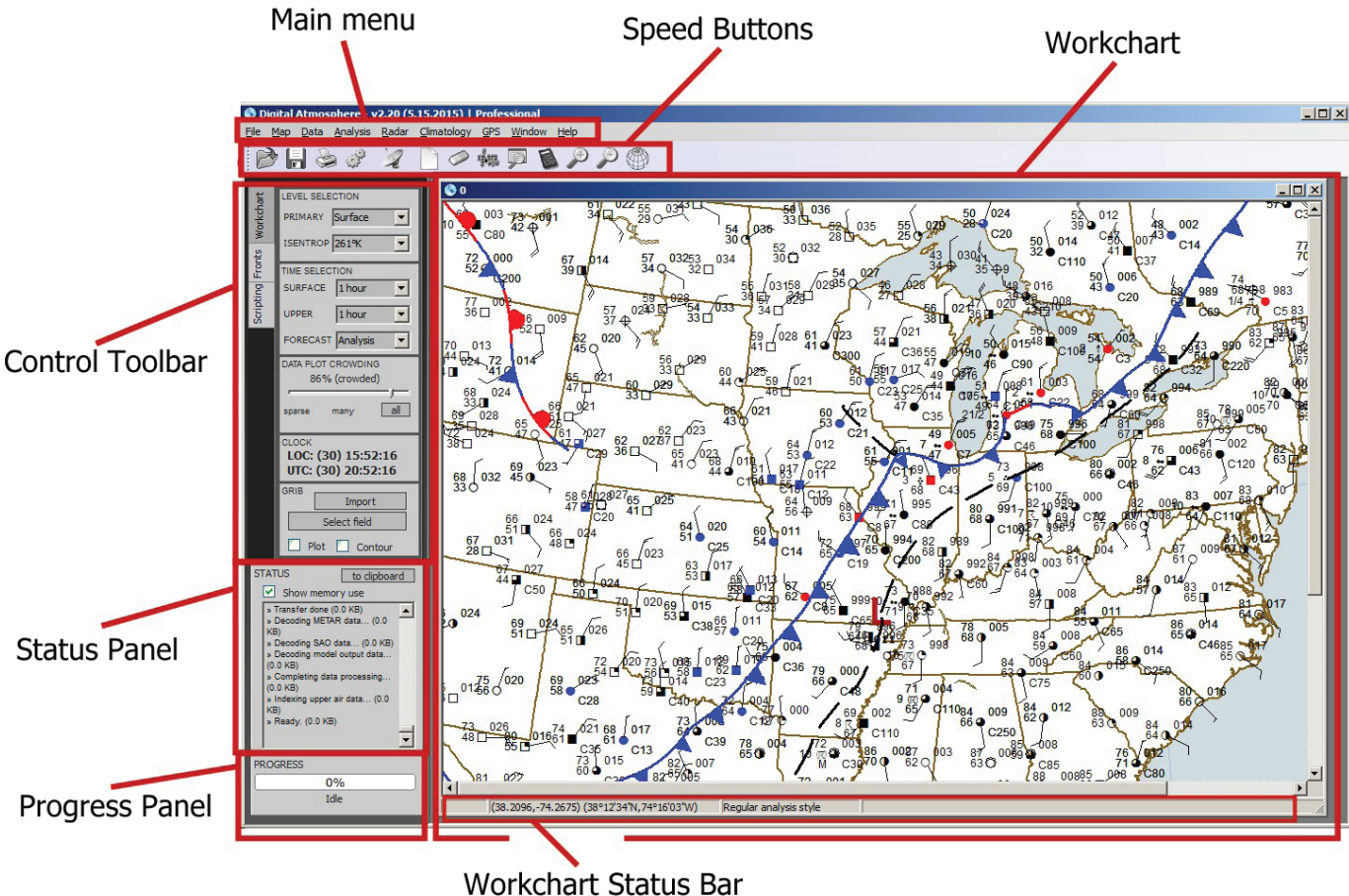
2.2. Control toolbar

At the left side of the screen is a vertical toolbar with various options and settings that help you select and view Digital Atmosphere products. It is divided by a tabs into three main sections, "Workchart", "Fronts", and "Scripting". Below we will go through each of these tabs in order, starting with the Workchart tab.

Level Selection [Workchart tab]

The great majority of Digital Atmosphere products are horizontal charts for a specific level. This is set in the **PRIMARY** dropdown box, where you can select the surface, a constant pressure level such as 500 mb, or isentropic analysis.

If isentropic analysis has been selected in the primary box, choose the desired isentropic level in the **ISENTROP** dropdown box. These values are in Kelvin. Keep in mind the lowest Kelvin values are found closest to the ground and in cold air masses. If you're uncertain which level to use, it's best to start with the warmest expected surface temperature you see on the map (e.g. 90°F = 32°C = 305 K) and adjust it as needed. A value too high will be too far aloft for data to be available, and a value too low will be entirely underground and not produce any results.

NOTE: When the charts show no plots or analyzed fields, the culprit is often forgetting to select a millibar level here when upper air data has been imported, or forgetting to set surface data here when METAR and SYNOP data has been loaded!

Time Selection [Workchart tab]

Digital Atmosphere products are also for specific instances in time. To define which times you want to see, make your selections here.
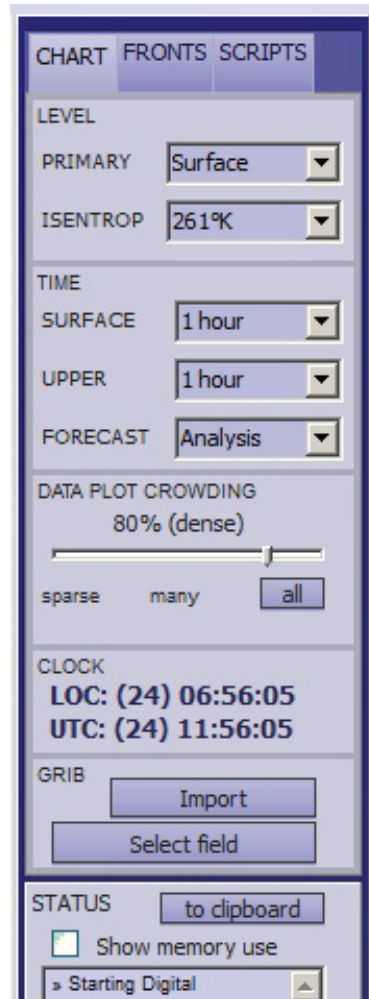
FIGURE 2-2. The workchart tab of the control toolbar.

Pro tip

Keep in mind that freezing, 0°C, equals 273 Kelvin. It's useful to memorize a few key reference temperatures, which will allow you to interpolate values in between. Here are some good reference temperatures:

-10°C / 263 K / 14°F   20°C / 293 K / 68°F
0°C / 273 K / 32°F   30°C / 303 K / 86°F
10°C / 283 K / 50°F   40°C / 313 K / 104°F

* *Surface time*. This controls how the valid time for surface data is chosen. You should leave it on "auto" to allow Digital Atmosphere to choose the most popular time from the available data. If you wish to override it, you can choose "manual" to be prompted for a time each time you generate a surface product, or you can choose a specific numerical time.

* Upper time. This controls how the valid time for upper-air data is chosen. You should leave it on "auto" to allow Digital Atmosphere to choose the most popular time from the available data. If you wish to override it, you can choose "manual" to be prompted for a time each time you generate an upper-air product, or you can choose a specific numerical time.

* Forecast time. Controls whether forecast data is used. You should always leave it at "analysis" unless you are plotting FD winds aloft data. Model output data valid times are chosen separately.

<div style="border:1px double black; padding:10px;">

SPECIAL NOTE

This option will not generate forecast data. It is only for use with specific forecast products, such as MOS data and FD winds aloft. The forecast time should normally be left at its default position, "Analysis".

</div>

Data plot crowding [Workchart tab]

This controls the density of station plots plotted on the charts. Set it to as high of a value as possible, but not so high that the charts become illegible. Setting it all the way to the right or clicking "all" will set the crowding at 100% and plot every available station, which may be useful for evaluating how much data is available and looking for clustering of stations.

To prioritize a station so that it displays regardless of the data plot crowding setting, edit the station rule for that station. This may be done in Data > Edit Station Rules (see the Data Menu chapter).

Clock [Workchart tab]

The clock panel shows the local and UTC time, as obtained from your computer's time and time zone settings. It is necessary that this information is correct for the Data Retrieval functions to work correctly. If the information appears erroneous, check our time and time
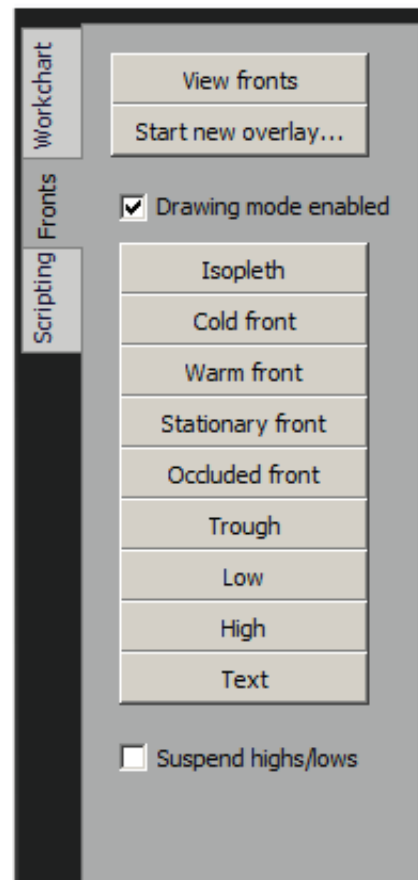
FIGURE 2-3. The fronts tab of the control toolbar.

zone settings in Windows and set them accordingly.

GRIB [Workchart tab]

This panel is used for importing and displaying GRIB data. GRIB is an interchange format for basic meteorological fields, and is currently the best way to get forecast data into the program. Third party sources provide GRIB data; Weather Graphics does not.

Use the **import** button to specify the file containing GRIB data. Check either **plot** or **contour**, depending on whether you want to see gridded values or isoplethed fields. Use the **select field** button to plot the desired data.
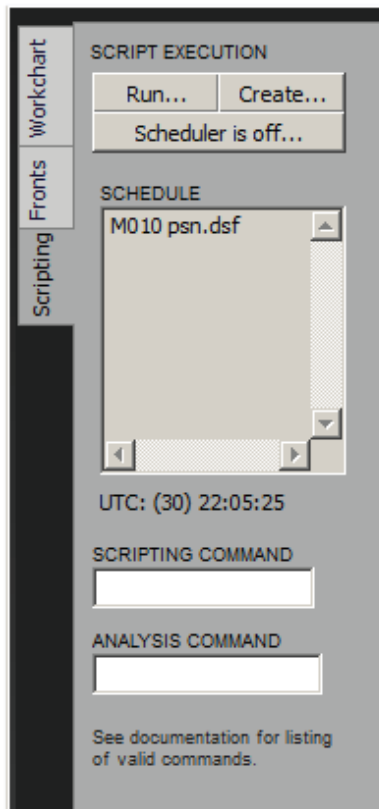
FIGURE 2-4. The scripting tab of the control toolbar.

SPECIAL NOTE

Currently this function only works with simple GRIB1 fields and does not yet handle the GRIB2 format. The GRIB functionality is strictly experimental / use at your own risk, and is currently being worked on.

Front tab

Digital Atmosphere allows for fronts to be drawn as an overlay on the charts. This data may either be programmed manually (using this tab) or may be imported using the Data > Fronts section. Note that Digital Atmosphere has no capability to automatically estimate frontal positions. There is currently no method for doing this, and even frontal data im-

ported from NOAA is manually generated by human forecasters.

Use the **view fronts** button if frontal data has already been generated during this Digital Atmosphere session using manual entry or the Data > Fronts option.

To program fronts manually, click the Start New Overlay. This erases any frontal data already in memory and lets you start a new session. The left-mouse-button drag options to measure distances and lasso stations for QC will interfere with drawing fronts, so you must turn them off by using the **Drawing Mode Enabled** checkbox to turn those functions off. When it is checked, then any left-mouse-button clicks on a map will signify a frontal position.

With drawing mode enabled, click any of the buttons **Isopleth**, **Cold Front**, **Warm Front**, **Stationary Front**, **Occluded Front**, **Trough**, **Low**, **High**, and **Text** to place those features on the map. Never drag on the map to place those items!

When drawing linear features (isopleth, cold front, warm front, stationary front, occluded front, and trough), you will click that button first to start a new line and then set a series of points on the map, preferably between 3 and 6 points that best define the front or trough. By drawing the points away from the low pressure centers, this will automatically point the front's barbs or pips in the proper direction (i.e. drawing a cold front southward will place the barbs facing east).

When drawing point features (low, high, and text), simply click the button of the feature you want and click once on the map. It will then appear and or you will be prompted for the text you want to be shown.

Currently there is no "undo" function, so if you make an error drawing on the map, you will need to click the Start New Overlay button and start over.

The **Suspend Highs/Lows** checkbox will prevent front plot highs and lows from ap-

pearing on the map. This is useful when you are plotting front data from a central source (NOAA) and prefer Digital Atmosphere's analysis to plot the highs, lows, and isobars.

Scripting tab

Digital Atmosphere has powerful scripting capabilities that allows automation of weather charts. A set of instructions is referred to as a "script", and scripts are executed either manually or using a clock-based "scheduler".

The **Run...** button is used to open a previously saved script file (*.dsf) and execute it immediately.

You can also stat a new script file from scratch using the **Create...** button. You may also do this in Windows Notepad, as long as script files are saved with the extension ".dsf".

The **Scheduler Is Off/On** button indicates the status of the scheduler and allows it to be turned on and off. If it is on, it will trigger the execution of script files at the times you select. To turn it on and off, simply click on the button and make the change in **Enable Scheduler**. You can also edit the scheduler in this window. See the appendix for more information.

The **Schedule** list displays which scripts will be executed at which time. The first four digits are the UTC time at which the script will be executed. Following this is the script file that will be executed at that time. Script files are named *.dsf.

The **Script Command** text box allows you to directly input one script command to evaluate what happens when it is executed. See the appendix for a listing of valid script commands.

The **Analysis Command** textbox, likewise, allows you to directly input an analysis command to observe what happens. This is the same thing as typing *ANALYSIS,[command]* in the Scheduler Command window above. See the appendix for a listing of valid analysis commands.

2.3. Status panel

Just below the Product Control Toolbar is the status panel. Diagnostic information detailing what is going on within the software will appear here. The status panel automatically clears itself when the amount of data in it becomes excessive. To copy the data to the clipboard, click **To Clipboard**.

The option Show Memory Use simply appends memory statistics to each line of status output, and is intended to be only for test use.

2.4. Workchart

The workchart is the large graphical space used to display maps, plots, and contours.

Clicking on the workchart

Clicking on the workchart will normally have no effect unless Drawing Mode for fronts is enabled. For more information, see above under Product Control Toolbar > Front Tab.

Hovering on the workchart

As you move the cursor around the workchart, the latitude and longitude for the cursor location will be continuously displayed on the status bar at the bottom of the Digital Atmosphere form. This is shown in both decimal degrees and in degree-minute-second format.
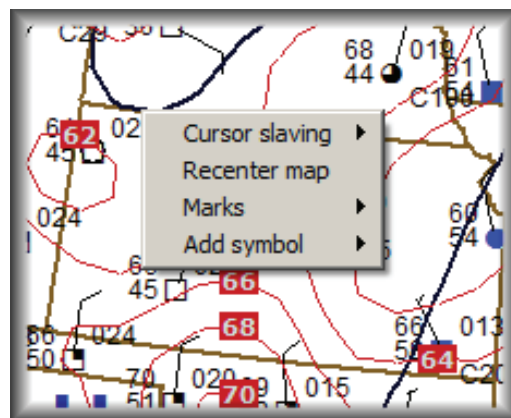
FIGURE 2-5. Right mouse button popup for the workchart images.

Dragging on the workchart

A drag operation on the workchart will produce a "marching ants" geographical selection box that has a twofold effect:

* *Showing distance and azimuth.* You can easily measure distances and bearings between two points. As you drag on the workchart, the status bar at the bottom of the screen will show the cursor latitude/longitude where you started the drag operation and where the cursor is now, and will also show the bearing relative to true north, along with the distance in statute miles, nautical miles, and kilometers.

* *Defining a quality control location.* Before using the Quality Control function (see File Menu) you will need to drag a box around a station of interest. The Quality Control function will display all available data within the geographical selection box.

Workchart popups

Right-clicking on workcharts will allow you to issue specific commands relating to that position on the map. When you do this, a popup menu will appear and you will have the following options that apply to the defined location:

* *Cursor slaving.* If you have multiple workcharts open, cursor slaving causes the geographical location of your cursor to be shown on all workcharts at their correct location. This can be useful for resolving a radar feature and comparing it with other products. Normally this should be set to "off".

* *Recenter map.* Generates a new map that is centered on the geographical location that has been clicked.

* *Marks.* Marks are small "specks" that can be added to the map and referred back to later. You can use Set Mark to save the current location to the list of marks, and Draw Marks to show all marks. Use Clear Memory to erase all stored marks and start again.

* *Add symbol (experimental).* This draws a symbol directly onto the map. Currently only a cloud shape can be added.

3 / File menu

Digital Atmosphere is a tool that lets you create weather charts using current raw data. Therefore, the first thing you need is a tool to get raw data into Digital Atmosphere. We refer to this process as **raw data import**. Once you import data into Digital Atmosphere (via any of the possible methods explained below), the program will continue to retain that data until you perform another import operation. Any new raw data import will replace the existing data.

There are three primary ways to import raw data. Most of the time you will be using Data > Internet Retrieve. This is easiest. When you use this method, the import operation is done automatically and there is no need to run any of the File Import commands. If you are supplying the source data on your hard drive, then you should use the Import Specific File or Import Directory options.

In any case, all raw import source files are treated as read-only and are not modified in any way. Even when you perform a new data import, only the internally converted data is changed out; not the original data file it came from.

3.1. Update all workcharts

This function will attempt to download new data from the Internet and replot any existing data. NOTE: This function has not yet been fully tested.
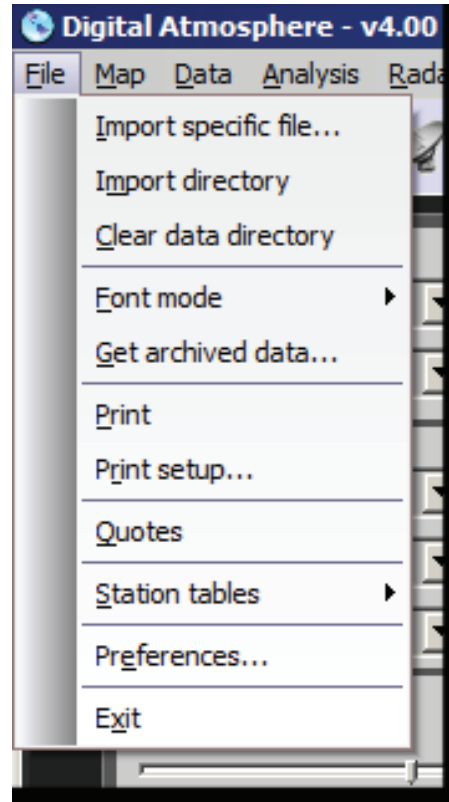
3.2. New workchart

Creates a new window. Use the Map > Generate Workchart option to center it on a new location.

3.3. Import specific file

This option prompts the user for a specific file containing raw observational data (not GRIB or other special formats) to manually import. The file will then be decoded and imported. The data file should consist of text bulletins containing METAR, synoptic, SAO, FD winds aloft, buoy reports, or rawinsonde data. After the data is imported, it can then be plotted or analyzed.

Instead of selecting one file, you may select multiple files (up to 20) by using Ctrl+click to select each file, or clicking on one file to set the start file and Shift+click to set the end file. This is useful for importing multiple data types at a specific time (such as when you have separate METAR, UPPER, and SYNOP data).

3.4. Import directory

This option will manually import all files in the Digital Atmosphere data directory at once. This should consist of standard observational data, not GRIB data or other special formats.

Regardless of the mode that Digital Atmosphere is in (scheduled or manual), this command imports all files contained in the directory listed on the File, Preferences General tab under "Data directory". The data files should consist of text bulletins containing METAR, synoptic, SAO, FD winds aloft, buoy reports, or rawinsonde data. After the data is imported, it can then be plotted or analyzed. This is the command you should use if you want to look view data from several files at the same time.

If you need more detailed information, consult the Appendix for technical information on data import.

CAUTION

Importing a directory means you are importing *every* file contained in it. Avoid importing any directory that contains a large amount of data (generally more than 100 MB), or contains binary files, programs, or other unrelated data. This may cause Digital Atmosphere to crash or lock up, requiring a restart of the program.

3.5. Import GRIB data

GRIB (Gridded Binary) is a standardized format for storing forecast data and is widely used in numerical modeling. It was developed by the World Meteorological Organization in 1985 and revised over the years. Effective with the 2020 V3.3 version released in June 2020, Digital Atmosphere handles GRIB Edition 2 (GRIB-2) data. Previous versions only supported Edition 1, an simpler and obsolete format.

When the Import GRIB Data option is chosen, the Import GRIB Data panel will appear. Within this panel users have a choice of either downloading a GRIB file from the Internet or opening a GRIB file on the local hard drive.

If you intend on opening a pre-existing file, the model type, grid type, and date/time parameters are already set in the file and you can skip down to the Select Data File selection below.

Once GRIB data is loaded, it will persist even if the software is closed and the computer is restarted. The user may return to a new session and continue to select additional fields for display. Although this is convenient, it also means the user may inadvertantly view old data if the data dates are not monitored and nothing new has been retrieved.

3.5.1. Model selection. The first thing the user should do is select the desired model. Possible choices are the GFS (the US global model), the NAM (US regional model), the RAP (US rapid refresh model), and others. Options are not limited to just these models; they can be further customized (see below) if the data is available without a login.

Note that the realtime model data does not go back any further than about 24-48 hours (longer for some sources). If data is unavailable, you will get a 404 error. For older data, you will need to query archival sources such as the NCEP/NCAR Reanalysis project and import the GRIB files manually.

3.5.2. Output grid. It is not practical to have all model data at full resolution, as this would take potentially hundreds of gigabytes. Most model output is provided as a subset based on a limited range of products, a limited set of vertical levels, and/or a coarser grid. In this dropdown box,

select the output grid that you think is best for your purposes. We think it is good practice to specify typical grid sizes in megabytes in order to help forecasters manage their time, so we title each option accordingly.

3.5.3. Forecast hour. Select the desired forecast hour here. Typical values are 00 to 120 hours, or longer for global models. If you're not familiar with a model you should try rounding to the nearest 6 or 12 hours unless you're sure that data exists.

3.5.4. Time tokens. Each model dataset is identified by its "cycle", which identifies the date and time corresponding to the first (00-hour) field. Likewise, most model data online is organized by cycle, and the Internet URL must be structured accordingly for many websites. In Digi-

FIGURE 3-1. GRIB display interface as of summer 2021. Users should work sequentially from top to bottom, first checking that the time tokens are correct (for selecting the right model cycle) and then choose the model. The field is then chosen and after that is available to be plotted after the analysis command is reviewed.

Remember you must click on a field in Step 2, "Select field", in order to populate the Display Field with a suggested analysis command.
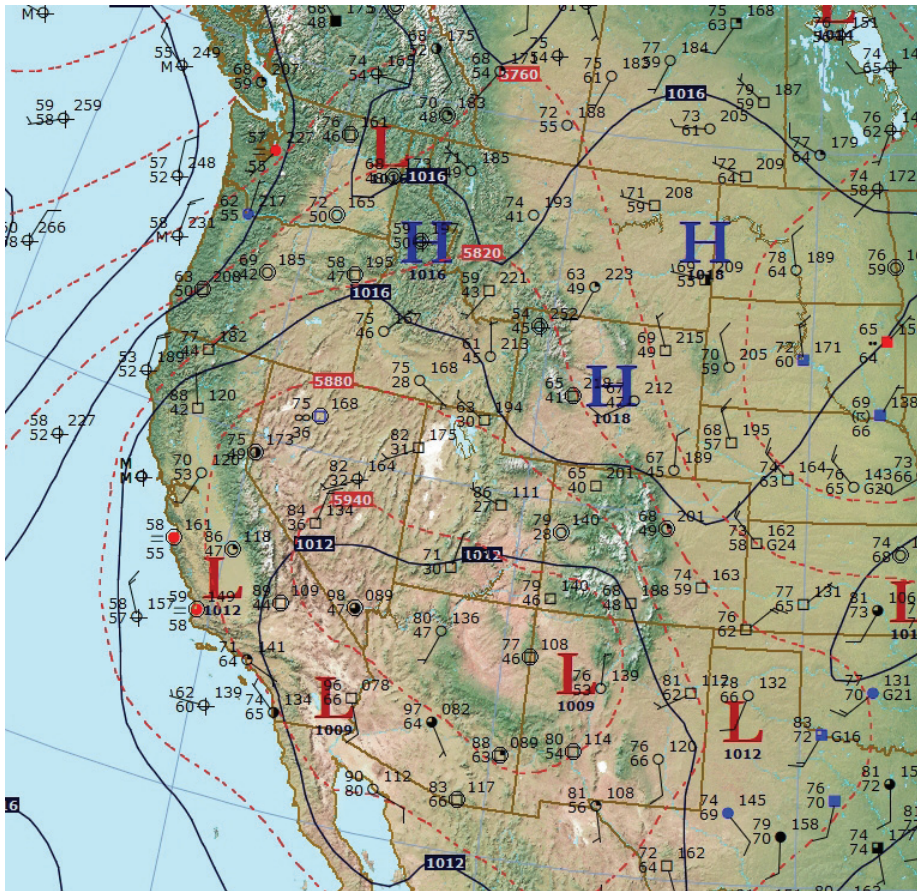
FIGURE 3-2. A combined plot using METAR and SYNOP surface data, together with Canadian GEM RDPS sea-level pressure and thickness from GRIB data. This is plotted on a basemap that uses a planetary terrain map (located under the Map menu). The example shown is for 1800 UTC, July 10, 2021. The combination of METAR and SYNOP data for plots and GRIB for synoptic contours provides superior results over data-sparse areas such as oceans.

tal Atmosphere, we use a series of "template addresses" that use time tokens, placeholders in which values for year, month, day, and hour can be inserted. When the GRIB Import panel is displayed, the time token values are filled in for you based on the system clock date, time, and time zone. You should check the entries to make sure they are correct. It may also be necessary to change the entries to the previous model cycle if data is not yet available and the model forecast run is not complete. You can do all of this in the time token fields.

3.5.5. Download now. When all the information above is correct, you can press the Download Now button to begin the download process. This may take awhile for large datasets. When it is done, continue to "Select Field" below.

3.5.6. Select data file. If you intend on loading GRIB data from a file, you may start with the Select Data File option. You will be asked to choose a GRIB file from disk or the local network. When it's loaded, you can continue below to "Select GRIB Field".

3.5.7. Save this GRIB file to a local file. You can use this open to save a copy of the data in memory to a disk or local network file. This is useful for keeping an archive copy on hand. Note that the entire GRIB file is saved, not individual fields. The program will encourage the use of the "grib2" file extension, but you can choose "grib" or some other extension; the resulting file will be exactly the same.

3.5.7. Select field. Once the GRIB data has been downloaded or loaded from disk, Digital Atmosphere will review it and build a list of displayable parameters, consisting of various combinations of forecast hours, levels, and weather values. Select the desired one for display. For vector fields like wind (UGRD/

VGRD) you can select either component and the vector form will be built and calculated by Digital Atmosphere unless the digatmos.grf reference file is configured to call for a scalar expression.

3.5.8. Display field. An analysis command will be displayed in the text entry box. This is obtained from the digatmos.grf file. It can be further modified by editing the text. For information on analysis commands, see Appendix G, "Analysis Scripting".

Please note that the base field (product) must always be set to GRIB. Do not select fields like SLPR, DWPT, TEMP, etc, as this will cause the analysis routine to look in the observational data files.

Scripting of GRIB data is not yet supported but will be part of the Digital Atmosphere Professional options.

Currently there is no capability to reference other fields in the GRIB file, but we are aware this is necessary and are working on a solution. We expect this will involve a value in parentheses that calls specific values of time, level, and field, such as GRIB(12,500,HGT). Again this is not implemented yet, thus there is no solution for combining fields to produce values such as divergence unless these are already provided as a pre-existing field.

3.5.9. Customizing analysis commands. Default analysis options and titles for various GRIB fields are configured in the **digatmos.grf** file in the Digital Atmosphere working directory. This may be edited by users with a text editor like Windows Notepad. We recommend avoiding the use of word processors like Microsoft Word to edit this file as they may insert extraneous characters and corrupt the file.

In the analysis scripting in digatmos.grf, it's important NOT to specify product types such as WIND, TEMP, etc, as this will override the GRIB data and cause Digital Atmosphere to attempt to refer to observational data files. Always use

GRIB as the product type. Review the examples shown throughout the file for clarification.

3.5.9. Customizing GRIB sources. You may edit, add, or delete GRIB sources in the digatmos.grb file in the Digital Atmosphere working directory. This may be necessary when a product suddenly disappears, as the forecast center may have reorganized their directories. Weather Graphics will occasionally check and update these GRIB sources.

Note that many of the URLs use variables starting with a dollar sign, which are explained at the top of the page. Digital Atmosphere replaces these variables with time data based on the settings chosen by the user in the Import GRIB Data panel.

The titles for each product normally contain a short description of the gridded data, This title is displayed to the user in the Import GRIB Data panel under the Output Grid option. A description, a typical size in megabytes, and a grid size are included. These are purely optional but are strongly recommended to enhance the forecaster's ability to select an appropriate grid.

Note that servers which require a login will not be supported. You may want to browser to obtain such files manually, or use a command-line utility such as wget or curl. The file can then be imported for display with the Select Data File option.

3.5.10. Notes about objective analysis. Note that the objective analysis routine (in File > Preferences > Analysis) does not need to use complex options with GRIB data since there are no data voids. However a small amount of smoothing is necessary since the GRIB grid must be transformed to the Cartesian analysis grid in Digital Atmosphere, and this results in some loss of fidelity.

3.6. Import historical data

This function is designed to directly access the free Historical Data dataset available on the Weather Graphics download page at www.weathergraphics.com/dl . The historical data may be installed to any location, and it will automatically make an entry in the Windows registry that will allow Digital Atmosphere to find the files. For technical users, this entry is HKCU\Software\HistoricalData\InstallPath.

The data consists of converted METAR and SYNOP data for North America, twice daily at 0000 and 1200 UTC, encoded in a highly compressed binary format only viewable with this import function in order to keep the dataset size a reasonable size that can be transferred easily via the Internet, below 1 GB. Due to this large size, only a basic set of meteorological fields are available. For worldwide coverage or data on an hourly basis, the Surface Archives and Upper Archives products at weathergraphics.com are recommended.

SPECIAL NOTE

If you are using a version of Digital Atmosphere dated before January 2019 (V3.10a) or are using a Historical Data release before January 2019, the following applies. The historical data installer must install to the Digital Atmosphere Program Files directory (where digatmos.exe is located). It will automatically create the subdirectories it needs. If it is not correctly installed, no historical data will be viewable. The Program Files directory is displayed in Help > About.

3.7. Clear data directory

This is a utility command that deletes all files in the data folder. It should not be used unless you are seeing corrupted plots after multiple raw data imports.

Clearing the data directory ensures that File > Import Directory does not inadvertently retrieve stray files that were placed there by the user. It can also prepare the data directory in case the user wishes to place numerous files into the directory to be imported.

3.8. Font mode

Text plots (especially station plots) can be plotted in one of two modes: as **Windows Fonts** or as **NMC/NCEP Raster Fonts**.

For most routine program use, users should use the Windows Font choice. In that case, the exact font name and size will be controlled from File > Preferences settings for the workchart style.

The NMC/NCEP Raster Fonts option is highly unique in that it uses character sets implemented in the late 1960s by the National Meteorological Center on their supercomputers. These fonts have been extracted from the FORTRAN code listings and can be used as fonts in Digital Atmosphere. This not only provides "official" looking charts but also provides high-visibility plots that are especially suitable for faxes and photocopies.

3.9. Quality control

If you're a newcomer to meteorology, you'll quickly discover that not all weather data is 100% accurate. Every single batch of hourly observations contains errors. The errors get there because of either transmission problems, communications interference, human error, equipment misconfiguration, equipment failure, or simply the observer hitting the wrong key when typing up the report. In many developing countries, it is still very common for observations to be transmitted over radio or telephone to a central facility where it is entered into a terminal computer, and numerous errors can be inadvertently introduced this way. The errors can either be unnoticable or may corrupt an analysis. Fortunately, Digital Atmosphere provides a tool to help fix the problem.

When you are looking at a chart and see a station reporting bad data, you will need to right-click once just to the top left of the station, then choose "Set QC corner" on the popup menu. Move the mouse to the bottom right of the station and repeat the procedure. Next, click on File, then on Quality Control. You'll see a panel showing all of the meteorological data at that station. Change the values to whatever is appropriate. *Always use a value of -9999 to indicate missing or unusable data.*

* **Accept Entry** — Saves the report as shown, including any modifications you might have made. Once you hit Accept Entry, all changes become permanent.

* **Ignore Changes** — Ignores any changes that you've made to the report and moves to the next one.

* **Delete Report** — If the individual report is so corrupted that you know you won't want to use it, you'll probably want to delete it. This is the button to use.

* **Stop Search** — Stops sifting through the file, saving any values that you've already entered.

Note that QC displays all data within the bounding box (even if it.s filtered out on the map), so you may need to press .Accept entry. numerous times until you find the station you want. One way of avoiding this problem is to make the initial QC box as small as possible so that you get only the station you want.

Since QC changes the internal cached data in Digital Atmosphere, you will lose your changes if you reimport the original source data.

The rule file: A permanent fix

To permanently fix data from a given station, at the main menu select Data > Edit Station Rules. See the Data menu chapter for more information.

3.10. Print

This option will print your currently active map. It's that easy! If you want to make changes in the way that the map is printed, you'll need to use Print Setup, listed below.

CAUTION
Do not print charts with black backgrounds, as this may consume excessive toner or ink.
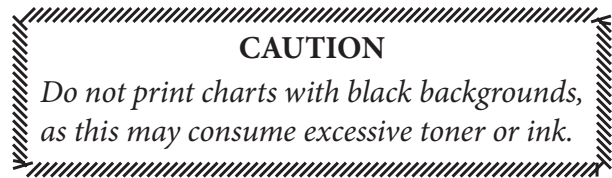
Print sends an exact copy of the screen image to the printer, so if the printouts are too dark or will consume a lot of toner, you will need to change your map settings in Preferences and regenerate new maps, preferably with white backgrounds, then print those. Many PostScript printer drivers will also allow you to set the printer to produce a negative printout.

If the maps are too dark, you should avoid using solid colors. Regenerate your maps without topography or ocean fills. Topography is designed mainly for screen viewing. If you absolutely must have dark maps on-screen and can't force your printer to produce acceptable output (either through File, Print Setup or through the printer's own setup menus), you will need to export the map and then use a photo-editing type graphics program (such as Photo Shop or Paint Shop Pro) to make a negative image or enhancements that allow for better printouts.

If the printer shows memory errors, this means that the graphic you are sending to the printer is too large to fit into the printer's memory. The easiest way to remedy this is to go to File, Print Setup and choose a portrait printout rather than a landscape printout. Another solution is to regenerate your charts without using any color fills or topography (i.e. totally composed of line graphics). The third method of solving a memory problem is to use a lower resolution (i.e. choose 600 dpi rather than 1200 dpi, or 300 dpi rather than 600 dpi in your printer setup). With older printers such as the HP 4 it is essential to increase the amount of RAM by installing a SIMM memory module. This requires a minimum of 2 MB of RAM, but

due to the cheap price of memory 16 MB is recommended.

Around 2003-2005 some users reported problems printing to HP LaserJet and a couple of other printers (such as getting blank pages). This is usually a problem with the Windows PCL 5 print driver and is beyond the control of Digital Atmosphere. Solutions that have been documented are changing the resolution from 600 to 300 dpi or change the print mode from "vector" to "raster". If your printer is equipped with a PostScript option, always use the Post-Script mode for 600-dpi printing. Overall, this printing problem is not specific to Digital Atmosphere and may occur with other applications that make extensive use of the PCL driver. Also note that for some HP printers, PCL 6 fixes the problems.

3.11. Print setup

This function is used for specifying how you want your printer to print maps. These panels will vary based on what type of printer you are using. One option that is useful for some printers is the "Graphics Resolution". When you lower this value, it will help you send extremely detailed charts to printers that keep producing "out of memory" errors or blank pages.

3.12. Calculator

Do you need to find a wind chill value? Mixing ratio? Theta-e? No problem. Digital Atmosphere's meteorological calculator lets you plug in values and find a result.

A very important note about pressure — when you are asked for "Actual Pressure", this indicates the actual pressure of the parcel. This is station pressure as a mercury barometer would observe it, not sea-level pressure or altimeter setting (which are corrected to sea level). If you're computing a surface-based parameter at a high elevation, you can find

"actual pressure" by simply calculating "Station Pressure (mb)".

An example: In Denver, Colorado, your elevation is 5300 ft and the pressure is 29.96 inches. This yields a *station pressure* or *actual pressure* of 834.8 mb. You can then use this value in calculations which ask for this information.

3.13. Warning status
(Under development)

3.14. Live chart retriever
(Professional version only)

This module retrieves weather from over the Internet and sends them automatically to your printer. Please note that supported filetypes are limited to GIF, JPEG, PNG, and TIF. There is no support for animated files or dynamically generated URLs.

To use this module, open the Chart Selection Menu and set a checkmark next to each chart you are interested in. Then close the menu and click Activate Retriever. The red square around the dog icon will turn green, indicating the retriever is active.

Charts will be sent to the printer shown in the Printer section. You can also control the startup behavior here to indicate whether you want the initial set of charts printed. The status of the retrieval jobs will be shown in the next three windows, "products queued for polling", "retriever engine status", and "preview of last downloaded product".

To add or edit products in the Chart Selection Menu, use the INSERT and DEL key to add and delete rows, respectively. Expert users may directly edit the digatmos.dfz file in the Digital Atmosphere working directory to make any complex changes.

3.15. Station tables

When you import weather observations, Digital Atmosphere refers to a special, internal listing of all of the weather stations. Starting in 2010 the storage format for this table was extensively revised and updated, and organized into a structured format called the Master Location Identifier Database (MLID). It uses the latest identifier updates from the FAA, ICAO, and WMO.

After several years of development, the MLID was added to Digital Atmosphere in December 2014 with Version 2.12. The old format (where ICAO appears in Columns 1-4) is no longer supported.

Some users may prefer to delete stations or add unofficial observing stations from their own network which report in METAR or SYNOP. Users may directly edit the Master Location Identifier Database, but this is not recommended because it is designed to be overwritten when Digital Atmosphere or the MLID version is updated. To keep your changes from being lost, we are implementing an "overlay file" solution. This is a file that Digital Atmosphere uses to modify the MLID listings after it has been loaded. Your overlay files can be kept permanently without fear of loss, allowing you to use any version of the MLID with a permanent set of changes.

Editing the overlay file

(Under development -- this has not yet been added but is a high priority item)

Load the overlay file into any text editor. If you don't have one, follow the format in the digatmos.lid file as a guide. Column 15 is used for signaling whether a row in the overlay deletes something in the master station list or adds/replaces a station.

* **Delete a station**: in column 15, enter DEL or DELETE and signify the identifier that is to be removed. It will be searched for in MLID column 16 (ICAO), 19 (FAA), or 22 (WMO). No other data needs to be entered.

* **Add a station**: in column 15, enter ADD. Make the appropriate entries throughout the row. Note that column 16, 19, or 22 will be used by Digital Atmosphere to obtain the identifer, not columns 10-14.

3.16. Check for updates

Checks the Weather Graphics site to determine if a newer version of Digital Atmosphere is available. If so, the user will be asked if they would like to go to the download page.

3.17. Preferences

Here's where you set your preferences for how the program will operate.

For more information on each Preferences item, please consult the chapter at the end of this manual, titled "Preferences Settings".

3.18. Exit

Exits Digital Atmosphere. The background map will be saved and it will automatically appear the next time you run the program. For many dialog boxes that were open, the directory they used will be memorized. The last data set you imported will continue to be available.

4 / Map menu

The map manu is used to control functions relating to the geographic and graphical display of information in the workchart.

4.1. Erase map

Before you make annotations, plots, or contours on your map, Digital Atmosphere retains a copy of the original map image in case you want to start with a blank slate. Use this command whenever you want to erase weather data from the map.

4.2. Load map

Loads a workchart from your disk drive. You will need a previously-saved workchart (which can be saved using the Save Map command). Load Map loads images that are Windows bitmaps (filename *.BMP), and it also expects to load a map attribute file with the same name (*.ATR), which contains data about the image's latitude, longitude, and zoom setting.

If this map attribute file is not present, you will get an error. This is why you cannot substitute a BMP satellite photo as a map, unless you've already created an corresponding binary ATR file that contains the proper attribute settings valid for that photo (not a job for the fainthearted).

4.3. Save map

Saves the workchart for future access within Digital Atmosphere. This *also saves any markings, annotations, weather data, and contours that are on the map already as a permanent part of the map*, so if you intend to load this map later without any weather data, you'll need to use the Erase Map command to get rid of the data *before* you save it. Save Map produces one image file (a Windows bitmap, *.BMP) and a very small map attribute file (*.ATR). The ATR file is necessary to load the map into Digital Atmosphere and should stay in the same directory as the BMP file.
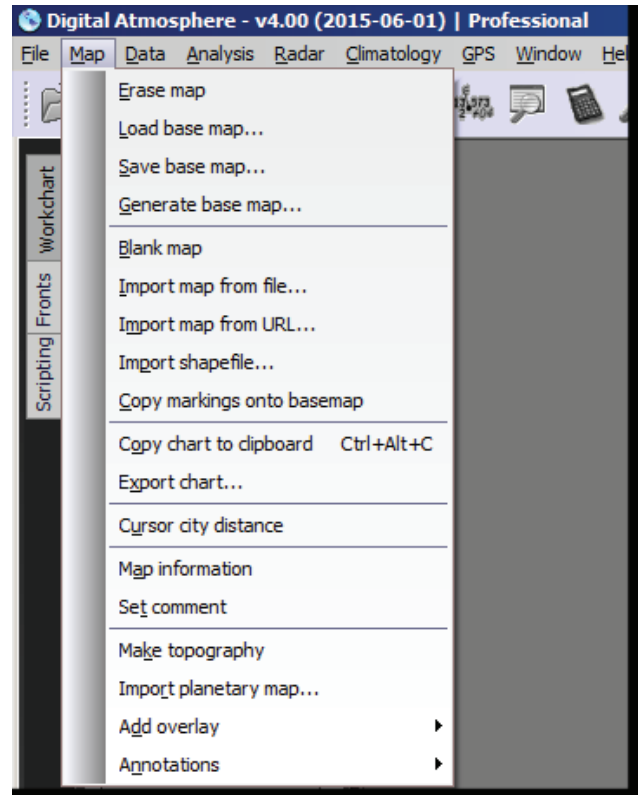
An important consideration is that only Windows bitmap (BMP) files can be saved, and they are rather large. File sizes can range anywhere from 300 to 700K in 8-bit color mode to 2.5 megs in 24-bit color mode. So avoid saving too many unless you have plenty of disk space. If you're using on-the-fly disk compression (such as Stacker, DoubleSpace, DriveSpace, etc), these images will take up about 80% less disk space than they do when uncompressed.

Once the *.BMP file is saved, you are free to use any graphics editor to tweak or annotate the image. Note that you must re-save it as the same type of graphics format it was in (a BMP with a color depth of 24 bits), or Digital Atmosphere

may produce an error when it attempts to load the image.

4.4. Generate map

There are three ways to generate a map. The easiest method is to use the "Generate map" dropdown box on the speed button toolbar and pick a country or continent. For those that want more accuracy, these two selections will provide greater control of map generation.

Enter station

If you know the station that you want to center you map on, you can simply enter it here.

* *Station*. Enter an ICAO code, WMO code, IATA code, or partial station name.

* *Map width*. Sets the width of the map in miles.

* *Map size*. Allows you to specify how many screen pixels wide and tall you want the map image to be. You may also wish to choose one of the map size quick-pick buttons. If you want an exceptionally detailed image, you may want to choose one of the higher settings. The 1550 x 1150 size yields excellent printed maps that are suitable for publishing. If this image size is larger than the screen, you will be provided with scroll bars to roam around the image. However, note that large maps place a burden on your computer's resources, and too many large maps open at the same time may cause warnings or errors. Avoid setting sizes larger than 2000 pixels.

Enter lat/long

This is a powerful tool that replaces the map contained within the selected workchart with another map. Once you choose this command, you'll see a settings panel appear. This is where you choose how your map should look. All maps are generated using an orthographic ("satellite view") projection.

* *Latitude*. Sets the latitude for the center of the screen in degrees.

* *Longitude*. Sets the longitude for the center of the screen in degrees.

* *Scale*. Sets the width of the map in either miles or kilometers.

* *Image width / image height*. Allows you to specify how many screen pixels wide and tall you want the map image to be. You may also wish to choose one of the map size quick-pick buttons. If you want an exceptionally detailed image, you may want to choose one of the higher settings. The 1550 x 1150 size yields excellent printed maps that are suitable for publishing. If this image size is larger than the screen, you will be provided with scroll bars to roam around the image. However, note that large maps place a burden on your computer's resources, and too many large maps open at the same time may cause warnings or errors. Avoid setting sizes larger than 4000 pixels unless testing shows there are no problems.

* *Set auto height*. This forces the image height to conform to the aspect ratio of a printed page; either letter or ledger, so that you can be assured it fills the printed page. The use of the margin (normally 0.25 inches) will change the aspect ratio slightly.

* *Color style*. The newly created chart will use the color scheme selected here (see Preferences > Styles) and the Preferences chapter.

* *Location quick-pick*. Click on any of these buttons to automatically set an appropriate latitude, longitude, and scale for a commonly-used region.

* *Zoom quick-pick*. Click on any of these buttons to automatically set a map scale based on a meteorological scale type. Global scale sets a width of 8300 nm, synoptic scale 4000 nm, subsynoptic scale 3000 nm, meso alpha scale 1500 nm, meso beta scale 700 nm, and meso gamma scale 200 nm.

4.5. Blank map

Creates a workchart with no background map. Projection data from the last workchart is used.

4.6. Import map from file

This option imports a graphic from an image file, replacing the existing map graphic.

IMPORTANT: Map positioning will remain unchanged, because there is no practical way to read the map and estimate lat/long and projection information. This option is designed to be used for very special cases, such as when you have carefully matched up a Digital Atmosphere base map with a pre-existing satellite image and wish to load the satellite data in.

4.7. Import map from URL

This imports a map from an Internet URL, similar to "Import map from file" above. The same caveats apply.

4.8. Import shapefile

Imports map data from a shapefile, which is a geospatial vector data format. Using Internet searches you can find all kinds of useful geographic shapefiles for your area that may be applicable to your forecasting work (power grids, FAA center boundaries, and so forth). It is important to remember that shapefiles (.shp) are always paired with a database file (.dbf) and

index file (.shx) of the same name, and they need to reside in the same directory as the shapefile.

Also the shapefile must use latitude/longitude coordinates. UTM or E00 coordinates are not accepted.

When you import the shapefile, you will be shown an attribute selection dialog, which is necessary to tell Digital Atmosphere which fields contain the latitude and longitude information. Here you can also set the color of the line to be drawn. In most cases you can leave all the drop-down boxes to their default positions "(none)", but with some files you may need to override this to indicate which fields contain the data.

You may also fine-tune your display by choosing to display only shapes that have specific attributes, such as in the case of a shapefile of NWS warning areas, you may only want to display a shape where WFO equals OUN, so that only the Oklahoma City warning area shows on the map. Or you may want to use this in a shapefile of road data to make different kinds of roads appear differently. This is done in the Attribute Selection Dialog under the "Plot Specific Features Only" panel. Choose the attribute, the operator (equals or does not equal), and the desired value. If you're unsure what to pick, open
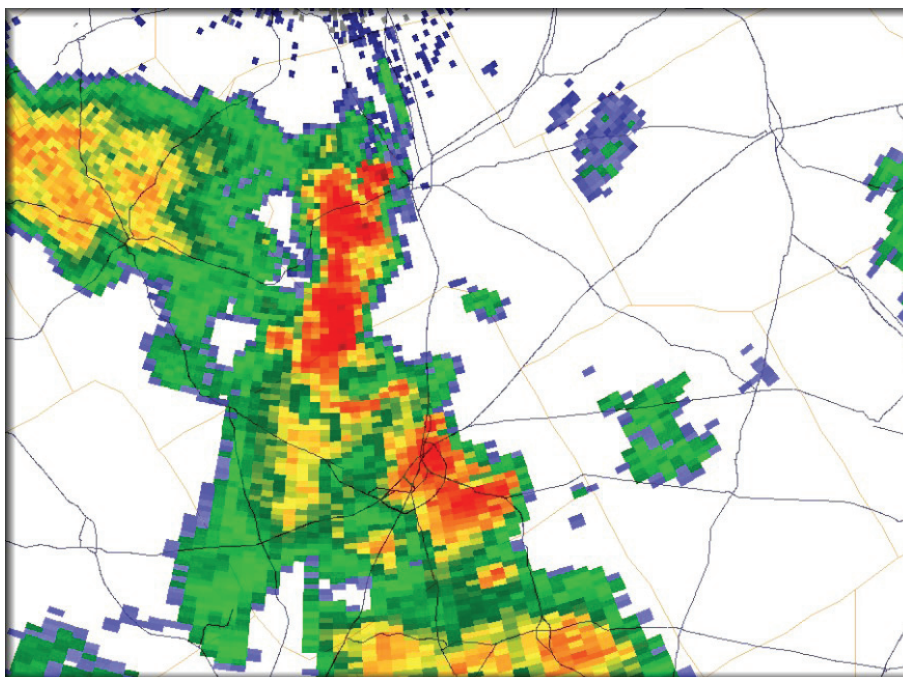
FIGURE 4-1. Road overlays (dark lines) from 2010 US Census Bureau TIGER/Line shapefiles, combined with radar imagery. These shapefile datasets can downloaded from the following link (be sure to unzip all files before trying to import them): http://catalog.data.gov/dataset?res_format=shapefile

the shapefile DBF file in an editor that handles .dbf format (Microsoft Excel is good for this) and examine the rows.

Since the shapefile drawing process is somewhat slow with larger files, we encourage you to use "Map > Copy Markings Onto Base-map" after you're done, so that they remain part of your workchart even after you erase the data.

Shapefiles can be obtained from many sources, including the US Census Bureau, state geological and natural resource agencies, and other government agencies. If they are zipped, always be sure to unzip them into a directory first before attempting to import them; the ZIP packages will not be recognized.

4.9. Copy markings onto basemap

If you choose this option, absolutely all markings, plots, and data becomes part of your basemap permanently, even if you choose Erase Map. The markings will persist until you replace it with a different map through a Load Map or Generate Map operation.

4.10. Copy chart to clipboard

This is the easiest way of transferring a workchart to another software program. When you choose this, the workchart is placed in the Windows clipboard. From there, you can paste it into any of your favorite graphics programs.

4.11. Export chart

This command is exactly identical to Save Map, except that no map attribute file (ATR) is saved. Therefore it is designed for your own projects, presentations, or reports. The output format can be selected under "Save as type". Default JPEG compression settings can be altered in preferences, under File > Preferences > Map.

Here are the different supported filetypes. Since Digital Atmosphere produces graphics that are similar to monochromatic line art, non-lossy formats will always give the best results.

* *GIF (Graphics Interchange Format)*. Non-lossy format that produces the smallest file. This is often the best choice for saving charts.

* *PNG (Portable Network Graphics)*. Non-lossy format similar to GIF; good compression.

* *JPG (JPEG/Joint Photographic Experts Group)*. Lossy format that yields excellent compression, but is not as crisp. The most widely used format.

* *BMP (Windows bitmap)*. Non-lossy format native to Windows. It does not work well in browsers and produces bloated filesizes; creates 24-bit files (may not be suitable with very old programs which expect 8-bit BMP files).

4.12. Cursor city distance

If this is enabled, the nearest city, direction, and distance will be shown corresponding to the geographical coordinates at the cursor location. This only works in the United States. CPU load may increase slightly while this is enabled.

To disable Cursor City Distance, click this option again so the menu checkmark disappears.

4.13. Map information

Displays detailed information about the map currently shown. Included is the map width and height (in both pixels and nautical miles), the center latitude/longitude of the map, and the corner latitude/longitude points. All negative latitudes indicate the southern hemisphere, and all negative longitudes indicate the western hemisphere.

4.14. Set comment

Users may enter a plaintext comment here to be prepended to chart titles. These titles are normally placed in the lower right side of each workchart when a product is generated. The comment is only valid for the Digital Atmosphere session and will be set to null when the program is restarted.

4.15. Make topography

Renders a topographic representation (terrain features) of the Earth on your map projection. After the topography is drawn, Digital Atmosphere then re-overlays the basic geography data. The topography draw operation may take a few minutes on slower computers.

Note: as of 2018 we recommend the use of a high-resolution planetary map (next section) instead of "Make topography" as this will achieve much better results.

4.16. Import planetary map

Imports a special image (JPG, GIF, or BMP; JPG is preferred) which provides a topographical or thematic depiction of the entire earth (Figure 4-2). The source file must provide an equirectangular projection, also known as plate-carrée (Figure 4-3). The top edge must represent 90°N, the bottom edge 90°S, the left edge 180°W, and

FIGURE 4-2. Sample of a planetary map with built-in vector basemap (brown borders and coastlines) overlaid.

FIGURE 4-3. The equirectangular, or plate-carée projection, must be used in Digital Atmosphere's planetary maps feature. Note the 1:1 proportion between meridians and parallels throughout the entire map, with no distortion or stretching of the graticule at polar latitudes.

Plate-Carrée Cylindrical Projection
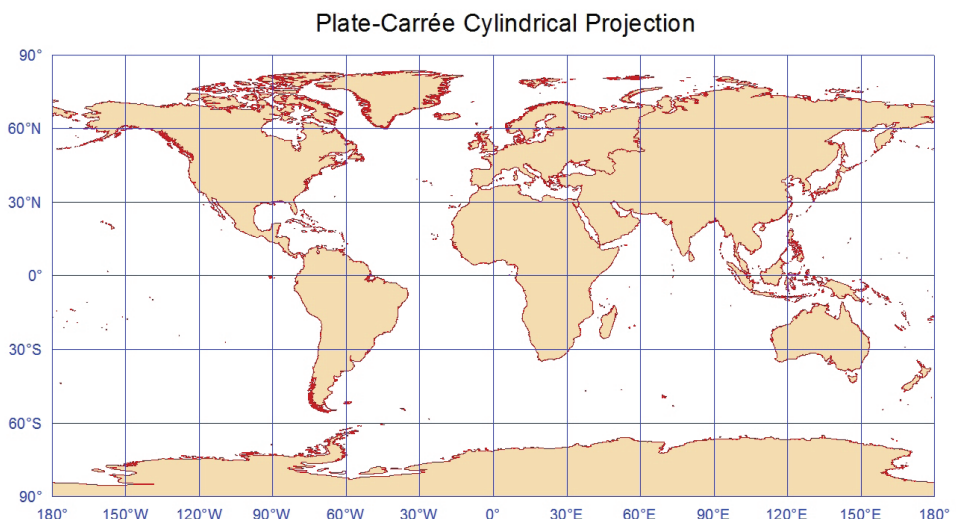
the right edge 180°E, with no margins. There-fore, for an image with a width and height of x and y pixels, respectively, 45°N must appear at $0.25y$, the Equator at $0.5y$, and 90°W at $0.25x$. When properly imported, this graphic will be mapped correctly onto the active workchart. Since it is processor-intensive, the procedure will normally take a few minutes to complete.

The advantage of planetary maps is they can use information from a wide variety of sources, such as vegetation, land color, geology, and so forth. Numerous sources for planetary maps may be found on the Internet via image search using terms like "equirectangular earth" or "earth texture". A resolution close to 16000 x 8000 will give optimal results. When using search engines, use image search and the search tools to specify the resolution. Images of less than 4000 x 2000 pixels are not sufficiently detailed and should be disregarded.

It is essential to visually inspect a new planetary map to make sure the creator did not use Mercator or some other format. A non-equirectangular projection is often indicated by "stretching" of the map content near the top of the map in a northward direction. In a correct equirectangular projection, Greenland will have a squashed look, appearing almost twice as wide as it is tall, whereas with the inappropriate Mercator projection it will appear taller than it does wide. Also, test any new planetary maps with the built-in vector map data using Add Overlay > Basemap. If the vector data does not match the graphic image, it indicates a problem with the source planetary image or an improper projection.

IMPORTANT: *Remember that to make this overlay permanent you must use Map > Copy Markings To Basemap. You should then save the basemap for later use.*

4.17. Add overlay

The overlay options allow you to add additional geographic datasets as follows:

City overlay format

For city overlays, you will need to define the cities you want drawn by editing the file DIGATMOS.CIT with any text editor. The columns used are as follows:

```
1-2     Latitude of city in degrees
3-4     Latitude of city in minutes
5       N or S latitude sign
7-9     Longitude of city in degrees.
10-11   Longitude of city in minutes.
12      E or W longitude sign
14-33   Name of city as you want
         it to appear
```

The DIGATMOS.CIT file contains some default cities that are formatted per the above specifications, which you may find useful to refer to as a template when adding new cities.

---

* *Basemap*: Redraws the workchart basemap without erasing the contents of the workchart.

* *Point*: Overlays a specified point on your map. You can also load or save a point plot list.

* *City*: Overlays predefined city marks and labels onto your map as a reference (see table in margin for formatting and location).

* *County outlines*: Overlays United States counties, parishes, and certain city border information.

* *County names*: Overlays the names of the counties. The names are truncated according to the zoom factor so that they fit within the county.

* *Highways*: Overlays United States interstate highways onto the map.

* *Secondary highways*: Overlays United States U.S. and state highways onto your map. This is a detailed process and may take a few minutes depending upon your computer.

4.18. Annotations

* *Change credits*: (Under development)

* *Change title*: (Under development)

5 / Data menu

Before you use any of these commands, you will need to make sure there is an active Internet connection. Note that Digital Atmosphere has only very limited support of proxy servers, so if you encounter problems, you'll have to use a regular browser to obtain the data, then save it and import it manually into Digital Atmosphere, or script it with a specialized web download utility such as wget.

If you are new to using the Internet and need some basic information, see the section on getting data at the end of this manual.

5.1. Retrieve data

This module retrieves alphanumeric data through the Internet and saves it to your hard drive. When the data download is completely finished, Digital Atmosphere will import the data for you. This means you can immediately begin plotting and analyzing.

To use Retrieve Data, you must have a connection to the Internet. If you can't get any of the download links to work, firewalls and antivirus programs might be blocking Digital Atmosphere. Make sure Digital Atmosphere is running and check Windows under Control Panel > Windows Firewall > Allow A Program > Allow Another Program and find Digital Atmosphere in the list and Add it. If you have a proxy server, enter any necessary proxy host information in Preferences > Misc. Also check your system time and time zone, since some of the product URLs are date-time dependent.

When you select Retrieve data, you will be presented with a dialog box containing a list of weather data products where you can check off the items you want to download (see illustra-

tion) from a product list. Normally you will only choose one or two products. A common favorite is METAR data from Albany.
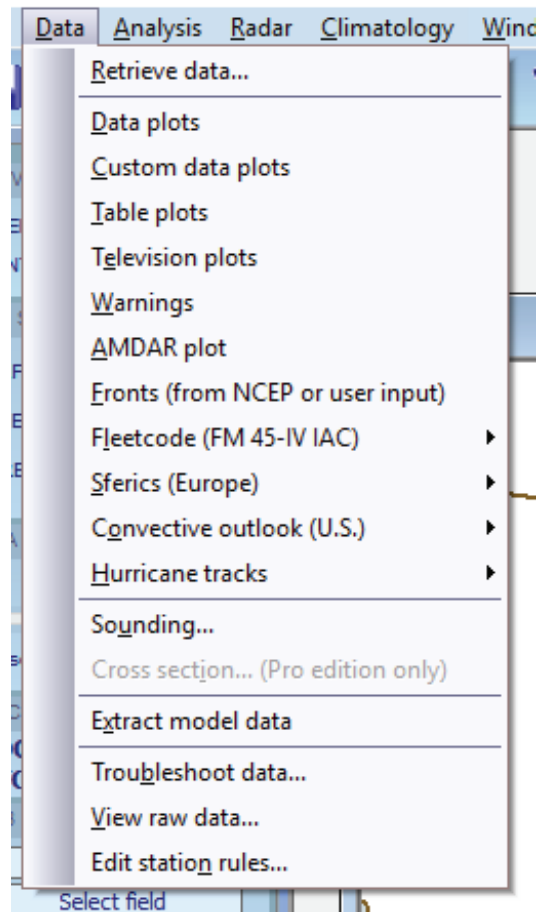
Once you press Retrieve, the chosen products will be downloaded and stored in your data directory. Then you can use File, Import Directory to see the results.

Since Internet sites often change, you can fully edit the list of products and data directly from this dialog box by highlighting the item you wish to change and clicking the Edit Site button or the Delete Site button. You can also add a new site by clicking the Add Site button. You will then be prompted to enter the site name and URL for the data.

Many sites, especially for surface and upper air data, have a filename that is dependent on the Greenwich Mean time of the observation. Digital Atmosphere lets you insert five-character

groups known as "time tokens" into a filename. Digital Atmosphere will substitute these groups with time data. For example, if data for 0400 UTC exists at the following URL:

  http://www.data.com/04data.txt

Then use the following expression to obtain that data:

  http://www.data.com/@HHHHdata.txt

Digital Atmosphere supports rounding of time down to intermediate, synoptic, and radiosonde hours. Also time may be subtracted up to 24 hours. Note that rounding is done first, followed by subtraction.

Note that any rounding and time subtraction operations must be applied to all of the time tokens (year, month, day, hour, etc) for that URL as they are processed individually.

Here is a complete list of time token combinations (revised in January 2023):

```
Character 1 - marker
@   Character 1 is always an "at" symbol.  Four
      more characters follow as shown below:


Character 2 - mode
Y   Year (UTC, two digits)
M   Month (UTC, two digits)
D   Day (UTC, two digits)
H   Hour (UTC, two digits)
N   Minute (UTC, two digits)


Character 3-4 - time (after any rounding down)
-   If each character equals Character 2 then
      do not modify the time
01  Subtract 1 hour from the specified time
02  Subtract 2 hours from the specified time
03  Subtract 3 hours from the specified time
06  Subtract 6 hours from the specified time
12  Subtract 12 hours from the specified time
24  Subtract 24 hours from the specified time


Character 5 - rounding down
-   If character equals Character 2 then
      do not round down (use system clock)
X   12-hour rounding (Radiosonde hour)
      (rounds down to 00 or 12 UTC)
S   6-hour rounding down (Synoptic hour)
      (rounds down to 00, 06, 12, or 18 UTC)
I   3-hour rounding (Intermediate hour)
      (round down to 00/03/06/09/12/15/18/21)


Examples
@HHHH   Use the latest hour
@HHHS   Round time down to 00/06/12/18 UTC
@H12S   Round time down to 00/06/12/18 UTC
```

```
        then subtract 12 hours
```

Although Digital Atmosphere automatically figures the time tokens for you based on the system clock, you may need to override them. This is useful if you want to see data for earlier hours. All you have to do is change the numbers that are displayed in the time token panel.

* *Solving incorrect time problems*. If the time tokens always show a slightly incorrect hour, check your Preferences menu under the General tab and make sure the "Daylight Saving" checkbox is marked in accordance with whether daylight savings time is in effect. If the hours are significantly off, go to your Windows control panel, look under Date/Time, and make sure your computer is set to the correct time zone. Then make sure your system clock is set to a current time which is valid for that time zone. For example, if you live in New York and typically have your computer clock set to Greenwich Mean Time, you will have to set the Windows time zone to "GMT" rather than Eastern Time.

* *Solving access problems*. Digital Atmosphere must have access to a regular Internet network (Winsock) in order to retrieve data. If for some reason you can't retrieve data through Digital Atmosphere, all is not lost. You can still use your Internet browser to get products, then save them to your Digital Atmosphere data directory. More adept users can use retrieval utilities like wget (http://gnuwin32.sourceforge.net/ under Packages and WGet) to script the download of data and call Digital Atmosphere to import it on startup using a script.

* *Technical tip*. Do you want to swap data product lists with other users? No problem; we've made it easy. Simply give them a copy of your DIGATMOS.URX file (it's in your Digital Atmosphere Application Data directory; see Help > About). If they replace their DIGATMOS.URX file with yours, they'll get your list of data products. We sometimes revise the DI-

GATMOS.URX file to give users the latest set of data products, so be sure to save a backup copy.

Be aware that if you edit the file directly, columns 5-9 are not generally used, except if it is set to MADIS it will be expecting binary MADIS data. Do not set it to this value for plaintext MADIS data; we use MADXX for this purpose. An ANTAR code was used before 2019 V3.10b to signal SSEC Antarctic data, but this has been dropped as the data source is no longer active.

5.2. Data plots

This option is provided near the top of the menu, since it's one of the functions you'll be using most. What it does is draw **station plots**, which are symbolic representations of the weather data at each station. You can check on how they are currently laid out and modify their appearance in the File > Preferences section.

If the station center represents sky condition (the default preference), a red station plot indicates instrument flight rules (IFR), which means the ceilings are below 1000 feet and/or the visibility is below 3 miles. A blue station plot indicates marginal visual flight rules (MVFR), meaning the ceiling is below 3000 feet and/or the visibility is below 5 miles. These colors are good for helping you visualize areas of low ceilings and visibility at a glance.

To "fix" bad data, use the Quality Control function (described in the File chapter). To permanently fix data from a station, edit the Station Rules (see Data > Edit Station Rules).

You may also prioritize any station for display on the map in the Station Rules above. The data crowding function (explained in Main Menu > Control Toolbar) will omit certain stations to prevent them from cluttering up other stations, but by setting a station rule you may require that the desired station is always plotted.

5.3. Custom data plots

You can use this to plot custom datasets on your screen. These can originate from Digital

Atmosphere's Climatology module or from your own sets of data. The density of these graphical plots is determined by the settings in Preferences, Station Plots.

The source file for custom data plots is *always* CUSTOM.DAT, located in your Digital Atmosphere directory (even if the source of data is climatology). Here is an example of what the format looks like:

```
APR LOWEST PRESSURE
US AL:Bir 722280    33.567    -86.750    2951
US AL:Hun 723230    34.650    -86.767    2946
US AL:Mob 722230    30.683    -88.250    2956
US AL:Mon 722260    32.300    -86.400    2957
```

The first line is used as a map legend title, and the lines following that are actual data groups. The columns must be organized as follows, and data must be left-justified into its respective column or it will not plot (i.e. putting a latitude in columns 23-25 will not work, but it will if it is shifted to column 21-23).

* *Column 1-10*: City name (not used at this time; you may omit it)

* *Column 11-20*: WMO block (not used at this time; you may omit it)

* *Column 21-30*: Latitude in decimal degrees (not minutes or seconds; negative is south hemisphere)

* *Column 31-40*: Longitude in decimal degrees (not minutes or seconds; negative is west hemisphere)

* *Column 41-50*: Data value at this location

5.4. Table plots

You can use this to plot data from table-based plaintext sources. It is first necessary to write a template in digatmos.tpl.

See Appendix K, Tabular Data, for more information. This functionality was developed to allow importing of Australian data.

5.5. Television plots

"Television plots" are large, simple displays - similar to what you might see on television - of the temperature at predefined cities. Each plot is made up of a temperature value and a city name. The use of Celsius or Fahrenheit is controlled in File, Preferences under the Meteorological tab. The font is controlled in File/Preferences under "Fonts", and the color is specified by the setting on the "Maps" tab under "Plots, text, and contours".

The television plots are controlled by the file DIGATMOS.PLL. It contains an ICAO and WMO that correspond to the city (either may be left blank). There can be up to 500 entries. The format is as follows:

```
Column 1-4        ICAO of the station
Column 6-10       WMO of the station
Column 12-61      City name
```

5.6. Warnings

(Under development)

Overlays National Weather Service flash flood warnings, winter storm warnings, severe thunderstorm warnings, tornado warnings, severe thunderstorm watches, and tornado watches. You must have original National Weather Service warning bulletins on your system and stored in your data directory. The directory and import mode specified in Preferences, Ingest method is critical to finding the warning files.

— **If Normal Import Mode is on**, Digital Atmosphere will look in all files in the Manual Import Mode Data Directory to locate warnings (make sure it is set correctly).

— **If Automatic Import Mode is on**, Digital Atmosphere will look only in files meeting the filename convention used by EMWIN (e.g. WSW*.*, FLW*.*, FFW*.*, SVR*.*, and TOR*.*). If you are not using EMWIN but are in automatic mode, simply name your data file TORN.TXT.

Once you see the warnings on the screen, you can view the text for any of the warnings by right-clicking on or near the county and choosing "Identify Warning". Do not display multiple screens with warning data if you intend to use Identify Warning.

There may be some warnings that Digital Atmosphere is unable to process, most likely due to unusual text formats. It's always best to use the overlay as a first-guess, and if you have a critical need to study the current warnings, refer back to the original data files that you captured. If you find a warning that doesn't plot correctly, please pass it on to me (preferably via E-mail) and I'll adjust the program to plot it (and others like it) correctly.

5.7. AMDAR plot

(Under development)

5.8. Fronts

This option allows plotting of georeferenced fronts, highs, and lows. The features are georeferenced, therefore you can always plot them later even if you zoom in or quit the program. You will lose your frontal depictions if you again create a depiction or if you import original ASUS1 data.

Using original sources of data. Raw sources of data consist only of the ASUS1 KWBC numerical text bulletin produced by the National Weather Service (covers the North American region only). This bulletin must have been imported and found with its headers intact before it can be plotted. The bulletin is usually found on Unidata servers under data/surface/front or a similar directory, or by the bulletin header name itself. A couple of links are provided in Digital Atmosphere's Internet > Retrieve Data window, which should be used if possible.

If you prefer to create your own frontal analysis, use the "Fronts" tab on the control toolbar on the left side of the screen (see Chapter 2, Control Toolbar).
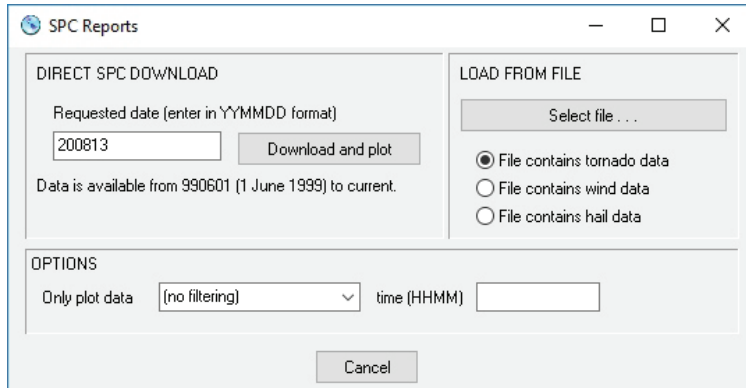
FIGURE 5-1. SPC Reports, added in 2020.

5.9. Fleetcode

Imports FLEETCODE format data. It produces graphics like those shown below. All fronts and isobars are plotted as spline curves, and due to the limited resolution of the data they may not display optimally. There is no way to alter how a spline plots except to change the scale of the workchart.

To the author's knowledge, FLEETCODE data is produced only for Europe. It comes in under the ASXX21 Family of Services header. One source ready for use is provided in the default Internet tables.

5.10. Sferics

Downloading of SFUK/SFLOC lightning strike data is no longer supported in Digital Atmosphere due to the UK Met Office withdrawing the SFUK bulletin from public access, citing Resolution 40 restrictions. The data will only be viewable if a disk files with sferic data is being used.

Europe's primary lightning network consists of five stations in the UK, one in Cyprus, and one in Gibraltar. The stations listen for static and use triangulation of the time delay to pinpoint the location. This is encoded to the nearest half-degree, yielding a resolution of about 40 km. The commonly-available British bulletin (SFUK) has a domain of 40W to 40E and 30N to 70N. The time period for each bulletin is 30 minutes, and a new bulletin is generated every 30 minutes. The SFUK is based on the WMO FM 32-I SFLOC code form but is adapted under a national variation. The British Met Office does

have a new system online that can pinpoint lightning within 100 meters, however this data is not publically distributed. Contact the Met Office if you need access to this data.

5.11. Convective outlooks

This option plots convective outlooks (thunderstorm forecasts) issued by the National Weather Service's Storm Prediction Center (SPC) in Norman, Oklahoma. These are centralized human-produced forecasts issued several times a day, and are used to help provide guidance to National Weather Service forecast offices. They are also used frequently by storm chasers, pilots, and hobbyists.

To use this option, you must have imported a convective outlook as part of your raw data set or from one of the choices in Internet > .

Advanced users can modify the color scheme by changing the contents of the file DIGATMOS. CCC in the Digital Atmosphere directory using a standard text editor such as Notepad (never use a word processor such as Microsoft Word or you will corrupt the file). This file contains self-explanatory instructions for modifying the hexadecimal numbers used to determine colors of the various threat boundaries.

If there are any problems ingesting a bulletin, the problem is most likely an error in the composition of the bulletin. It is not necessary for the header to be intact, but the "STORM PREDICTION CENTER" title must appear in the bulletin along with the convective outlook type,

valid times, and standard bounding locations of each threat area.

5.12. SPC reports

This plots reports of tornadoes, hail, or significant wind (50 kt or greater) received by the NOAA Storm Prediction Center in Norman, Oklahoma. Tornado data appears on the map as red squares, hail data appears as green diamonds, and wind data appears as blue circles. Valid dates are anytime from June 1, 1999 to the current calendar date.

For most cases, the user should choose "Direct SPC Download" to receive the data direct from SPC. Simply enter the date in YYYYMMDD format in the "Requested Date" box. This is in local time and spans 1200 UTC of the morning of interest to 1200 UTC the following morning. Data for the current date is usually updated to within the past 10 minutes. There are some gaps with older historical data, so you get a 404 "not found" error with some dates. You can visit the SPC Storm Reports website to verify the date is missing.

For saved files on the local hard drive, users may select "Load from file". It is important to also select which type of bulletin is being imported, since this information is not provided in the rows or columns. Failure to do this will result in the wrong type of plot on the screen.

Before the data is selected, you may also filter the SPC reports by time in the lower panel, "Options". If you choose "before", only data before the HHMM time will be plotted, and if you choose "after", all data after the time will be plotted. All other data, including reports for the exact time value itself, will not be plotted.

5.13. Hurricane tracks

Plots hurricane tracks from the National Hurricane Center (NHC) or Joint Typhoon Warning Center (JTWC) forecast/advisory bulletin (WTNT, WTPZ, WTPN, WTIO, and WTXS). This shows the current and forecast location of hurricanes, typhoons, and tropical storms. A track connecting each forecast point is created using a mathematical spline.

The source bulletin needs to be the NHC forecast/advisory or JTWC warning with coordinates and forecast positions. They can be automatically downloaded via the Internet > Retrieve panel. If there is any problem with a bulletin not plotting, it may be due to an error in the way the bulletin is written. Decoding these bulletins into machine-readable format is not always error-free.

Currently there is no support for bulletins from other global hurricane centers.

Technical information: The import module locates hurricane bulletins based on the National Hurricane Center header (KNHC) or the Joint Typhoon Warning Center header, and saves them to the queue.hur holding file. When Data > Hurricane Tracks is requested, the hurricane module reads queue.hur and displays any available bulletins.
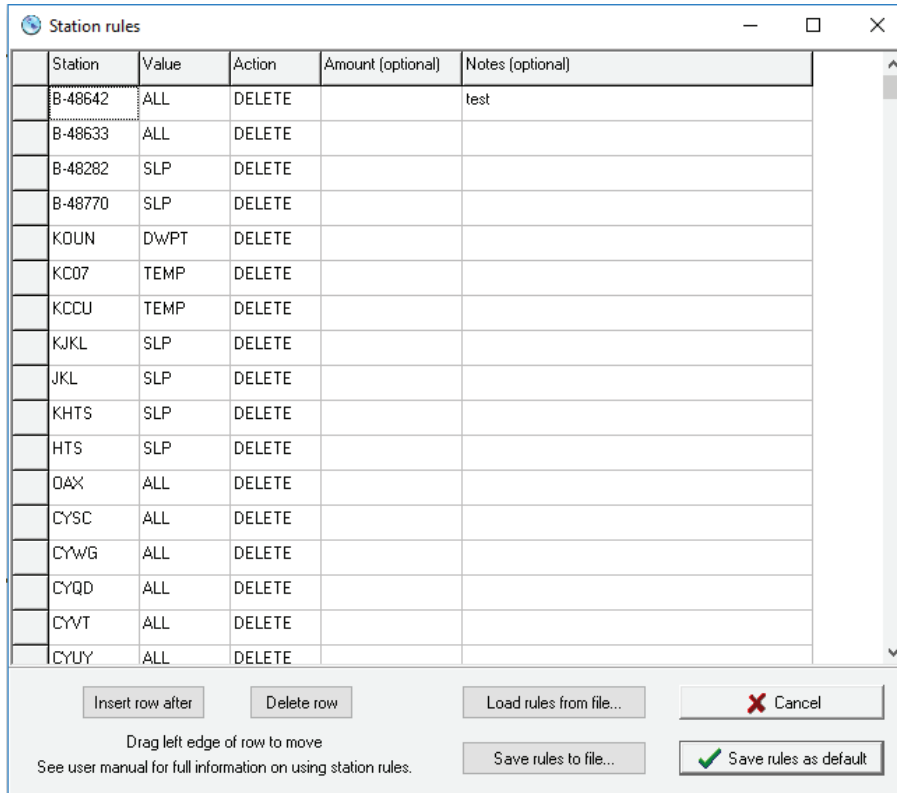
5.14. Sounding

This function allows you to display a sounding (a SKEW-T diagram, or graph of the vertical structure of the atmosphere above a point) for a chosen station. You must have already imported upper air (rawinsonde or FD) data. You will be prompted to enter the WMO or ICAO for the station that you want to view. The "Rescale" button resizes the SKEW-T window to its normal size (unstretches it).

If you do not know the WMO or ICAO you want to use, you can simply right-click on any horizontal map window and choose "Display SKEW-T". Digital Atmosphere will locate the closest rawinsonde observation and plot the sounding for you.

5.15. Cross section
(Under development)

FIGURE 5-2. The station rules table window.

Technical notes
The station rules table, when saved as default, is written to **digatmos.rul**, providing a feature that was first implemented in January 2001. The file required direct editing with tools like Notepad until the addition of this "Edit Station Rules" dialog in March 2019. If you still want to directly view or modify the rule file, go to your Application Data directory (given in Help > About) and edit digatmos.rul with Notepad or a similar text editor.

5.16. Extract model data

This command extracts various elements from NGM and ETA output bulletins which have been imported.

Prior to using this command, you must use the status panel to (1) choose the desired Forecast Hour, and (2) to select the model you want (under Active Level). The extracted data is saved into a custom data file. Then you may use Overlay, Custom Data or Analyze, Custom Data to plot or contour that data element. For more details on custom data files, see Overlay, Custom Data in the "Overlay Commands" chapter.

5.17. Troubleshoot data

This interface shows at a glance which datasets are available from the most recent import operation. If a dataset is shown as empty, it cannot be plotted. Note that some data may be shown which does not really exist, due to wide variations in coding formats. You should consult this to check on any problems before reporting a problem about data not plotting. If no data is shown, check your source, the URL it came from (if any), and make sure the system clock settings are correct on your computer since some products are time-dependent.

Protip (US users): if you are still not getting data and have tried everything, check the National Weather Service Telecommunications Gateway outages page at: http://tgftp.nws.noaa.gov/tgstatus/ for messages. On rare occasion there may be data outages.

5.18. View raw data

Sometimes you will want to go back and look at the original data. Program users may wish to review observations for vital clues (such as observer remarks), as well as look through any other data embedded in the data files.

The file that is viewed is the internally-saved clean data file produced by *the most recent* File Import or Data Retrieve command. The original raw source file is not referenced and does not

have to be present. If you don't like this interface, you can view the same data file (DATA. USR in the Digital Atmosphere directory) using any text editor.

The View Raw Data panel also has a .Find. function that lets you search for stations and keywords in the file.

5.19. Edit station rules

This function displays the station rule set. It allows users to permanently modify or delete variables at a given station before they are plotted and analyzed. This is useful for stations that are sending out bad data and must be repeatedly quality-controlled. Rows with DELETE must be reloaded from the Internet or from the local disk file for the changes take effect. Rows with PRI will take effect with the next data plot.

You may move and reorganize rows by dragging the gray button on the left side of each row. Rows are inserted by using the "Insert Row After" button, in which case a row will be inserted after the currently active row. The currently active row may be deleted with the "Delete Row" button. Use "Cancel" to avoid saving changes. Currently there is no sort feature, so clicking the top header of the column will not sort rows.

When the window is first opened, the default station rules are displayed. Pressing "Save Rules As Default" will replace the default rules with this table, including any changes that were made. Pressing "Cancel" will cancel making any changes.

You may also choose to save your rule set to a disk file as a backup or for other types of analysis work. You may do so using "Save To File". Likewise, "Load From File" will view any previously saved rule sets. Be careful not to press "Save Rules As Default" unless you want these rules to be active.

Again, remember the changes to the station tables do not take effect until "Save Rules

As Default" is pressed and data is reloaded via Data Retrieve or a Load File selection.

Column 1 - Station

The station identifier (ICAO, WMO, or buoy number) that the rule will apply to is listed here.

WMO, buoy, and ship stations must be prefixed with W-, B-, and S- respectively before their station identifier. This is to prevent conflicts since sometimes they may use the same number. If a number is not prefixed it will be assumed to be a WMO station.

Column 2 - Data type

Indicate the type of data from the given station that will be modified. Valid selections are ALL for all elements. For specific elements, use TEMP, DWPT, WDIR, WSPD, SLP, or ALST, for temperature, dewpoint, wind direction, wind speed, sea-level pressure, and altimeter setting, respectively. Only one data type may be specified; to handle multiple data types you will need to create additional table rows.

Column 3 - Action

This indicates the action that will be applied to data matching the given station and data type. Valid selections are DELETE or DEL to remove the data, and PRI to prioritize the station for display.

Prioritizing a station for display will plot the station first before any other data is plotted, ensuring it appears on the map. This may be useful at very low settings of the data plot crowding slider (see Main Menu chapter under Control Toolbar).

The PRI functionality replaces the older system before March 2019 (V3.20) in which prioritized stations were maintained in the file **digatmos.pri**.

Column 4 - Quantity

Not used. This will be used in the future for modifying data values.

Column 5 - Notes

Users may enter notes here. This data is not used by the software.

6 / Analysis

Digital Atmosphere hosts a powerful suite of tools for analyzing various atmospheric properties. It is quite simple to use. You simply click on a **primary field** that you want to view (such as temperature, wind speed, pressure, etc) in the Analysis menu. However, if you first click on a **derivative field** (i.e. vorticity, divergence, or advection) in the status panel, Digital Atmosphere places a checkmark next to that field. Derivative fields are not analyzed until you click on a primary field from the Analysis menu. Only then are the derivative choices looked at. All analysis methods are computed based on whatever level is selected under the "Active Level" pop up menu on the status panel, so if the analysis does not appear, it means no data is available for the active level.

To "fix" bad data, try to determine the location of the problem and use the Quality Control function (described in the File chapter) to find the bad data. Then erase the map and analyze the chart again. To permanently fix data from a station, use the Rule File (described in the Quality Control section above.

Font types used during analysis (contouring and labelling) operations are controlled in "File/Preferences/Fonts" under "Annotations". Only the font name is used; the size is ignored.

6.1. Analysis basics

To fully understand how the analysis routines work, you have to know a little bit about the theory behind them. All meteorological fields can be described as a series of waves. For example, assume that at a certain time the coldest spot in the country is International Falls, MN at 12°F and the hottest spot is Death Valley, CA at 96°F. Then draw a long line on your map that passes through both of those points. If you graph the temperatures along this line and gather data from cities along the line, your temperature graph will show unique undulations, rises, and falls. These are mathematical waves in the temperature field.

Assume that you find that the temperature 200 miles on each side of Death Valley (along the line) is 94 deg F. You could then assume most of the southwest United States is hot. The temperature graph would show a gradual rise towards Death Valley and a gradual fall as you move away. But what if the temperature 200 miles on each side is instead 52 deg F? With Death Valley being at 96, this would appear on your graph as a short upward "spike" at the location corresponding to Death Valley. These are two unique mathematical waves — the first one (with gradual rises and falls) means that the temperature field is composed of large or long wavelength features. The latter situation (with sharp spikes and dips) means that the temperature field is composed of short or small wavelength features. As you can see, gradual changes mean that the meteorological field has long

wavelength characteristics, and sharp localized changes imply small wavelength features.

Digital Atmosphere uses a 30 x 30 mesh (adjustable in Preferences > Analysis) to sample these conditions. The mesh is like lines that are drawn across the map, 30 across and 30 down, to sample the wave structure that is present in the type of analysis you pick. Using equally-spaced grid points is the easiest way to perform computerized analysis calculations. Digital Atmosphere must find where reporting stations are within the grid, and try to map the values to that grid, taking into consideration how far the reporting station is from a grid-point and figuring out what to do with grid-points that aren't assigned any data. This is what takes up the majority of processing time.

So why not just map values to the grids and interpolate between all the points? Digital Atmosphere's nearest neighbor technique does something like this. It maps data to gridpoints and fills in unassigned gridpoints using the nearest data value, a process known as expansion. However, if the temperature in San Francisco is 52 and in Los Angeles is 85 (and assuming we have NO other data), the analyzed field anywhere in California will show either 52 or 85 degrees! This is clearly not correct, so after expansion, Digital Atmosphere runs a smoothing algorithm. Smoothers "even out" the mesh by changing the value at each grid-point to an average of itself and its neighbors. Unfortunately, this can dampen out features in the field. Too much smoothing will remove all of the short wavelength features.

A better way to do this is to use the Weighted, Barnes, or Cressman techniques. See the Preferences > Analysis section for more information. Proper selection of analysis type gives much better control over smoothing, which is not available from Internet web charts, and allows the software to accurately resolve a mix of large waves as well as small, localized waves.

Let's now take a closer look at each type of analysis.

6.2. Analysis fields

Temperature

Analyzes the free air temperature in either degrees Fahrenheit or degrees Celsius.

Potential temperature

Potential temperature is what the temperature of the air would be if it was forced to the 1000 mb level. In other words, it eliminates the effects of elevation, allowing you to effectively compare temperatures in mountainous areas using a common temperature measurement.

Equivalent potential temperature (theta-e)

Equivalent temperature indicates the potential temperature of a parcel of air whose latent heat had been completely released. Physically, it's what the parcel's temperature would be if it were forced upwards to about 200 mb then forced downwards to 1000 mb. In any given atmosphere, higher values of surface or low-level theta-e will always yield higher instability values (it's a better indicator than dewpoint or temperature), so theta-e is useful for seeing where an inversion or cap is about to break.

Dewpoint temperature

The dewpoint is the temperature that the air must be cooled to before saturation begins. It is proportional to the actual quantity of moisture present in the air, so it is often used as a universal indicator of the "moisture" in the air.

Mixing ratio

This measure tells you exactly how much moisture is in the air. It is calibrated in grams of water vapor per kilogram of air. Mixing ratio is basically the same type of measure-
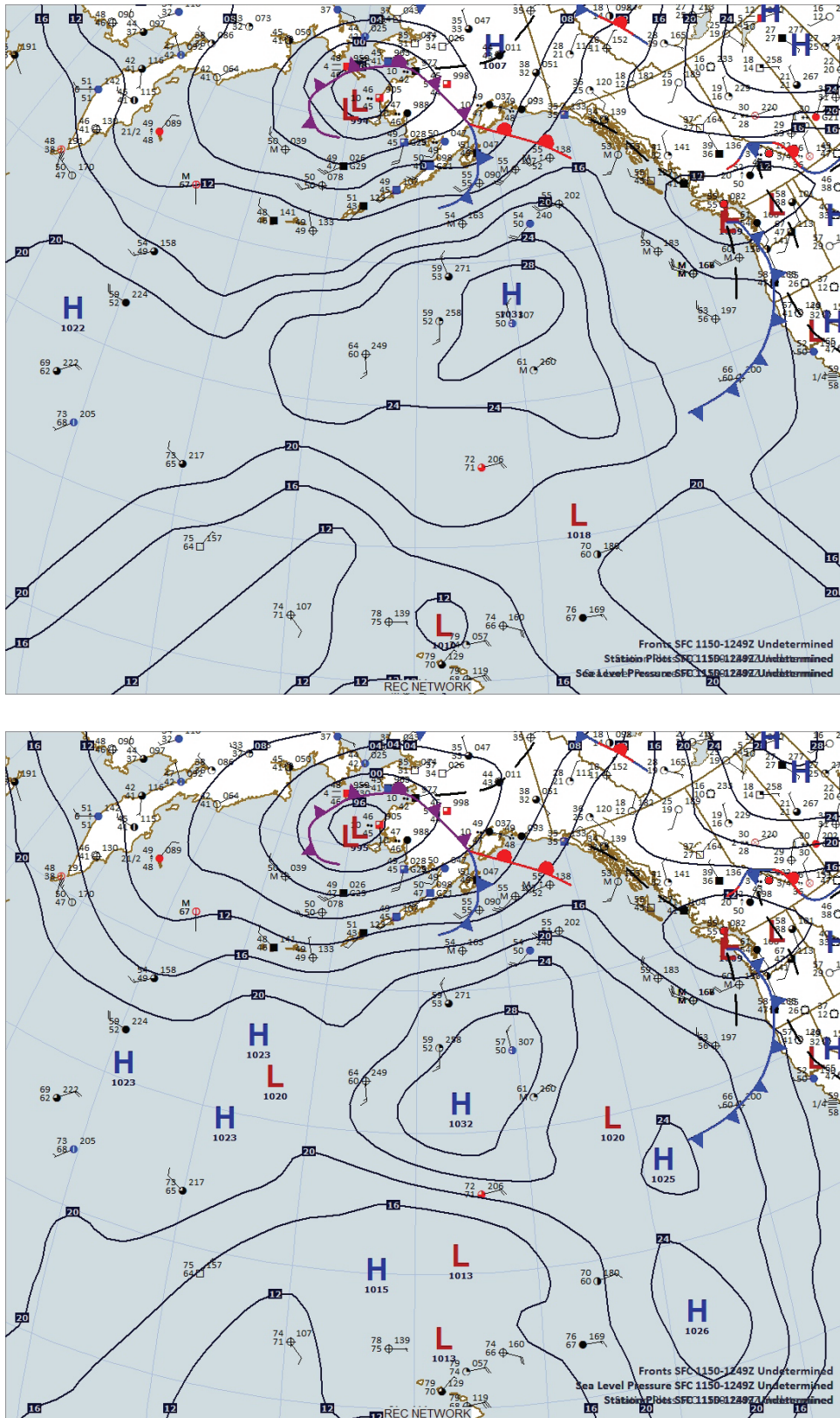
Figure 6-1. Comparison of nearest neighbor (top) and Cressman (bottom) analysis. In the Cressman analysis the surface radius has been increased to 1000 nm and reduction interval increased to 5 to handle the large voids between stations. The result is a much better depiction of oceanic systems, in particular the high pressure area from the Gulf of Alaska to the lower right corner. Also note the more evenly-spaced isobars across the Aleutian Islands. In spite of that, contours near very isolated stations like the one just below the image center can take on a dipole appearance due to the lack of gradient information. This can be improved with the use of smoothing. Note the good detail on smaller scale systems like the Alaskan occlusion, and the more refined isobar field in the Aleutians, thanks to the versatility of the Cressman technique at different scales.

ment as dewpoint, however, mixing ratio is an absolute, measurable quantity, and with increasing amounts of moisture, changes in mixing ratio become more significant than changes in dewpoint. This makes it ideal for finding features in moist air masses, especially in severe weather situations.

At the surface, by checking the divergence derivative and clicking mixing ratio, you can produce a "moisture convergence" chart useful for forecasting severe thunderstorms. By clicking that and the advection derivative, you can produce "moisture flux convergence" (SMC). In an unstable atmosphere, it takes a few hours for SMC to produce convection, so persistant SMC areas must be watched. SMC patterns are more important than the actual values.

Relative humidity

This is a measure of how close the air is to being saturated. An analogy is having a shot glass half full of water, and a large jar half full of water. Relative humidity is like saying that each of the containers is 50% saturated with water, regardless of the true amount in the container.

Wind chill

The wind chill is an empirical equation describing what the temperature feels like to a person based on the free air temperature and the wind speed. The wind chill always equals the free air temperature when the winds are 4 knots or less.

Heat index

The heat index is an empirical equation describing what the temperature feels like to a person based on both the free air temperature and the relative humidity.

Humidex

This is similar to the heat index but is often used in Canada. It equals H = T + (0.5555 * (e - 10)), where T is the temperature in Celsius and e is the vapor pressure in mb. Further information is available in *Humidex, A method of quantifying human discomfort due to excessive heat and humidity*, by J.M. Masterton and F.A. Richardson, CLI 1-79, Environment Canada, Atmospheric Environment Service, Downsview, Ontario, 1979.

Sea level pressure

(Surface data only) The sea level pressure is the atmospheric pressure at the surface in millibars reduced to sea level, taking into account temperature patterns over the previous 12 hours. It is similar to altimeter setting, but not the same. It's biggest use is for comparing patterns over a broad area, as in synoptic analysis.

Altimeter setting

(Surface data only) The altimeter setting, measured in inches, is what the surface pressure would be if it were reduced to sea level, however it takes into account no temperature corrections. Unlike the sea-level pressure, if the temperature outside varies drastically, the altimeter setting will fluctuate. Altimeter setting is typically what is used by the National Weather Service to report pressure readings to the public. It is somewhat more commonly available than sea level pressure, so it finds use in day-to-day mesoscale analysis.

Geopotential height

(Radiosonde data only) Geopotential height (usually called simply "height") is the height of a given pressure surface (such as 300 mb) in meters. It is widely used in upper-air analysis

About analysis

To fully understand how the analysis routines work, you have to know a little bit about the theory behind them. All meteorological fields can be described as a series of waves. For example, assume that at a certain time the coldest spot in the country is International Falls, MN at 12°F and the hottest spot is Death Valley, CA at 96°F. Draw a long line on your map that passes through both of those points. If you graph the temperatures along this line and gather data from cities along the line, your temperature graph will show unique undulations, rises, and falls. These are mathematical waves in the temperature field.

Assume that you find that the temperature 200 miles on each side of Death Valley (along the line) is 94 deg F. You could then assume most of the southwest United States is hot. The temperature graph would show a gradual rise towards Death Valley and a gradual fall as you move away. But what if the temperature 200 miles on each side is instead 52 deg F? With Death Valley being at 96, this would appear on your graph as a short upward "spike" at the location corresponding to Death Valley. These are two unique mathematical waves — the first one (with gradual rises and falls) means that the temperature field is composed of large or long wavelength features. The latter situation (with sharp spikes and dips) means that the temperature field is composed of short or small wavelength features. As you can see, gradual changes mean that the meteorological field has long wavelength characteristics, and sharp localized changes imply small wavelength features.

Digital Atmosphere uses a 30 x 30 mesh (grid) to sample these conditions. The mesh is like lines that are drawn across the map, 30 across and 30 down, to sample the wave structure that is present in the type of analysis you pick. Using equally-spaced grid points is the easiest way to perform computerized analysis calculations. Digital Atmosphere must find where reporting stations are within the grid, and try to map the values to that grid, taking into consideration how far the reporting station is from a gridpoint and figuring out what to do with gridpoints that aren't assigned any data. This is what takes up the majority of processing time.

So why not just map values to the grids and interpolate between all the points? Digital Atmosphere's nearest neighbor technique does something like this. It maps data to gridpoints and fills in unassigned gridpoints using the nearest data value, a process known as expansion. However, if the temperature in San Francisco is 52 and in Los Angeles is 85 (and assuming we have NO other data), the analyzed field anywhere in California will show either 52 or 85 degrees! This is clearly not correct, so after expansion, Digital Atmosphere runs a smoothing algorithm. Smoothers "smooth" out the mesh by changing the value at each gridpoint to an average of itself and its neighbors. Unfortunately, this can dampen out features in the field. Too much smoothing will remove all of the short wavelength features.

A better way to do this is to use the Weighted, Barnes, or Cressman techniques. These techniques look at each gridpoint, find where it corresponds to on the earth, and from that location it looks at the values of the stations around it and figures out a carefully averaged value best representing what the value at that gridpoint probably is. The Barnes algorithm goes a step further by going back and seeing how incorrect its mesh turned out to be, then adjusting that to produce a final analysis. The Cressman algorithm does the same thing, but it also begins its analysis using values at stations over a wide area, then gradually tightens up its analysis, running corrections and using values at stations over a progressively more narrow area. This allows Cressman to accurately resolve large waves as well as small, localized waves.

Wind speed

This is the speed of the air movement, usually measured in knots (nautical miles per second, or 1.15 mph).

Observed wind

(Vector field) Computes an observed wind grid, as reported in the weather data. The "arrow" of the feather or vector points towards where the wind is going.

Custom data file

Analyzes a custom data set from your CUSTOM.DAT file (see the appendix on Custom Data for full details). The contour base and interval are automatically determined.

Geostrophic wind

(Vector field) Computes a wind grid based on the pressure or geopotential height field. Geostrophic wind is based on the pressure gradient and the Coriolis effect, and due to the effects of friction, it is always higher than the observed wind speed. Geostrophic winds are useful for getting an idea of how strong the winds will be later in the morning when air flow is being suppressed by radiational inversions.

Ageostrophic wind

(Vector field) This is the vector difference between the actual wind vector and the geostrophic wind vector. Ageostrophic wind is stronger when the pressure and wind fields are out of balance. Much of the vertical motion in the atmosphere can be attributed to ageostrophic flow.

Q-vectors

(Vector field) The omega equation is a diagnostic for the total time derivative of pressure. It allows synoptic-scale vertical motion to be accurately estimated by analyzing temperature and wind fields above the boundary layer.

The omega equation is defined as shown here, where the term on the left side of the equation indicates vertical motion. On the right side, the left term is proportional to differential vorticity advection, while the right term solves for thickness advection. So positive differential vorticity advection plus warm thickness advection equals upward vertical motion. A Q-vector roughly depicts the ageostrophic horizontal wind that develops in order to maintain the thermal wind balance in a developing synoptic system.

Q-vector convergence implies synoptic-scale upward vertical motion, and Q-vector divergence implies downward vertical motion. This can be interpreted either by looking at the Q-vectors or running a derivative convergence field together with Q-vectors. Also, where 850 mb Q-vectors cross the 850 mb isotherms, moving towards warmer air, frontogenesis is indicated. Q-vectors crossing into colder temperatures indicate frontolysis. This quality is known as the "geostrophic frontogenesis function" (use 700 mb levels in mountainous areas). Avoid using the advection derivative to forecast Q-vector movement, since the field is constantly changing and may not be representative after a few hours.

Divergence

Divergence is a measure of the amount of stretching of a parcel of air, or the relative rate of increase of a material surface. Divergence is defined by the following, where u and v are the x and y components of wind, respectively.

Relative vorticity

Relative vorticity is a measure of curl of the air. Geometrically, vorticity is twice the angular speed of rotation of a parcel that moves with the flow. It is a relatively simple expression of the flow of air, and is most often used to examine the wind field within the boundary layer. Relative vorticity is defined by the fol-

lowing, where u and v are the x and y components of wind, respectively.

Absolute vorticity

Absolute vorticity is the same as relative vorticity, however, the Coriolis effect is added into the equation (absolute vorticity equals relative vorticity at the Equator). Absolute vorticity of the wind is used most frequently in upper-air analysis.

7 / Radar

The radar menu is for native support of the United States WSR-88D radar systems. Currently, the United States is the only country in the world that openly shares its raw radar data in real time. Although Europe and other countries have similar radar networks, the data is proprietary and consequently Digital Atmosphere is unable to support this data except through low-resolution imports of publicly available images (the user can configure these if they are available; see the Import Radar Images section).

Digital Atmosphere's radar module processes Level III high-resolution data directly from sites that carry the data feed. Because there are over 100 radar sites and 31 products at each site that can be used operationally, Digital Atmosphere has implemented a completely separate, unique system for retrieving data. The Data > Retrieve interface used for "normal" weather data is not used. Rather, all choices for obtaining data are built into the radar menu and controlled by options in Preferences.

To use the radar menu, you simply (1) make sure the station you want is set (with Set NEXRAD Station or Quick Pick); and (2) click on the product you want. The image will be downloaded (taking anywhere from 1 to 30 seconds) and will be displayed immediately on the current workchart.

Special note about choosing multiple stations: Digital Atmosphere can only access a handful of stations at a time. It cannot access all stations in the U.S., because currently no server provides current data combined in one file, and accessing each file individually would take several minutes of time and potentially "hammer" the server with requests. Digital Atmosphere is also intended to be a tool to view local storms and phenomena rather than to build national
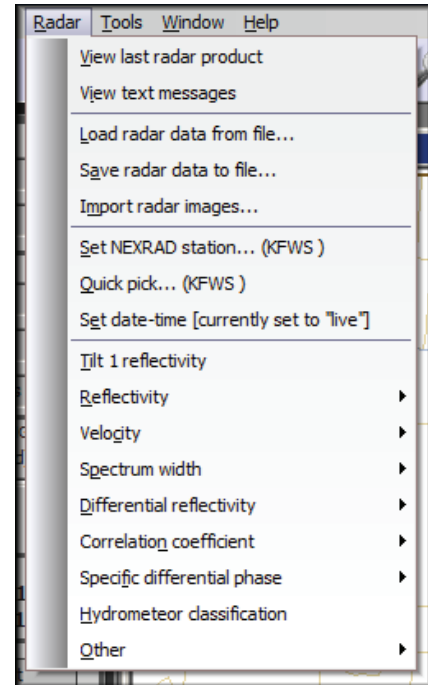
mosaics, which are readily available on the Internet from countless sources. If you select two or more stations, Digital Atmosphere will mosaic the radar based on highest reflectivity at a given bin.

7.1. View last radar product

This function will display any radar data that has been recently imported. You can use it to re-display existing data without causing the system to download new radar data.

7.2. View radar free text messages

This will view freeform text messages (if present) contained in the downloaded data files. This generally has information on things like outages.

7.3. Load radar data from file

Rather than accessing new radar data through the Internet, you may load the data from an existing file. Any NEXRAD data in this file will be imported and automatically displayed. You may save data to be loaded and

viewed again at any time in the future by using the "Save radar data to file" command.

7.4. Save radar data to file

Saves any imported radar data to a file of your choice. You may then view it again later by using the "Load radar data from file" option.

Advanced users: This basically copies the queue.nid holding pen to your desired location.

7.5. Import radar images

This is a sophisticated interface that allows any graphical radar image to be georeferenced and mapped into Digital Atmosphere. This provides a "poor man's" solution that can be used with international radar sites that just have a static graphical image.

Please see the appendix for complete information on how these are constructed and built.

7.6. Set NEXRAD station

Before Digital Atmosphere can access NEXRAD data from the Internet, it must know which stations you want to look at. A map will be displayed and you will be able to select the sites for which data should be accessed.

7.7. Quick pick

Allows you to quickly set a new station by typing its identifier into an entry box. This is designed for advanced users. Always enter the three-letter identifier, such as FWS, MHX, or CCX. If there are multiple stations, separate them with a space.

If you do not know what to enter or how to use this box, use the Set NEXRAD Station interface instead.

Special note: Please see "Special Note About Choosing Multiple Stations" in the radar introduction.

7.8. Tilt 1 reflectivity

Shows the most common radar product: radar reflectivity at the lowest (0.5 deg) scan. Radar echoes are shown as color-coded polygons that may be one of 15 colors. If you need to see a scan over a wider area or at different elevations, use the expanded Reflectivity menu instead to select a more specialized reflectivity product.

7.9. Reflectivity

Shows radar echoes in any of several formats. Reflectivity is simply a measure of power returned to the radar in decibels (dBZ).

0.5 deg. Shows reflectivity from scan elevation 1, tilted 0.5 deg from the ground. This is exactly the same as "Tilt 1 Reflectivity" selection shown in the radar main menu, so you should not normally have to select this item.

1.5 deg. Shows reflectivity from scan elevation 2, tilted 1.5 deg from the ground.

2.4 deg. Shows reflectivity from scan elevation 3, tilted 2.4 deg from the ground.

3.4 deg. Shows reflectivity from scan elevation 4, tilted 3.4 deg from the ground.

Extended (248 nm) 0.5 deg. This is similar to the 0.5 deg reflectivity scan, but shows it over a wider area (248 nm). This comes at the cost of degraded resolution (1.1 nm instead of 0.54 nm).

Composite. Composite reflectivity blends all available elevations, showing the highest reflectivity in all elevations above a given point on Earth. This is useful for showing all echoes returned by the radar, regardless of scan elevation. However this masks important features useful for severe weather forecasting, such as hook echoes and reflectivity gradients which are seen only on base slices. Composite reflectivity can give false impressions of precipita-

RADAR: Technical information & overriding the defaults

Remote data is selected with the digatmos. rad file. Data is imported into queue.nid, then is plotted. The digatmos.nxc file is used to define how fields are plotted, and digatmos. nex defines the colors. Since the station identifier is not contained within the data blocks, the NEXRAD station table (digatmos.nxa) is consulted (this table is built from digatmos. stn whenever doing a Recompile Tables command).

For advanced users who are customizing access URLs, a list of valid product codes for Internet retrieval can be found at: http://www.nws.noaa.gov/tg/radfiles. php . To get historical NEXRAD data, visit http://has.ncdc.noaa.gov/plclimprod/plsql/ HAS.FileAppSelect?datasetname=7000 . Level II data is at http://has.ncdc. noaa.gov/plclimprod/plsql/HAS. FileAppSelect?datasetname=6500 but is not compatible with Digital Atmosphere at this time.

* *Setting and overriding radar access URLs* . Users are able to change URLs corresponding to the desired products. This is done by editing the digatmos.rad file. Within this file you construct a template for retrieving the NIDS Level III radar file. Only the URLs in the "Default" section are used under normal circumstances. However you can override them by creating new sections (which contain a title that starts with an equal sign). To implement any radar access source, set the "Preferred source" in Set NEXRAD Station to something besides Default. If the product you request cannot be found in the override, the one in the default section will be used.

* *Setting and overriding color schemes* . Likewise, users are able to set and override color schemes. To do this, simply edit the digatmos. nex file. To implement any color scheme, go to Set NEXRAD Station and choose something besides the default color scheme. Color schemes for annotations, storm tracks, hail, mesocyclones, and so forth, are handled in the map's color table (you may either edit this in File > Preferences > Colors or by directly editing any file in the /styles directory).

* *Translucency*: Radar echoes are drawn using translucent polygons. Due to the limited capability of the graphics library currently being used, there is only limited support for translucency at this time. For best results, make sure your basemap is as bright or as dark as possible. Before plotting radar echoes, Digital Atmosphere will examine your style file for the background color (bas, in Preferences > Styles) and use the appropriate translucency algorithm based on whether it is closer to white or black. If you get unusual results, change your background color or regenerate the map, preferably towards the white or dark end of the spectrum.

* *Mosaicing*. When plotting radar imagery for multiple sites, an important problem arises when Digital Atmosphere has to decide which radar's data to use for a particular location. The rule is that Digital Atmosphere plots the pixel for the nearest radar site. The exception is when raster images (such as echo tops, composite reflectivity, etc) are displayed; in this case the pixel with the highest detected level is used (this raster rule took effect with Equinox v1.05, 1/16/07, and later versions).

tion at the surface from suspended precipitation, as in storm anvils.

Extended (248 nm) composite. This is similar to the composite product but reaches over a wider area: 248 nm instead of 124 nm.

7.10. Velocity

Shows radial velocity (to and from the radar site) in any of several formats. It is expressed in knots. Positive velocity is always motion away from the radar, while negative velocity is always motion toward the radar. As a mnemonic it is useful to link positive ("typical") values to that of energy being transmitted from the radar ("typical" radar energy), and negative values as being associated with energy coming back the other way.

0.5 deg. Shows velocity from scan elevation 1, tilted 0.5 deg from the ground.

1.5 deg. Shows velocity from scan elevation 2, tilted 1.5 deg from the ground.

2.4 deg. Shows velocity from scan elevation 3, tilted 2.4 deg from the ground.

3.4 deg. Shows velocity from scan elevation 4, tilted 3.4 deg from the ground.

Short 32 nm (0.5 deg). Surprisingly, the radar generates a close-range velocity product with a gate resolution of only 790 feet! You can view this product here for looking at storms up close.

SRM 0.5 deg. Shows storm-relative mean radial velocity from scan elevation 1, tilted 0.5 deg from the ground. The storm-relative mean radial velocity (SRM) product is essentially the same as base velocity, but removes the component of the storm's motion, allowing velocity signatures to be more accurately analyzed. This product is preferable to the standard velocity products for storm forecasting. The source for the storm motion component is usually the average motion of all storms detected by the radar's SCIT storm tracking algorithm.

SRM 1.5 deg. Shows storm-relative mean radial velocity from scan elevation 2, tilted 1.5 deg from the ground.

SRM 2.4 deg. Shows storm-relative mean radial velocity from scan elevation 3, tilted 2.4 deg from the ground.

SRM 3.4 deg. Shows storm-relative mean radial velocity from scan elevation 4, tilted 3.4 deg from the ground.

7.11. Spectrum width

Spectrum width is a measure of the variance in velocity within each bin. It is actually generated from a pulse pair algorithm, rather than being computed directly from velocity data. The product is generated using 7 levels, with a maximum possible width of 20 kt. Anything beyond 20 kt is truncated by the radar unit.

The spectrum width product it is the basis for the WSR-88D turbulence products. The application of the product to severe thunderstorm forecasting is not known, but it may be a secondary indicator of small tornadoes, landspouts, and gustnadoes.

32 nm. Uses the close-range radius of 32 nm at 0.13 nm resolution.

124 nm. Uses the standard radius of 124 nm at 0.54 nm resolution.

7.12. Differential reflectivity

Dual-polarization radars have the ability to measure the signal as received in the horizontal plane as well as the vertical plane. The ratio between these two for a given bin is known as differential reflectivity (DR). This tends to measure the oblateness of scatterers: particles that are stretched horizontally (pancaked) tend to be large raindrops. On the other hand, particles stretched vertically usually include ice particles and especially hail.

Values of high differential reflectivity (+2 to +5 and up) indicate stretching in the horizontal, and suggest pancaked particles. Values

that are near zero suggest a spherical ratio of width to height. Values that are negative (e.g. -1 to -2) indicate the particles are stretched in the vertical, and are likely to be ice.

7.13. Correlation coefficient

Correlation coefficient (DCC) provides a measure of the similarity of scatterers in the horizontal plane to scatterers in the vertical plane.

Very low correlation coefficients are in the range of 0 to 0.8 (0-80%) and normally indicate non-meteorological targets such as birds, insects, bats (especially in Texas), chaff, tornado debris, and ground clutter. Giant hail may dip into the upper range of these values (about 70-80%), as can large, clumped snow.

Moderate correlation coefficients are in the range of 0.8 to 0.97 (80-97%) and normally consist of transitional forms of precipitation like hail and wet melting snow.

High correlation coefficients are in the range of 0.97 to 1 (97-100%) and are made up of uniform snow, rain, and drizzle. The highest values are made up of very small droplets.

7.14. Specific differential phase

Specific differential phase (DKD) measures the change in phase of the radar signal caused by precipitation and other scatterers. It is highly similar to base reflectivity (DR), except that by nature it tends to be impervious to attenuation. This makes it of excellent use for finding the "true" reflectivity of cells when the beam is having to cross lengthwise through a squall line or through numerous cells to a distant storm.

7.15. Other

A number of derived products are generated from the base products of reflectivity, velocity, and spectrum width.

Echo tops (ET). This displays the highest altitude at which a radar echo exceeds 18.5 dBZ. It is computed to the nearest 5,000 ft up to a maximum height of 70,000 ft. The standard coverage radius is 124 nm with a resolution of 2.2 nm.

Vertically integrated liquid (VIL). Sums the reflectivities above a bin location to provide a measure of the total water load above a given location in kilograms per square meter. It has a direct correlation to severe weather, hail, and flood potential, and is most useful in assessing in an extremely short time which storm cells have the greatest significance. Generally values above 40 kg/m^2 are associated with severe weather. The maximum possible displayable value is 80 kg/m^2. The product has a coverage radius of 124 nm with a resolution of 2.2 nm.

Severe weather probability (SWP). Displays the probability of severe weather, based solely on the VIL algorithm. This product is of extremely limited use for severe weather forecasting and must be used with caution. Values are expressed as a percentage from 0 to 100. The product has a coverage radius of 124 nm with a resolution of 2.2 nm.

Mesocyclone. Shear couplets are resolved vertically and with time to determine the existence of a storm mesocyclone. If one is present, it is displayed as a red circle. The radius of the circle equals the reported radius of the mesocyclone. Mesocyclones are resolved only within 124 nm of the radar.

Hail index. The radar system contains a severe hail index (SHI) algorithm that relates the 45 dBZ level to the -20C height. When the computed probability for hail for each storm cell exceeds a predetermined criteria, it will be displayed as a green isosceles triangle. If the triangle is small, there is a 30% probability of hail (50% if it is filled). If it is large, there is a 30% probability of severe hail (50% if it is filled). The maximum expected hail size (MESH) is displayed in the middle of the symbol, rounded to the nearest whole inch; if less than one inch an asterisk shows. The hail index has a radius of coverage of 124 nm from the radar.

Tornado (TVS). This product uses the Tornado Detection Algorithm (TDA) to resolve velocity signatures that suggest a tornado. The tornado signature is shown as a red filled inverted isosceles triangle. An ETVS may also be displayed, but the NIDS code does not provide for differing TVS from ETVS signatures, therefore they will appear the same. The radius of coverage is 124 nm, but is rarely detected outside of 60 nm since the algorithm is unable to sample the lower portions of the storm at long ranges.

1-hour precipitation (OHP). Radar reflectivity is summed with time to estimate the rainfall accumulation in the coverage area. This product provides an estimate of how much rain fell during the past hour. The highest reportable total is 8 inches. The radius of coverage is 124 nm with a resolution of 1.1 nm.

3-hour precipitation (THP). Radar reflectivity is summed with time to estimate the rainfall accumulation in the coverage area. This product provides an estimate of how much rain fell during the past three hours. The highest reportable total is 8 inches. The radius of coverage is 124 nm with a resolution of 1.1 nm.

Storm total precipitation (STP). Radar reflectivity is summed with time to estimate the rainfall accumulation in the coverage area. This product provides an estimate of how much rain fell during the past hour. The highest reportable total is 15 inches. The radius of coverage is 124 nm with a resolution of 1.1 nm.

Storm tracking information (STI). This product shows information provided by the radar's Storm Cell Interpretation and Tracking (SCIT) algorithm. It shows past, current, and future location of identified storm cells. Past locations are shown for each volume scan (this is an interval of 5 minutes in VCP11 and 6 minutes in VCP21). Future locations are identified at 15, 30, 45, and 60 minutes in the future; though these intervals are customizable by the radar site operator. Each storm has a unique ID of two characters ranging from A0 to Z9 and is recycled when past A0; when no storms have occurred in a certain number of volume scans the ID is reset to A0. The storm data has a radius of coverage of 248 nm.

Clutter control filter (CFC). Shows the clutter filter notch and bypass maps as a radial image. The levels are coded as follows: 0=disable filter; 1=no clutter filter; 2,5=low clutter filter; 3,6=medium clutter filter; 4,7=high clutter filter. Codes 1 to 4 specify the map is bypassed by CTRL, while 5-7 force the filter to operate. The product has a radius of coverage of 124 nm with a resolution of 1 km and 1.4 deg azimuth.

8 / Climatology

8.1. Extract data

This option will let you extract climatology data for any of 2,000 stations around the world. Simply enter a partial word or country digraph to search for a station, or choose from the drop-down list.

Extract Data will allow you to select a category and timeframe of climatological data. Digital Atmosphere will then create a custom data field, saving it into CUSTOM.DAT in your Digital Atmosphere directory. This can then be immediately plotted (with Graphics, Plot, Custom Data) or analyzed (with Analyze, Custom Data Field). You can even import the data into a spreadsheet or database program.

8.2. Graph

This option will let you graph climatology data for any of 2,000 stations around the world. Simply enter a partial word or country digraph to search for a station, or choose from the drop-down list.

What you'll see is a graph of average high and low temperatures for each month, as well as extreme high and low temperatures for each month. They will be indicated in either degrees Fahrenheit or Celsius, depending on your choice of units in File, Preferences. At the bottom, you'll see average monthly precipitation totals (United States) or precipitation days (elsewhere). The total height of a precipitation day bar is the total precipitation days during a given month. The part in gray is how many of those days are composed of snow days, and the part in red is how many are composed of thunderstorm days.
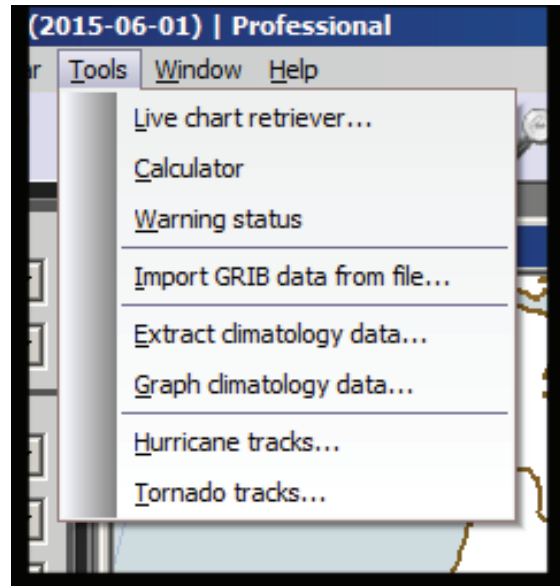
8.3. Hurricane tracks

Digital Atmosphere offers a database of historical hurricane tracks, taken every six hours, for storms that occurred in the East Pacific and Atlantic basins from 1850 to 2002. The tracks will be displayed on the active workchart.

* *Year*. Use the range boxes to display data for a certain time period. To display data for only one year, enter the same year in both boxes.

* *Line width*. Enter a number here to control the width of the lines that will be plotted. The recommended value of 4 should be used.

* *Plot storm name at origin*. Plots a label containing the storm's name at the beginning of the track.

* *Plot date labels along track*. Plots dates and times along the length of each storm track.

* *Color code for wind speed*. Changes the line color of the previous segment based on the sustained wind speed at that time. The values are: Gray 0-34 kt (tropical depression); Black 35-63 kt (tropical storm); Green 64-83 kt (hurricane, Saffir Simpson 1); Yellow 84-95 kt (Saffir Simpson 2); Red 96-113 kt (Saffir Simpson 3); Purple 114-134 kt (Saffir Simpson 4); Blue 135+ kt (Saffir Simpson 5).

* The source of the data is the NHC HURDAT tables at http://www.nhc.noaa.gov/pastall.shtml . The tables are provided in Digital Atmosphere verbatim, so users are free to swap out the existing tables with fresh ones. The files are located in the /hurr directory.

8.4. Tornado tracks

Digital Atmosphere is equipped with a database of United States tornadoes that occurred between 1950 and 2002. These may be plotted on any weather chart for reference purposes. It is important to note that due to limitations in available data, the database carries only the start and end location of a tornado track, and not the intermediate points. This means that tracks will tend to be more accurate for short, slow-moving tornadoes, and much less accurate for long-tracked, fast-moving tornadoes. This is a limitation in the way that tornado climatology is compiled by the National Weather Service, and neither Digital Atmosphere nor its authors have any control over this.

* *Year*. Choose a range of years to display only data during these periods. To display data for only one year, set both blanks to the same value. Choose "all" if you want all years in the database to be displayed.

* *Month*. Choose a range of months to display only data during these periods. To display data for only one month, set both blanks to the same value. Choose "all" if you want all months in the database to be displayed.

* *Day*. Choose a range of days to display only data during these periods. To display data for only one day, set both blanks to the same value. Choose "all" if you want all days in the database to be displayed.

* *Plot date labels at each track*. Digital Atmosphere will plot a MM/DD/YY label to the lower right of the beginning of each tornado track to show which date the track occurred.

* *Color code*. If checked, Digital Atmosphere will code a track black if there were no re-

ported injuries or fatalities, green if there were fatalities but no recorded deaths, and red if deaths occurred.

The source of data is the Storm Prediction Center historical tornado archive, located at http://www.spc.noaa.gov/archive/tornadoes/ . To save disk space, the data has been converted into a series of binary records stored in digatmos.tor that have this structure: Year (signed 32-bit integer); month (unsigned 8-bit integer); day (unsigned 8-bit integer); hour (unsigned 8-bit integer); minute (unsigned 8-bit integer); fujita rating, of which very little data is available (unsigned 8-bit integer); fatalities (signed 32-bit integer); injuries (signed 32-bit integer); latitude of beginning (4-byte float); longitude of beginning (4-byte float); latitude of end (4-byte float); and longitude of end (4-byte float). Weather Graphics does not object to users providing their own updated tornado statistics to replace this one and sharing them with other users.

9 / Window

9.1. Cascade

Arranges all open workcharts in a stacked fashion in which they overlap one another. The title bar remains visible so that you can always see which windows are open.

9.2. Tile

Arranges all open workcharts so that they do not overlap one another, appearing in a gridlike fashion.

9.3. Arrange icons

Minimized workcharts are arranged so that they are evenly spaced and do not overlap

9.4. Remove last product

The last product that was drawn on the active workchart is erased. (Has not been tested with latest programming efforts as of 2015).

9.5. Replot last product

The last product that was drawn to the active workchart is drawn again. (Has not been tested with latest programming efforts as of 2015).

9.6. Allow Digital Atmosphere to run in background

Currently this option is not used.

9.7. Toolbox

This controls whether the left side panel containing the control toolbox is visible. This may be unchecked temporarily to help make
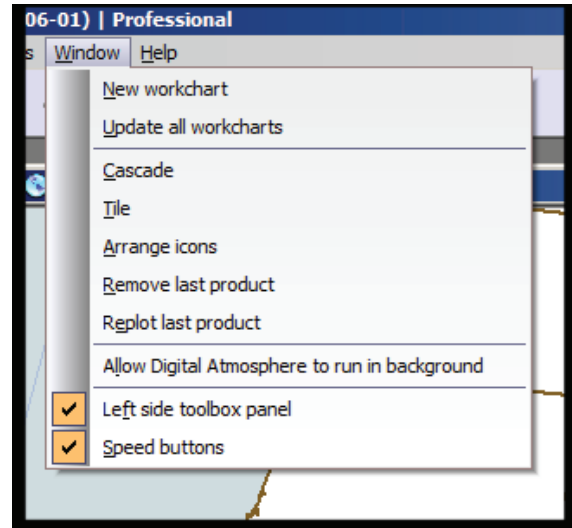
more of the workchart visible. It will be reset to "checked" when Digital Atmosphere is started.

9.8. Speed buttons

If unchecked, the speed button bar at the top will be temporarily removed. It will be restored when this open is checked again or the program is restarted.

10 / Help

10.1. Open PDF User Manual

This option opens the User Manual in the user's default PDF reader.

Alternately, instead of using this option, the user may look in the Digital Atmosphere program group or search for "Digital Atmosphere Manual" in File Explorer. The file is installed in the Program Files directory listed in Help > About.

The context-sensitive help (normally launched with the F1 key) was removed because of Microsoft's decision to phase out WinHelp format in 2007 and remove support for it in Windows 7, 8, and 10. This significantly impaired our own efforts to provide a simple help system embedded in the program. As a result, we migrated to a PDF help manual. This allows for easier printing, the use of more graphics, and it may allow us to provide a printed manual in the near future.
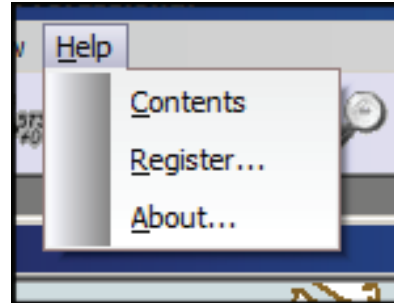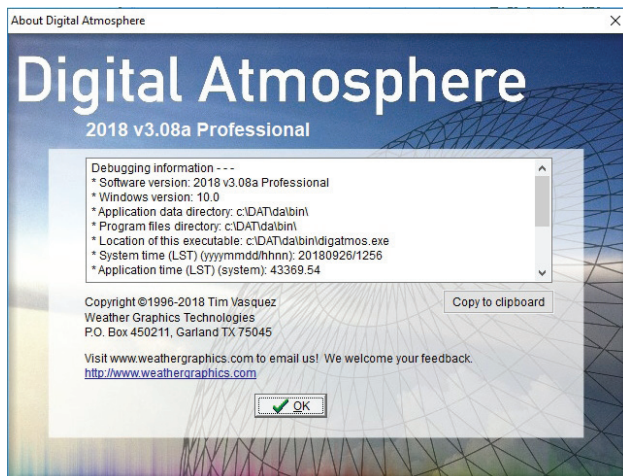
10.2. Help / Register

(Only appears if program is the Standard Version and is unregistered)

If the program is still in 30-day evaluation mode, the Register menu option will be visible. Clicking it will present a dialog that "unlocks" the program and converts it to a fully registered version.

To use it, you must first obtain the key number shown in this panel. This is uniquely generated for your computer. E-mail this to us at servicedesk@weathergraphics.com. If the license is valid, we will then provide a key number to enter in this panel that will complete the unlock process.

Programs that are still in evaluation mode after 30 days will lose some functionality such as loading and generating of maps. However, completing the registration process at any time wil unlock it.

Please note that if you reinstall Windows or use a new computer and install the Standard version, you will see a different serial number in this panel and will need to contact us for a new key. The Professional version does not check for serial or key numbers.

Be aware that attempting to bypass the evaluation period by setting the date to a much earlier value will end the evaluation mode.

FIGURE 10-1. The About panel.

10.3. Help / About

Displays the version of Digital Atmosphere being executed, and also provides diagnostic information. Within this section is helpful information on the location of your Program Path (where this executable resides) and the Application Data Path (where all of the Digital Atmosphere data files are located).

The Copy To Clipboard function will copy all of the diagnostic information to the clipboard. This should be included in e-mails whenever requesting support from Weather Graphics.

CAUTION

We strongly discourage saving maps, user data, or any file requiring write access in the Program Files directory or any of its subdirectories. This portion of the file system is write-protected by Windows. This change was introduced by Microsoft with the release of Windows Vista in 2007, as part of the new User Account Control (UAC) system. This UAC change is part of the reason very old versions of Digital Atmosphere do not work reliably under Windows Vista/7/8/10 (the other reason being the oldest versions were 16-bit applications). You may place user data under the Application Data path, or create your own user data folder elsewhere, such as under the Desktop or Documents directory or in a custom directory created under C: .

11 / Preferences

The preferences dialog is used to change any of numerous options for the software. Any changes you make are used only for the duration of the program's execution, *unless you mark "Save as default preferences" at the bottom of the dialog window*. If you check this box, the entire set of preferences is saved to your registry (HKCU\Software\DigAtm2015) and will be used each time you run the program. Advanced users can manually delete the HKCU\Software\DigAtm2015 with Windows REGEDIT if there is a need to "factory reset" all preferences.

The preferences menus are divided up into several sections, each of which may be accessed by clicking once on the tabs at the top of the dialog box. Just click on the tab corresponding to the settings you want to change to switch between preference pages.

11.1. General tab

Send errors to status window

If this option is checked, certain errors will be sent to the status panel at the bottom left. In particular this pertains to Internet retrieval errors.

Automatically check for updates

If checked, Digital Atmosphere will notify you when a new version is on the weathergraphics.com website. If an update is available, it will offer to download the update. If you accept, the Digital Atmosphere download page will appear in your default browser. Otherwise it will offer to remind you, and you can accept or decline.

If this is unchecked, Digital Atmosphere will not check for updates.
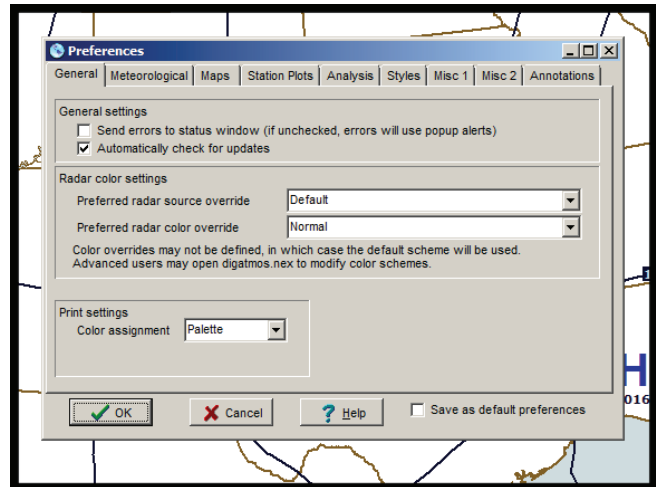
NEXRAD settings

* *Preferred radar source override*: This directs Digital Atmosphere to which set of URLs it should be using to retrieve its NEXRAD (WSR-88D) data. Expert users can load the file digatmos.rad, found in your Application Data folder (see Help > About) to view and edit the sets.

* *Preferred radar color override*: This sets the radar color table scheme. Expert users can load the file digatmos.nxc, found in your Application Data folder (see Help > About) to view and edit the sets. Note that we are changing the color set formats as of 2015 to support newer NEXRAD data formats, so this item may temporarily not work.

Print settings

* Color assignment: This can be used to experiment with how Digital Atmosphere maps colors to the printer, in case printouts do not look as expected. Simply try changing the value here and make a printout, and if it still does not look satisfactory then change it back.

Expert users: Setting this to Palette causes the Windows API function StretchDIBits to use DIB_PAL_COLORS in the iUsage field (which indicates the color structure of the source image). If the setting is RGB, then DIB_RGB_COLORS is used.

11.2. Meteorological tab

CAPE mixed layer depth

This sets the depth of the layer that will be used for mixed layer parcel calculations (including CAPE and parcel trace) in the Data > Soundings panel.

FOUS data level

Whenever you plot model (ETA/NGM) data, the temperature and moisture variables are determined according to this setting. Normally the first button (T1/R1) is selected to give you surface data, but by choosing another button you can plot or analyze temperature or moisture aloft (calculating derived values such as dewpoint should be done with caution, though, since T3 is not the same level as R2). Here are the meanings of the different levels.

Level   Equivalent

T1 Surface
T3 About 100 mb above surface (1 km)
T5 About 215 mb above surface (2 km)
R1 Surface to about 35 mb above the surface (lowest 1000 ft)
R2 About 35 mb above surface to 500 mb
R3 500 mb to the tropopause

Geopotential heights in full meters only

The geopotential height on upper-level charts are commonly plotted in decameters (dam). When this box is checked, contour labels and upper plot models will appear in full meters. When it is unchecked, the labels and plot models will switch to conventional shortening typically used by meteorologists (see table below). The default setting is unchecked.

Normal shortening values are as follows:
* 100-500 mb: Hundreds, tens, and units, dam.
* 501-1000 mb Hundreds, tens, and units, m.

Round synoptic reports to nearest 3 hours when importing

You have two options when importing synoptic (SYNOP) data — you can either round the reports to the nearest 3 hours (making maximum use of off-hour data) or use no rounding (ensuring sampling of the atmosphere at an exact moment). It is generally best to use no rounding when possible.

View NEXRAD RCM rather than RAREP radar data

This prevents two different radar formats from being mixed when you use Data > Radar > Echoes. Check this box whenever you use NEXRAD RCM data (such as that transmitted over EMWIN). If you use the old SD RAREP code, uncheck this box.

Round AIREP reports within __ mb of a standard level

Forecasters like to see AIREP reports on upper-air charts, but AIREPs are rarely at an exact standard constant-pressure level. When this box is checked, it allows AIREPs within a certain range of the active pressure level to be included on the map. Usually 25 mb is a good value. When it is unchecked, no AIREPs will be used unless they are at the exact pressure level that's active.

Display highs and lows when plotting frontal bulletins

This should usually be left checked. When you display a frontal bulletin using Data > Fronts, Digital Atmosphere will automatically plot highs and lows contained in that bulletin. However if you intend to plot an analyzed pressure analysis, you may want to have Digital Atmosphere determine the high and low locations. Thus you can switch off the frontal bulletin highs and lows with this option so they don.t clash.

If you wish to suppress drawing of highs and lows in Digital Atmosphere analysis, you will need to remove the HILO command from the appropriate analysis script entry in digatmos. mnu (see Analysis Scripting in the appendix).

Display pressure values when plotting frontal bulletins

This should usually be left checked. When you display a frontal bulletin using Data > Fronts, Digital Atmosphere will automatically plot any pressure values found in that bulletin for highs and lows. You may suppress these labels by unchecking this selection. This does not have any effect on highs and lows created with an Analysis command; it is solely for imported frontal bulletin message data.

Winter depiction: extend contours over non-precipitating areas

(Not implemented yet)

Convert ALSTG to SLP for analysis (advanced users only)

If you are plotting maps with sea-level pressure, then source data that does not offer a sea-level pressure value but does have altimeter setting data will be converted through a simple standard-atmosphere pressure reduction. This should not be used in mountainous areas or with unusually hot or cold temperatures.

Lowest possible METAR pressure

The METAR surface observation code format only allows the tens, units, and tenths place to be encoded, which means that Digital Atmosphere has to determine whether the final millibar value is 9xx.x or 10xx.x. The default value for lowest METAR pressure is 960 mb, which means that if a value such as 584 is found, Digital Atmosphere will assume it is 1058.4 mb, not 958.4 mb.

Normally there is no need to change this, but if you're looking at exceptionally low pressure

areas and the sea level pressure contours aren't plotting correctly, you'll want to decrease this value. Likewise, if you're looking at very high pressure and the sea level pressure contours aren't plotting correctly, you'll want to increase this value. Some adjustment may be needed during the cold season in temperate and polar latitudes.

Earth's rotation constant

Specifies the earth's rotation in radians per second, which is normally set at 0.000007292. Naturally, there is no need to change this unless you want to tinker and see the results. The earth's rotation constant is used in the Coriolis parameter equations, which are used for geostrophic wind calculations and calculation of absolute vorticity. Hitting reset replaces any entered value with the Earth's rotation constant.

Gravity constant

Specifies the gravity on the Earth's surface, which is normally set at 9.806 m/s-2. There's no need to change this unless you want to tinker and see the results. Gravity is only used in the calculation of geostrophic wind based solely on height contours. Hitting the reset button replaces any entered value with the Earth's gravity constant.

11.3. Maps tab

Topography: use avg elev rather than max

This controls what source of data is used when you select Map > Make Topography. When it is checked, average elevation data is used. When it is unchecked, the maximum elevation data is used.

Fill outer space

When the map is zoomed out to where you can see the disc of the Earth, the area outside the disc (the outer space area) will be filled with the general plot color if this option is selected.

Label graticule

When checked, and the are checked and active, latitude/longitude labels will be placed at the left and bottom of the map consistent with the setting.

Draw graticule behind landmasses

If checked, the latitude/longitude graticule will not appear on top of landmasses and will only be shown over oceanic areas.

Plot legend on right hand side of the map

The product legend will appear on the right side of the map if this is checked, otherwise it will appear on the left side.

Copy viewed point files from PLS to PLT format

Data point files that were used before 2008 used the older PLS format. If checked, Digital Atmosphere will offer to convert them for you to the new PLT format if they are encountered.

Graticule type

Digital Atmosphere can overlay a latitude/longitude grid, and here you can control how it will be displayed. You will see the lat/long grids only if the .lat/long grids. setting in the .map element table. is checked and only when you re-generate a new map. Note that the grid interval is controlled by the .grid interval. setting and the color is controlled by the grid color listed in the .map element settings. color table.

* *Line*. Plots latitude/longitude as a series of lines.

* *Mixed*. Same as "line" above, but also adds dots for every integer degree of latitude and longitude. The size and interval of the dots is fixed and cannot be controlled.

* *Cross*. Plots a cross at each latitude/longitude intersection.

* *Dash*. Plots latitude/longitude as a series of dashed lines.

* *Dotted*. Plots latitude/longitude as a series of dotted lines

Graticule interval

If a latitude/longitude map is plotted, this value controls what interval will be used (in degrees) to plot the grid. A value of 10 or 15 should normally be used. So that the grid wraps uniformly around the globe, the value you select should divide evenly into 360.

Default map size

When you use quick mapmaking commands such as Generate Map on the speed button toolbar, this determines what the map size will be in pixels.

Map features to be drawn

Use this table to set which geographical features you want displayed. Remember that these will not take effect until the next time you generate a map. Colors are set in Styles.

NOTE: To set translucency on states, set the Styles / Misc field for states to 1. This will prevent international borders from being redrawn with state/province line settings.

Professional map file tile root location

You can use this to adjust where the Professional maps can be located, such as if you copy them to a hard drive.

JPEG image compression

If you choose Map, Export and choose JPEG as an image type, the image will be compressed according to the settings you specify here. JPEG is a lossy compression scheme, which means that higher compression values result in degradation of the image. As the user, you select the tradeoff that you think is most acceptable. For a typical 640 x 480 image, a setting of 0% (loose) will result in a high-

quality image with a filesize of 225K. A setting of 100% (tight) will result in a very coarse image with a filesize of 11K.

11.4. Station Plots tab

Plot radar status labels

Whenever Overlay > Radar is chosen, this determines whether symbols are plotted at each radar location together with the radar echoes. By unchecking this box, only radar echoes will be plotted.

Station plot units

This controls the units (English or metric) used for plots of temperature, dewpoint, visibility, sea temperature, wave height, wind wave height, swell height, minimum and maximum temperature, elevation, precipitation, and .television. plots. This also controls the units used for Data > Television temperature plots.

Surface plot model settings

These settings only apply when the active level is the surface level and Overlay, Data is selected.

* *Plot wind barb*. If checked, Digital Atmosphere will plot a wind barb at each station plot when it is reporting valid wind data. If unchecked, no wind barb is plotted on any report.

* *Smart visibility plot*. If checked, Digital Atmosphere will omit plotting surface visibility when no significant weather is occurring. If unchecked, surface visibility is always plotted.

* *Plot missing as "M"*. If checked, missing values for key elements will be plotted as "M" instead of left blank.

* *Color code IFR/MVFR plots*. If checked, when stations are reporting IFR conditions (visibility less than 3 miles and/or ceiling less than 1000 ft), the OKTAS (sky cover) plot symbol is colored red; when MVFR conditions (visibility less than 5 miles and/or ceiling less than 3000 ft), the OKTAS (sky cover) plot symbol is colored blue.

If unchecked, the standard draw color is used to paint the sky cover plot symbol.

* *Use km when above 5000 m*. If a visibility is reported as greater than 5000 m (5 km) it will be reported in whole kilometers.

* *Plot model configuration*. A "grid" of combo boxes are set up in a way that represents the various data positions around a given station plot. You can use these combo boxes to adjust the kinds of data that are plotted in the different positions. A "Save Plot Model" and a "Load Plot Model" option are provided so that you can make quick, on-the-fly changes to the desired plot model. For a listing of the different types of data and the meaning of encoded values, please see the Appendix.

* *Load plot model*. Loads a predefined plot model configuration from disk.

* *Save plot model*. Saves the current plot model configuration to disk.

Upper plot model settings

These settings only apply when the active level is an upper level and Overlay, Data is selected.

* *Plot wind barb*. If checked, Digital Atmosphere will plot a wind barb at each station plot when it is reporting valid wind data. If unchecked, no wind barb is plotted on any report.

* *Fill dewpoint depression circle*. If checked, Digital Atmosphere will "shade in" the station plot of each upper level station whenever the dewpoint depression is 5 deg C or less. If unchecked, all station plots are left unfilled.

* *Plot model configuration*. A "grid" of combo boxes are set up in a way that represents the various data positions around a given station plot. You can use these combo boxes to adjust the kinds of data that are plotted in the different positions. A "Save Plot Model" and a "Load Plot Model" option are not provided for upper air plot models since most users will stick to a single configuration.

* *Load plot model*. Loads a predefined plot model configuration from disk.

Save plot model. Saves the current plot model configuration to disk.

11.5. Analysis tab

Analysis type

Specifies which algorithm is to be used to construct the analysis.

Nearest neighbor (proximal interpolation) — This is by far the quickest, and most users will use this setting. It is a simple multivariate interpolation scheme. Values are mapped to the closest gridpoint. This leaves some gridpoints unfilled which are not near a station. These unfilled points are filled by "expanding" gridpoints outward in all four directions to their unfilled neighbors until all unfilled points are completed. Afterwards, a smoothing operator removes noise, with the smoothing proportional to how soon in the iteration cycle the gridpoint was filled with data.
STRENGTHS: It's fast and always works since a gridpoint will always be matched with a data point.
WEAKNESSES: Very simplistic technique. In data void areas, the transition between gridpoints using different sources takes on a linear or pie-shaped appearance.

Weighted — Digital Atmosphere looks at the neighboring stations around a gridpoint, giving it an average of those values around it with more weight allotted to values from closer stations and less weight from distant stations.
STRENGTHS: This method is more sophisticated than Nearest Neighbor as it uses multiple sources of data, considering distance. Since the crude expansion technique is not used, this eliminates noise in the analysis.
WEAKNESSES: Not as sophisticated as the Barnes and Cressman techniques.

Barnes — The Barnes method, the cornerstone of the MCIDAS and GEMPAK weather workstations, has a number of advantages: versatility, simplicity, and speed. The 1964 Barnes version used a radius of influence, R_m from each gridpoint, where stations exceeding R_m are discarded and stations within R_m are assigned a distance-dependent Gaussian weighting function. A difference field is calculated, which determines how far off from reality the analysis field appears to be, then a difference correction is applied to the analysis field. This takes a relatively long time to compute, but is one of the more accurate analysis algorithms.
STRENGTHS: Only two passes are necessary.
WEAKNESSES: It can fail with extreme data distribution.
REFERENCES: *Koch, SE, des Jardins, M, Kocin, PJ 1983, "An interactive Barnes objective map analysis scheme for use with satellite and conventional data". J Climate Appl. Meteor., 22, 1487-1503.*

Cressman — The Cressman analysis method is similar to the Barnes technique, however it is a successive corrections method (SCM) technique. In this technique, it uses multiple iterations with a smaller and smaller radius of influence to eliminate all errors. It takes more time, but the results can be superb if configured correctly. In data-sparse areas like over oceans, it is common for there to be erroneous contours with Nearest Neighbor and Weighted methods. The Cressman method is one of the best methods for use in these data sparse areas without smoothing fine-scale data near dense data areas.
STRENGTHS: It is sophisticated and flexible, and retains more mesoscale structure while smoothing data-sparse areas properly.
WEAKNESSES: It can't resolve short-wavelength components very well, it can require a large amount of time, and it can fail with extreme data distribution. It does not account for the distribution of observations relative to

one another. Also the optimum distance values might only be obvious after trial and error. REFERENCES: *Cressman, G.P. (1959): "An Operational Objective Analysis System". Mon. Weather Rev, 87, 367-374.*

For the following items, the letter after the title indicates the parameter applies to: N=Nearest Neighbor, W=Weighted, B=Barnes, or C=Cressman.

Automatic smoothing

If checked, Digital Atmosphere will automatically determine the surface and upper air surface radius based on existing data for the Weighted, Cressman, and Barnes analyses.

Smoothing coefficient

(ALL) Sets the mathematical value of "s" for the smoothing equation. This affects what kind of wavelengths will be filtered in the analysis grid.

Smoothing passes

(ALL) Determines how many times a smoothing operator will operate whenever it is called. With this, you can set how "smoothed" the maps will look when the analysis is complete. This should be set to "1" or to a low non-zero value.

Surface radius / Upper radius

(W, B, C, in nm) Determines a radius of influence used in the Weighted, Cressman, and Barnes analysis method for surface data. All data outside the radius of influence is ignored. This value should approximate the average spacing between surface stations. For good results in data-sparse oceanic areas use Cressman and increase this radius to 500-1000 nm or more, with at least 4 or 5 reduction steps (below).

Auto Surface/Upper radius

(W, B, C) When the "Auto" box is checked, Digital Atmosphere will ignore the Surface/Upper Radius slider values and calculate an appropriate amount based on the areal width of the workchart. This allows flexibility between mesoscale maps and oceanic maps with large data voids. The user can exert control over the final value with the Auto Radius Bias slider (below).

Gamma

(B) This is known as the "convergence parameter". It determines the gamma used in the Barnes analysis method. It may range between 0..1, but a value of 0.2 to 0.3 is recommended.

Reduction

(C) Determines the number of interval steps used in the Cressman algorithm between the surface/upper radius and zero. For example if radius=300 and reduction=4, then each analysis pass will analyze stations within 300, 225, 150, then 75 nm of a gridpoint, with the earlier passes capturing large-scale waves and the later passes capturing small-scale waves.

Increasing this number will increase the sensitivity to a variety of wavelength scales. Decreasing it will make the analysis proceed faster at the cost of degraded sensitivity to various wavelength scales. The analysis time is proportional not only to the analysis type and the number of reduction steps, but also to the number of stations that exist in the window.

Analysis domain size

This controls the number of gridpoints in the analysis domain. The default is 30 x 30, but you can set it to 60 x 60 for fine-scale analysis. The maximum this should be set to is 100 x 100, and larger sizes may cause memory errors. A good rule of thumb is that the gridpoint count should exceed the number of stations in the domain by more than twice (i.e. the grid should be no more than 40 x 40 when 800 stations are available,

though higher gridpoint counts may be needed with increased station clustering. Station domain counts may be found under the status window when Data > Data Plots is performed. Excessive gridpoint resolution may cause noise and unusual isopleth artifacts, especially if the analysis does not have enough smoothing or reduction passes.

Isopleth - small fonts

This option simply controls what size and type of fonts are used to label contour lines on analysis charts.

Isopleth - negative fonts

Plots an inverted color font.

Auto radius bias

When Auto Surface Radius or Upper Radius is used, this biases the values by the given percentage. Normally this should be set to 100%.

11.6. Styles tab

With Digital Atmosphere you are not stuck having to use one set of map colors, line styles, and fonts for everything. Obviously when you want to use a different color set, this might mean spending a lot of time making tedious changes. Digital Atmosphere allows you to manage sets of colors, fonts, and line settings. These sets are known as styles. A style is identified by a plaintext name and a filename (all styles are stored in the \styles directory under Digital Atmosphere, without exception). To change the color settings, use the Preferences > Styles panel. Advanced users may edit the files directly.

Editing the parameters

Listed here are the various codes that appear in the edit window. Above all, be sure you pick Save when you are done, or your changes will be discarded!

Code

This is a predefined code that marks the parameter type for internal use. It cannot be modified.

Parameter

This is a predefined code that is used to provide a plain language explanation of the parameter for that row. It cannot be modified.

R, G, B

These are color codes, which must be a whole number between 0 and 255. The R column is for red, G is for green, and B is for blue. To pick orange, for example, you would set R to 255, G to 128, and B to 0. You do not need to use these columns. A vastly simpler input is available simply by clicking on the color swatch to the right of the R, G, and B columns. If you do wish to enter R, G, and B values, the following resource may help:

http://www.colorpicker.com/

Do not enter hex (hexadecimal) values; they will not be recognized.

Color swatch

Click on the color swatch to select a different color. In the popup window, a crosshair will show the current color value. Move it around or change the values to pick a new color. The value of R, G, and B will be filled in automatically for.

Contour type

Indicates the purpose of this contour. It cannot be modified.

Unit

Proper entries are as follows. Do not mixmatch units or the program will ignore the setting and use a default unit. Units marked with * cannot be changed.

Temperature	deg f, deg c, deg k
Moisture	g/kg
Relative Humidity .	percent
Horizontal Velocity	knots, mph, m/s
Vertical Velocity . .	microbars/s
Height	meters
Pressure	mb, hpa, kpa, inches
Precipitation Totals	inches, mm

Base

Determines the base value that the intervals are based off of. For example, if you use an interval of 5 degrees, a base of zero will give 0, 5, 10, 15, 20, 25.. degrees. If you use a base of 2 degrees, you.ll get 2, 7, 12, 27, etc. Always reduce the base to the lowest common denominator (as close to zero as possible).

Interval

Represents the contour step interval (the numerical difference between each contour).

AI

Automated interval. If y is entered, Digital Atmosphere will override the base and interval settings and choose the ones that will give the clearest view of the data field.

Style

Indicates the linestyle that will be used to draw the contour. Acceptable values are solid, dash, or dot. Radar echoes must be either solid, clear, bdiag, fdiag, cross, crdiag, horiz, or vert.

Making a new style

At some point you may not be happy with just editing the default styles. When you want to create a new style, click the New... button.

Enter a plaintext name. Choose any phrase that will readily identify the map to you. A brief phrase without any brackets should be used.

Filename for this map style. The file shown here is what the filename will be on your hard drive. This will be filled in automatically when you choose a plaintext name. However the edit box gives you the opportunity to override the filename. Only alphanumeric characters and dashes are allowed.

Style template filename (optional). Normally the new color settings will be extracted from the \styles\master.stx file. If you'd like to clone a different file, choose it here.

Creating style files manually

Advanced users can can create their own style files manually in a text editor, as long as the filename ends with *.sty, resides in the \styles directory, and conforms to the style formats shipped with Digital Atmosphere in this directory. Incorrect configurations may produce an error in Digital Atmosphere and prevent fields from being generated.

NOTE: To set translucency on states, set the Styles > Misc. field for states to 1. This will prevent international borders from being redrawn with state/province line settings.

11.7. Misc1 tab

Advanced internet settings

If you use a proxy host, enter the name and port here. If you do not know the proxy settings, you will need to contact your ISP. We cannot guess thes settings or look them up for you. For example, users of Alphalink in Melbourne, Australia will notice on their Alphalink support pages that they would need to enter proxy.alphalink.com.au in "Proxy host" and 8080 in "Proxy port".

SPECIAL NOTE: Due to the use of more sophisticated connections to proxy servers, this may no longer work with many ISPs.

Color gradient fills

This section lets you define how gradient fills will look. It is designed mostly for experienced

users and will require some basic mathematical knowledge. The colors are defined according to the plotted Value for the particular point on the map, which will always be in the range 0..1, where 0 is the lowest possible reading and 1 is the highest possible reading. This Value is fitted to a sine wave according to user defined parameters to determine the Red, Green, and Blue component of its color.

See the appendix for full information.

Planetary maps

This preference setting is used for Map > Planetary Map generation.

* *Smooth final image*. Applies a smoothing function to the finished planetary map.

* *Reoverlay geography*. Plots the basemap on top of the planetary map.

Cities

Digital Atmosphere has certain functions related to cities (namely, Map > Cities and Map > Cursor City Distance). It is impractical for all 40,000 towns and cities in the United States to be displayed and used all the time. Therefore this panel gives the user control over how many towns and cities are considered.

Set the number high (in the thousands or tens of thousands) to use as few cities as possible. Set the number low (in the tens or hundreds) to use as many cities as possible. To determine whether a city will display at a given threshold, open digatmos.cty, look up the city, and look at its PROGDI value (cols 40-44).

You will have to enter a number lower than this value for it to be used. There is some variation in the sensitivity between different states and you may need to increase or decrease the factor for your region.

* *Cursor sensitivity threshold*. This controls which cities and towns will be referred to when Map > Cursor City Distance is active.

* *Plotting threshold*. Controls how many cities and towns will be plotted when Map > Cities is chosen.

Special diagnostics

This obtains diagnostic information for specialized user debugging purposes. As of 2015 its only function was to obtain system time data.

11.8. Misc2 tab

Copy imported data to local file

If enabled, data will be saved to a local file with a fixed filename. If you know how to write command line batch files, you can have a script which monitors this file for changes, and then when a change is detected it performs other operations on this file.

Debug GRIB data

(For internal use only)

Icons have black backgrounds

Icons plotted on the map will have black backgrounds.

11.9. Annotations tab

Text annotations / Highs and lows

Highs and lows will be plotted with the characters shown here. This is useful for international users who may have other abbreviations for high and low pressure areas.

Text annotations / Title

If this is enabled, a large title will be displayed at the top or bottom of the chart indicating the product name, such as "Station Plots". You can use the other options here to further fine-tune the appearance of the title and disable the small, detailed legend that nor-

mally appears in the bottom left or bottom right corner.

Text annotations / Credits

This will display a permanent credit at one corner of the screen, such as a copyright, website name, or source. Using the options here you can fine-tune it the way you want it to look.

Logo

Here you can specify a logo, such as a company image, to be displayed on the chart. Acceptable image types are GIF and JPEG.

12 / FAQs

If you are having trouble with Digital Atmosphere, first check and see if the problem you are having and its solution are listed here. If not, you can obtain technical support via the Internet. We always appreciate feedback and notification when users find bugs, since we are committed to producing the best possible product.

A station plot I want to look at isn't on the map

Digital Atmosphere operates with a default selection of using a clutter suppression algorithm, which avoids plotting a station if there is a chance it will overwrite an neighboring one that's already plotted. You can turn this off by going to File > Preferences > Station Plots and checking "Plot All Stations". This may make your map VERY cluttered. To have a legible, uncluttered map and see a particular station, your only options are zooming in further so that more stations in the region of interest are displayed, or eliminating a neighboring station you don't want to see by deleting it from the DIGATMOS. STN listing and selecting File, Recompile Tables. Plans are in the works for a station priority function that forces Digital Atmosphere to always plot a desired station before it uses the clutter supression algorithms.

Also check your "digatmos.rul" file to see if you have set exceptions or deletions for certain station. A couple of problematic stations are added by default.

The analysis isopleths don't seem to match well with the data.

All objective analysis routines are smoothed so that the isopleths don't look extremely coarse. You can reduce the smoothing operators in the

File, Preferences, Analysis menus. Also, take into account that if a station sends out a bad meteorological value, the analysis may yield a more representative value than the station plot itself. You can clean up bad data using the Quality Control command as discussed in previous chapters. If you need extremely accurate isoplething, hand analysis (on top of a printed map) is always the best solution.

Why are some station plots red or blue?

A red station plot indicates instrument flight rules (IFR), which means bad weather with the ceilings below 1000 feet and/or the visibility below 3 miles. A blue station plot indicates marginal visual flight rules (MVFR), meaning marginally bad weather, with the ceiling below 3000 feet and/or the visibility below 5 miles. These colors are useful for helping you visualize areas of poor weather at a glance. Areas poleward of a warm front are often characterized by extensive IFR (red) areas.

How can I make a map with the colorful topography?

Whenever you use the Map, Generate Map command, the map is always in monochrome outline format. We recommend using the Planetary Maps option (see the Maps section in this manual) for generating maps with topography, terrain, and vegetation.

Every now and then when generating a map, I see an area that's been flooded by an ocean fill.

There is probably a defect in the geography file that allows a gap in the coastline to be plotted. Let me know all the settings on the "Generate Map" panel so I can reproduce it. You may be able to fix this yourself by zooming in on the

suspect area and making changes to the data in the geography files to isolate and close off the coastline gap (see the File Commands, Generate Map section). If you succeed, let me know what you did so I can fix the distribution copies.

Digital Atmosphere never fills ocean colors.

This may happen if the map background color is set to a custom (non-basic) color. It is a limitation of the graphics components we are using. To remedy the problem, go to File > Preferences > Maps > "Background Color" and choose a color under Basic Colors (not a custom one) and make sure that Water Body Fill is checked. Then re-generate your map.

The printer responds with "overflow error" or erratic "out of paper" errors

The maps that Digital Atmosphere sends to your printer are huge and for best results will require 4MB or more of RAM on your printer. This usually isn't a problem with inkjet printers (where the printfile can be spooled off the hard drive), but laser jet printers require a complete image in their memory before they print to the drum. If this is the case, go to File > Printer Setup and change the resolution settings so the map is printed at a lower resolution. Another remedy is to avoid solid color fills, such as topography, blue oceans, etc, since they take up considerable printer memory.

The Digital Atmosphere status bar shows a countdown message down to zero, then I get the error message "Automatic/EMWIN surface file not found."

How it happens: When Digital Atmosphere is in EMWIN Scheduler mode, every 60 seconds it checks the "EMWIN Data Directory" for the presence of the "EMWIN Surface Datafile". If there is no such file, an error message is returned and Digital Atmosphere turns off the EMWIN Scheduler.

How to fix it: First, find out what file the surface observations are being stored in. For example, the satellite EMWIN feed usually puts them in:

Directory:
   C:\WEATHER\WXDATA\RXFILES\
File:
   SAHOURLY.TXT

Check this in Digital Atmosphere by going to File > Preferences > General. Compare "EMWIN Data Directory" to the correct directory and "EMWIN Surface Datafile" to the correct data file.

FD observations will not plot.

This is usually due to one of several things:

* The file containing weather observations either does not contain FD observations or was not imported by Digital Atmosphere.

* Before plotting the data, the current level is not set to a level in feet.

* The FD observations have been reformatted or are in a nonstandard format, and they have failed the pattern recognition algorithms in Digital Atmosphere. If this happens, please send a sample of the file (no larger than 50K) to support@weathergraphics.com and we will try to provide added support for the format in future releases of the program. Be sure to clearly mark what is wrong with the sample or we will not be able to do anything with it.

Upper level height contours don't work. The computer freezes up.

Go to File > Preferences > Analysis > "Figure geostrophic heights". If it is checked, height contours can take a long time on old computers. Newer computers should not have this issue.

Do you need the Internet to use Digital Atmosphere?

No, you don't. Digital Atmosphere will work with saved (canned) data, as long as it is given a file containing raw weather data.

How can I change isopleth colors, linestyles, and intervals?

Edit the Analysis script (under Analysis > Edit Analysis Script) to change the COLOR= entry for the isopleth type and set new red:green:blue values. In old (pre-2003) versions of Digital Atmosphere, go to File > Preferences > Contours and make the changes.

I get a "Range Check" or "Floating Point Overflow" error when importing data. However everything else seems to work fine.

This is caused by a corrupt data element in your file that is causing Digital Atmosphere to abort one of the import modules. It will continue importing data, but one of the data types (such as synoptic, SD, or rawinsonde) will be unavailable. Range check errors are for the most part harmless though annoying. If this happens, please send a sample of the file (no larger than 50K) to support@weathergraphics.com and we will try to fix it in the next version of the program. Be sure to clearly indicate the problem with the sample or we will not be able to do anything with it.

How can I download data to a file and then load it into Digital Atmoshere so that it can process the data?

You must save the incoming weather data into a disk file. Under your favorite browser, bring up the raw data on your screen, then choose "File, Save As..." and save it as a text file (not HTML). Remember the location you saved it to. Then go into Digital Atmosphere, choose "File, Import a file..." and choose that file. After it imports, you can then plot and analyze it. Note that if you're on the Internet, you can skip this whole process by choosing Internet > Retrieve Data and let Digital Atmosphere do all the work.

I'm having problems printing to my HP Laser-Jet printer.

This issue may have been solved in Windows 7/8/10. Around 2005, some users reported problems printing to HP LaserJet printers (such as getting blank pages). To fix this, go to print setup (below), and either change the resolution from 600 to 300 dpi or change "vector" to "raster". If your printer is equipped with a PostScript option, use the PostScript mode for 600-dpi printing. This 600-dpi PCL5 printing problem is not specific to Digital Atmosphere. Documents with various graphic images may not print correctly to the LaserJet 4 in PCL mode at 600 dpi unless the Graphics option in the Windows printer driver setup is set to Raster mode.

Digital Atmosphere is missing the mouse tracker and roaming SKEW-T.

The mouse tracker has been replaced by right-clicking on the map and choosing "Get lat/long". The roaming SKEW-T will be enabled soon.

When using the Internet Data Retrieval function, Digital Atmosphere always retrieves the wrong file, a missing file, or the file for an incorrect time.

This will happen if your computer clock is set to the wrong time or Windows is set to the wrong timezone. Also if you've recently gone off or came onto daylight saving time, check File > Preferences > General > "Adjust for daylight time". To set the timezone, head to your Windows status bar and right-click on the time clock. Choose Adjust Time/Date. Then look at the Time Zone tab. Make sure these settings are all correct. Digital Atmosphere tries to determine UTC (Greenwich Mean Time) based on the system time and the time zone setting, and using this data tries to retrieve the appropriate file.

How can I customize the Television Plot cities?

All you need to do is look in your Digital Atmosphere program directory (using any ASCII editor such as Windows Notepad) and edit the file named DIGATMOS.PLL . Columns 1-4 should contain the ICAO (for METAR observations) and columns 6-10 should contain the synoptic station number (for synoptic observations). Either the ICAO or synoptic identifier, or both, can be used. Columns 12-50 should contain the text for the station that you want plotted on the map (leave it blank if you want nothing). We hope to do away with this crude interface in an upcoming version of Digital Atmosphere and add a city list interface.

I performed a contour analysis but no lines appear.

In most cases, the contour lines have been set to the background color. Go to File > Preferences and check the colors under the Map tab and the Contours tab.

APPENDIX

APPENDIX A — Terminology

Please refer to these key terms when asking for technical support or talking with other users. It will help streamline some of the confusing "lingo" used for the functions in this program.

ACTIVE LEVEL — At any given moment, Digital Atmosphere will only perform analysis or plotting operations for a certain type of data or height/level (such as surface, 300 mb, NGM model output, etc). Active level describes which one is the current one. You change it by going to the Level menu. The active level is indicated by a checkmark in the Level menu, as well as in the title of the status panel.

ANALYSIS — See objective analysis.

DERIVATIVE FIELD — The vorticity, divergence, or advection of a selected primary field.

DIALOG BOX — Any box (window) that pops up on the screen temporarily asking you to enter or click something.

FORMATTED BINARY DATA FILE — The end results of File, Import, where tables of raw data are stored on disk and made available to the plotting or analysis routines. These files consist of compressed data and can only be modified using the File, Quality Control function.

IMPORTING — The process of "crunching" raw data. This is how you feed new data into Digital Atmosphere. The data is stored in formatted data files.

ISOPLETHING — The process of Digital Atmosphere drawing contours, or lines, on the screen, as the result of an objective analysis. Isopleths are not "plotted"; they are "drawn".

MAP ATTRIBUTE FILE — A small file (36 bytes) that is paired with a geographical bitmap file to provide mathematical mapping information about that image. A map attribute file has the file extension "ATR".

MAP GENERATION — Forcing Digital Atmosphere to draw a customized map based on latitude, longitude, and zoom settings that the user selects.

OBJECTIVE ANALYSIS — The process that Digital Atmosphere undergoes before it can show a contour or isopleth. It consists of looking at data at randomly-spaced points, mapping it to a grid, and running smoothers on the grid. In the context of this user's guide, I will refer to objective analysis as simply "analysis", and refer to human analysis as "hand analysis", etc.

OCEAN FILL — The blue color that Digital Atmosphere usually draws in oceans and lakes.

PLOT — See station plot.

PRIMARY FIELD — An atmospheric property that the user chooses to analyze. The user may also force Digital Atmosphere to calculate a derivative field of the primary field.

RAW DATA FILE — The original weather data from online services, the Internet, etc, that is fed into Digital Atmosphere when the user selects File, Import. First, the file is copied and filtered to produce a clean data file (C:\DIGATM\DATA.USR), and then data is imported, producing a formatted data file.

STATION PLOT — A small grouping of numbers and symbols that depicts the observed weather at a given location. Plots are not "drawn"; they are "plotted".

STATUS PANEL — The window that shows the clock, the active level, data display options, and import filters.

STERILIZED DATA FILE — A temporary file containing original raw data that is produced whenever the user imports data. It contains no control codes or extraneous characters. The sole purpose of a clean data file is for the File, View Raw Data command and for Digital Atmosphere functions where English-language bulletins are drawn on the screen (such as tornado watches, convective outlooks, etc). Weather data plots and analyses do not come from this file, but from the formatted data file.

TOPOGRAPHY — The multicolor shades that can be manually drawn on landmasses to represent terrain.

UPPER AIR — Involving any level besides the surface.

APPENDIX B — Custom data fields

A custom data field comprises a package of data that can be readily imported into Digital Atmosphere.
You can create this data by any means (using third-party programs).
The custom data field must always be placed in the file CUSTOM.DAT in your Digital Atmosphere directory.
It should be structured according to the following example:

```
THUNDERSTORM DAYS (ALL MONTHS)
US AL:Bir 722280    33.567    -86.750    57          *
US AL:Oza 722269    31.283    -85.717    73          *
US AL:Hun 723230    34.650    -86.767    54          *
US AL:Mon 722265    32.383    -86.367    56          *
```

Here is a breakdown of each row and column:
Row 1   A header that will be used by Digital Atmosphere to title the field
Row 2+ Custom data

Column 1-19   Not used. The user may wish to put location names here.
Column 21-29 Latitude (degrees and thousandths; negative is southern hemisphere)
Column 31-39 Longitude (degrees and thousandths; negative is western hemisphere)
Column 41-49 Primary data value
Column 51-59 Secondary data value

Ingesting a scalar field. When a simple scalar field (such as temperature, pressure, wind speed, etc) is imported, the value must be placed in the primary data value field, and the secondary data value field must contain an asterisk character: *.

Ingesting a vector field. If a numerical value is detected in the secondary data value field, Digital Atmosphere will assume a vector field (such as wind u/v component) is being ingested. The primary data value must assume a direction relative to true north (such as wind direction), and the secondary data value must assume a magnitude (such as wind speed). When vector data mode is being used, analysis calculations will use wind barb symbology to represent data elements.

APPENDIX C — Map attribute file format

For technically inclined users only!

This file, ending with the file extension *.ATR, is associated with each map which is saved to disk. The attribute file consists of 6 48-bit floating point numbers. They can be modified as follows:

Number   Purpose
1   Central latitude (degrees)
2   Central longitude (degrees)
3   Zoom setting
4   Horizontal offset (in pixels)
5   Vertical offset (pixels)
6   Projection, where
                         0 or 2 = orthographic
                         1 = polar stereographic (not implemented)
                         3 = space oblique (not implemented)

APPENDIX D — Field and product codes

Product codes
Represents a set of data (a product).

```
pla ACARS plots
plf Standard data plots
plc Custom data plot
tdy Television-style data plots
rad Radar plots
sf0 Europe sferics (0 hr)
sf6 Europe sferics (6 hr)
wgr Wind grid
```

Field codes
Representing a single quantity; usually a scalar value.

```
tmf Temperature (deg F)
tmc Temperature (deg C)
pot Potential temperature (deg K)
wcx Wind chill factor
hix Heat index
dwf Dewpoint (deg F)
dwc Dewpoint (deg C)
rhu Relative humidity
mxr Mixing ratio
eqp Equivalent potential temperature (the-
ta-e)
slp Sea level pressure
alt Altimeter setting (QNH)
wsp Wind speed
cig Ceiling
hgt Geopotential height
thk Thickness (1000-500 mb)
wrx Warning overlays
p01 1-hour precipitation
p06 6-hour precipitation
p12 12-hour precipitation
p18 18-hour precipitation
p24 24-hour precipitation
rst RCM radar storm centroids
rhl RCM radar hail signatures
rms RCM centroid movement and speed
rtv RCM tornado TVS signature
reh RCM echo height signatures
rem RCM echo movement
wxp ASUS1 KWBC frontal depiction bulletin
ste Sea surface temperature
pdw Wave period
htw Wave height
hti Wave instrument-measured height
pdd Wind wave period
htd Wind wave height
di1 Primary swell direction
di2 Secondary swell direction
pd1 Primary swell period
```

```
ht1 Primary swell height
pd2 Secondary swell period
ht2 Secondary swell height
cig MVFR/IFR weather
dy1 SPC Convective Outlook Day 1
dy2 SPC Convective Outlook Day 2
06k Surface-6000 ft shear [not completed]
lcl Lifted condensation level [not com-
pleted]
be+ CAPE [not completed]
be- CIN [not completed]
cxx [not used]
hux [not used]
iht [not used]
zb+ [not used]
prt [not used]
```

Radar product codes
All ranges 128 nm unless otherwise noted

Base reflectivity
```
BREF1   Base reflectivity 0.5 deg
BREF2   Base reflectivity 1.5 deg
BREF3   Base reflectivity 2.4 deg
BREF4   Base reflectivity 3.4 deg
BR248   Base reflectivity 0.5 deg (248 nm)
```

Base velocity
```
BV32    Base velocity 0.5 deg (32 nm)
BVEL1   Base velocity 0.5 deg
BVEL2   Base velocity 1.5 deg
BVEL3   Base velocity 2.4 deg
BVEL4   Base velocity 3.4 deg
```

Base spectrum width
```
SW      Spectrum width
SW32    Spectrum width (32 nm)
```

Derived products
```
CR      Composite reflectivity
CR248   Composite reflectivity (248 nm)
ET      Echo tops
SWP     Severe weather probability
VIL     Vertically integrated liquid
STI     Storm tracking
H       Hail detection
TVS     Tornado vortex signature
M       Mesocyclone
OHP     One-hour precipitation
THP     Three-hour precipitation
STP     Storm total precipitation
SRMV1   Storm relative velocity 0.5 deg
SRMV2   Storm relative velocity 1.5 deg
SRMV3   Storm relative velocity 2.4 deg
SRMV4   Storm relative velocity 3.4 deg
CFC     Clutter filter
```

APPENDIX E — GRIB data

Because of the complexity of GRIB data and the fact that it is not fully supported by Digital Atmosphere yet, Weather Graphics Technologies will not provide assistance in locating, retrieving, or using GRIB data. It is provided as-is. Comments are welcomed but we may not be able to respond to questions. If you need help, please access our public discussion group on our website at www.weathergraphics.com

Sources
The majority of GRIB output data is available from supercomputer models, such as the ETA model output provided by the National Center for Environmental Prediction near Washington DC. Sources of data include (updated as of 2018):

http://tgftp.nws.noaa.gov/SL.us008001/ST.opnl/- Choose the .grl directories. Within these, try to choose the smallest datasets, as even the smallest ones will contain a vast amount of data. The larger ones may crash Digital Atmosphere. A good dataset usually ends in awp211. These are GRIB sets but will not have a *.grb extension. To get them to show up you will need to change the filetype to "AWIPS" or "all" when choosing a GRIB file to import.

https://www.ecmwf.int/en/forecasts/datasets/wmo-essential (follow Public FTP link)

New NWS GRIB filename convention

Since 2002, the NWS has used a hierarchichal naming convention that forms a URL. An example is:
  http://weather.noaa.gov/pub/SL.us008001/ST.opnl/MT.eta_CY.00/RD.20031009/PT.grid_DF.gr1/fh.0000_tl.press_gr.awp211

This shows that at the central server location (SL.us008001), one can find operational status data (ST.opnl) consisting of the Eta 00Z cycle model (MT.eta_CY.00) produced on 09 Oct 2003 (RD.20031009). Within this one can find GRIB data (PT.grid_DF.gr1) consisting of data for the 00h forecast hour mapped onto the AWIPS 211 grid (fh.0000_tl.press_gr.awp211).

For more information on this naming convention see
  http://www.nws.noaa.gov/datamgmt/filstnd.html (Directory and File Naming Standards)
  http://www.nws.noaa.gov/datamgmt/tgftp_file_reference.html (TGFTP File Reference).

Old NWS GRIB filename convention

The legacy filename format for NWS GRIB data is as follows. Some datasets can still be found in the top-level directory at http://weather.noaa.gov/pub/ which use this filename convention.

Sample: us008_gf000_02020300_HxXAx

Portions: us008_gfMMM_YYMMDDHH_ADGT

Here is what each field means:

MMM - Model code. Underlined codes are in current use as of February 2002; others are obsolete and are listed only for historical purposes. 000=Experimental, 010=GlobalWindWave, 039=NGM, 044=SeaSfcTemp, 076=MRFbiascorrected, 077=AVNfcst, 078=MRF, 080=MRF, 081=AVNinit, 082=MRFinit, 083=ETA80km, 084=ETA22km, 085=ETA29km, 086=RUC60km, 089=ETA48km, 094=MRF-T170/L42, 096=AVNfcst-T170/L42, 121=WesternNorthAtlanticwavemodel, 122=AlaskaWatersRegWaveModel, 130=MergeOfRucEtaSpectral.

YYMMDDHH - Year, month, date, and hour - of model start time.

A - GRIB designator - H=WAFS (Family Of Services), Y=AWIPS, Z=AWIPS.

D - Data type. X=mixture.

G - Grid. A=201 (Nhem/PS), H=213 (US/PS), I=202 (US/PS), J=203 (Alaska/PS), K=204 (Hawaii/MER), L=205 (PuertoRico/PS), M=206 (CentralUS/LAM), N=207 (Alaska/PS), O=208 (Hawaii/MER), P=210 (PuertoRico/MER), Q=211 (US/LAM), R=212 (US/LAM), T=214 (Alaska/PS), U=215 (US/LAM), V=216 (Alaska/PS), X=experimental. Code following the geographical area means PS=Polar Stereographic, LAM=Lambert Conformal, MER=Mercator.

T - Timestamp. A=00, B=06 C=12, D=18, E=24, F=30, G=36, H=42, I=48, J=60, K=72, L=84, M=96, N=108, O=120, P=132, Q=144, R=156, S=168, T=180, U=192, V=204, W=216, X=228, Y=240. However if "A" (GRIB designator) is Z (AWIPS), this will instead be A=02, B=03, C=04, D=08, etc.

Note that Digital Atmosphere will only process grids mapped in lat/long, polar stereographic, and lambert conformal projections

APPENDIX F — Scheduler scripting

Scripting is a powerful function that allows Digital Atmosphere to do various tasks while unattended. You can have it download data every half hour and always have the latest map displayed, or send charts to the printer automatically. The possibilities are up to you.

Scripting basics

To run a single script command
Simply type in the script command in the "command" line on the scripts toolbar. Hit return or click "Enter" and it will be processed. Note that this does not run a script; it just runs a script command. A list of commands is below.

To write a script
Use any text editor or click on Create Script on the scripts toolbar and you can begin typing your script. Note that scripts should use the file extension .dsf in order to be properly recognized in Digital Atmosphere. To "comment out" a line of code simply place a # (octothorpe), : (colon), or ; (semicolon) at the beginning of the line. Commands are generally not case-sensitive.

To run a script in run-time
Go to the scripts toolbar and select the Run Script button.

To run a script at startup
Advanced users can run scripts on Digital Atmosphere startup by using standard command-line parameters. A space and the full name of the script file is simply appended after the filename at the command prompt or in the shortcut property for Digital Atmosphere.

To use the scheduler
Go to the scripts toolbar and select the Scheduler button (it will say "Scheduler on..." or "Scheduler off..."). This will bring up a configuration window (see below) where the scheduler will coordinate which script files run at which time.

* You must set "Enable scheduler" for the scheduler to take effect.
* When the scheduler is no longer wanted, bring up this window again and unset "Enable scheduler".
* To specify the execution time for each script, write the execution time in 4-digit UTC time in hhmm format (i.e. 7:45 am is 0745 and 2:15 pm is 1415), followed by a space, and the name of the file (including its .dsf extension).
* Be sure to specify the full pathname of the file,

otherwise Digital Atmosphere will assume it is located in your Digital Atmosphere directory.
* There can be an unlimited number of scripts and execution times in this list.
* Advanced users: You can edit or swap out this schedule list if you wish; it's located in the Digital Atmosphere directory under digatmos.sft .

Data display commands

PRODUCT,type,level,title
Overlays a meteorological product on the map. The appropriate data must have already been imported. Valid type parameters are documented at the end of this section. Levels are specified as follows: for surface data, the level is 0 (zero); for millibar levels the level equals the millibar level (500, etc); and for FT height levels the level equals the ten-thousands and thousands digits multiplied by -1 (so 34,000 ft equals -34). The title parameter is optional and contains a text title that will be placed in the legend. Derived fields are not supported at this time.

ANALYZE,scriptstring
Performs an analysis using an analysis script command. For information on building an analysis script command please see the Analysis section.

FONTTRUETYPE
Forces workchart fonts to TrueType mode. Takes effect when new products or contours are displayed.

FONTNCEP
Forces workchart fonts to NCEP raster font mode. Takes effect when new products or contours are displayed.

SFCPLOTMODEL,filename
Loads a particular surface plot model. Filename must be the fully qualified filename with path and extension (*.sps).

Data management commands

DOWNLOAD,url,filename
Downloads a product from an Internet source. The url is the fully qualified, RFC 1738 standard URL (including filename), and filename is the full local name where the file will be stored.
Example: download,ftp://userid:password@ftp.mydomain.com/anonftp/pub/out.jpg,c:\da20\bin\map\in.jpg

UPLOAD,url,filename
Uploads a product to an Internet source. The url is the fully qualified, RFC 1738 standard URL (including filename), and filename is the full local name of the file to be uploaded.
Example: upload,ftp://userid:password@ftp. mydomain.com/anonftp/pub/out.jpg,c:\da20\ bin\map\out.jpg

Note that you can set a password privately by using the DIGATMOS.PWD file (if there isn't one, you may create it). This will make your scripts secure and prevent passwords from showing up in the status windows. This file must be located in the Digital Atmosphere directory. Make entries as follows:
token=value
So if you have a login for your blog site, you might have something like this in your DIGAT-MOS.PWD file:
myusername=joeblow
mypassword=12341234
When Digital Atmosphere encounters %%something%% in your URL, it will replace it with the values you defined in DIGATMOS.PWD. Thus, in the example above %%myusername%% would get replaced with joeblow, and %%mypassword%% would get replaced with 12341234.

INGEST,filename
Imports the specified data file (filename is a fully qualified file name).

Radar commands

RADAR,product,station
Retrieves the desired radar product from the given station. Station is a 3-letter station identifier (e.g. FWS, EWX, etc). Multiple stations are separated by one space character. Product is the Radar Product Code from the table below.

RADARPLOT
Plots the latest retrieved radar data.

RADARSAVE,filename
Saves the latest retrieved radar data to a given filename.

IMPORTRADAR
Imports an imagemap radar, using parameters selected in Radar > Import Radar Images.

Derived product commands

HURRICANE
Imports hurricane bulletins.

HURRMODEL,type

Plots hurricane models. The type is as follows: 0, splines only; 1, splines and datapoints; 2, splines, datapoints, and labels.

FLEET
Plots all fleetcode information.

FLEETHL
Plots fleetcode bulletins with only highs and lows.

FLEETF
Plots fleetcode bulletins with only fronts.

FLEETI
Plots fleetcode bulletins with only isobars.

Graphics commands

LOAD,filename
Loads a map. IMPORTANT: You must specify the .dmf file in your filename, e.g. c:\da20\bin\ mymap.dmf . The associated map will also be loaded.

SAVE,filename
Saves a map. The filename parameter is the fully qualified filename without the extension (i.e. without .bmp).

EXPORT,filename
Exports a map (i.e. saves it to a variety of formats and without the accompanying .atr file). The filename parameter is the fully qualified filename with a valid extension (may be bmp, gif, jpg, png, pcx, or tif). Compressed TIFF saving is not available.

IMPORT,filename
Imports a map.

SOUNDING,station
Plots a sounding for the given station.

ERASE
Erases all of the overlays on the map.

BLANK
Erases the overlays as well as the basemap.

STAMP
Imprints a timestamp at the top of the map that says "GENERATED (date) (time)".

CLIP
Copies the map to the clipboard.

GRADIENTCOLOR,red|blue|green,ph1|ph2| scale|offset,value
Sets one of the File > Preferences > Misc > settings to a particular value. This allows the script

to change a contour gradient scheme on the fly.

Programming commands

SET,keywordnumber,keyword
Sets a specified keyword (1 through 9) to a certain value. You can then use this keyword later on in the same script simply by placing the token $$x anywhere in the code, where x is the keywordnumber. This is useful for managing large scripts.

Examples:

SET 1 500
Sets keyword 1 to "500"

PRODUCT $$1 HGT
$$1 indicates "500", so here 500 mb heights are plotted

PRODUCT $$1 TMP
$$1 indicates "500", so here 500 mb temperatures are plotted

TIMERON
Enables the script timer. It will adhere to the current timer script schedule.

TIMEROFF
Turns off the script timer.

PRINT
Prints the map to the default printer using default settings.

SLEEP,seconds
Causes Digital Atmosphere to pause for the specified number of seconds. An hourglass cursor will be displayed during this time.

SPAWN,filename
Executes an executable file or MS-DOS batch file specified by filename (must be a fully qualified filename with correct path; e.g. "c:\utilities\myprogram.exe").

MINIMIZE
The Digital Atmosphere application window is minimized.

MAXIMIZE
The Digital Atmosphere application window is maximized.

NORMAL
The Digital Atmosphere application window is neither minimized nor maximized.

QUIT
Quits the program

Mapping commands

MAKE,projection,lat,long,zoom,width,height
Makes a map using the given coordinates. Projection is an integer (1 for standard orthographic, 2 for polar sterographic, 5 for satellite, 3 for mercator, and 10-29 for special NEXRAD projections). Lat is negative in the southern hemisphere. Long is negative in the western hemisphere. Zoom is a value equal to 3964/x, where x is the width of the map in statute miles. Width and height are the map sizes in pixels.

TOPO
Makes a topographic underlay on the map (takes some time).

POINT
Plots points.

BASEMAP
Plots the basemap.

CITY
Plots cities.

COOUT
Plots county outlines.

CONAME
Plots county names

HIGHWAY
Plots Interstate highways (U.S. only).

ROAD
Plots major roads (U.S. only).

CUSTOM
Plots custom overlays.

REMOVE
Removes the last product from the display.

Deprecated commands

THESE COMMANDS ARE NOT SUPPORTED AS OF THIS BUILD. THIS IS A REFERENCE FOR DEBUGGING OLDER SCRIPTS.

CENTER,station,zoom,width,height
Makes a map with the chosen station in the center of the screen. Zoom is a value equal to 3964/x, where x is the width of the map in statute miles. Width and height are the map sizes in pixels.

ARCHIVE,cddriveletter,yymm,yymmddhh
Accesses data from the Weather Graphics Tech-

nologies Surface Archives or Upper Archives CD-ROM. The cddriveletter parameter is the drive letter, while yymm is the year and month (full four digits) and yymmddhh is the year, month, date, and hour (full eight digits). Caution: This command has not been fully tested and may not work.

GRADIENT,on|off
Turns on or turns off the File > Preferences > Contours > option.

ISOPLETH,on|off
Turns on or turns off the File > Preferences > Contours > option.

List of valid product types
For a list of valid codes, see the appendix showing Valid Product Types.

Sample scripts

This script downloads synoptic data from Albany (offline as of 2017), imports it, displays plots, and iso-pleths sea level pressure, then outputs it to a file. Note that this will probably not work on your computer without changes, and is only intended to demonstrate the appearance of script commands.

Note the first line below is split onto two lines due to lack of room on this PDF document.

```
download,http://www.atmos.albany.edu/weather/data1/surface/syn/@Y@M@D@S_syn.wmo,c:\digatm\
data\test.dat
import,c:\digatm\data\*.*
product,plf,0,Test plot
product,slp,0,Test plot
export,d:\da20\bin\map\out.jpg
```

This script plots a series of upper air charts for 1200 UTC August 27, 1990 from our Upper Archives CD-ROM and saves the completed charts for 250 mb, 500 mb, 700 mb, and 850 mb to individual files (1990082712250.gif, etc). Again this may not work on your computer without some changes.

```
set,1,9008
set,2,90082712
archive,f,$$1,$$2
product,plf,250,PLOT
export,d:\da20\bin\shannon\19$$2250.gif
erase
product,plf,500,PLOT
export,d:\da20\bin\shannon\19$$2500.gif
erase
product,plf,700,PLOT
export,d:\da20\bin\shannon\19$$2700.gif
erase
product,plf,850,PLOT
export,d:\da20\bin\shannon\19$$2850.gif
```

APPENDIX G — Analysis scripting

Analysis scripting is slightly different from scheduler scripting. While scheduler scripts are designed to accomplish tasks in Digital Atmosphere such as accessing data, displaying fronts, and so forth, the analysis script language is based solidly on logic and mathematics, and is meant to build display products in a very flexible manner. However, analysis script sentences may be embedded in a scheduler script by using the scheduler command ANALYZE.

An analysis sentence is made up of a group of commands on one line. There are two ways of executing a script containing these analysis sentences:

(1) On the command line (in the Toolbox under the Scripting tab).

(2) In the DIGATMOS.MNU file, which is used to build the Analysis dropdown menu. This may be edited by hand. The pipe, |, symbol is used to separate the title from the script form and may be placed anywhere between the two providing it is padded with spaces only. The Standard version is limited to 50 defined script commands; the Professional version is unlimited. Note that you will need to restart Digital Atmosphere to invoke the changes.

Command sentence structure

A sentence of analysis script follows the strict order:

[output] [transform] [base] [setup]

(1) Digital Atmosphere processes the script from RIGHT TO LEFT, so that any optional setup is done (such as setting the level), then defining the base field to be worked on (such as temperature), then transforming (such as converting m/s to kts), then producing output (such as setting a contour interval and then displaying contours. Deviation from this form may cause unpredictable results.

(2) Users must be vigilant as to whether a scalar or vector field is being processed. For example, CONT WIND will result in a nonsensical output, because wind is a vector field and cannot be isoplethed. To view wind speed, you will need to extract a magnitude by using CONT WSPD (contour windspeed) or use a display function provided for a vector field.

(3) The active level is always taken from the Active Level setting on the toolbar. It can be overridden using a Setup Command. The same is true for data Time settings.

(4) Multiple fields are handled by using the output form to write a field to a slot, such as STOR=5 to store the result in slot 5. A slot contains a single scalar analysis grid. Various transformations which depend on a field number, such as SDIF (scalar difference), are supplied with two field slots with which to read.

(5) Commands can be strung together to produce multiple fields. Currently there is a limit of 255 characters to a script command.

(6) Suggestions for transformation commands, output commands, operators, and so forth are greatly welcomed at this time. Much more is planned; this is only a start! For an idea of what is possible see the PCGRIDDS documentation at http://www.lib.noaa.gov/pcgridds/appendix.html#C as some of the commands are based on these techniques.

(7) Scripts are not case-sensitive.

Examples

CONT CINT=4 SLPR
Explanation: Take the sea level pressure field. Set the contour interval to 4. Now contour it. Note that the color is not set, so the result color is unpredictable. Also the level is not set, so if the current height setting is 500 mb, an invalid fieldwill result.

DATA VKNT WSPD
Explanation: Take the wind speed field (which will be in m/s). Convert it to knots. Now view it as a numerical grid.

CONT CINT=60 DASH COLOR=200,0,0 SDIF=1,2 STOR=2 HGHT H000 STOR=1 HGHT H500
Explanation: Take the 500 mb height field. Store it in slot 1. Take the 1000 mb height field. Store it in slot 2. Compute a difference between field 1 and2. Now set the pen color to 200,0,0 (lightred, i.e. red=200, green=0, blue=0. Set lines to dashed, and set a contour interval of 60. Nowcontour theresult. This produces the 1000-500 mb thickness.

For other examples please open the DIGATMOS. MNU file and study the examples provided. They drive the Analysis dropdown menu.

Setup commands

HSFC
Set level to surface

H000
Set level to 1000 mb

H925
Set level to 925 mb

H850
Set level to 850 mb

H700
Set level to 700 mb

H500
Set level to 500 mb

H400
Set level to 400 mb

H300
Set level to 300 mb

H250
Set level to 250 mb

H200
Set level to 200 mb

H150
Set level to 150 mb

H100
Set level to 100 mb

Analysis method commands
If not specified, the setting in Preferences > Analysis will be used.

ANLN
Sets analysis method to Nearest Neighbor

ANLW
Sets analysis method to Weighted

ANLC
Sets analysis method to Cressman

ANLB
Sets analysis method to Barnes

Base field commands

TEMP
Temperature (deg C)

THTA
Theta, or potential temperature (deg K)

DWPT
Dewpoint (deg C)

RELH
Relative humidity (%)

BULB
Wet bulb temperature (deg C)

MIXR
Mixing ratio (g/kg)

HIDX
Heat index (deg F)

HGHT
Geopotential height (m)

GHGT
Geostrophically balanced height field (m)

THTE
Theta-e, or equivalent potential temperature (deg K)

PTEN
Reported pressure tendency

WCHL
Wind chill (deg F). This is the November 2001 JAG/TI formulation.

WCHO
Old wind chill formula (deg F). This is the original model.

WCHC
Environment Canada wind chill formula (deg C)

HIDX
Heat index (deg F)

HAAT
Australian apparent temperature (deg C)

HUMX
Humidex (deg C)

WSPD
Wind, speed (m/s)

WIND

Wind, vector (m/s) (referenced to true north)

WDRC
Wind, direction (deg)

UGRD
Wind, west-to-east component (m/s) (referenced to true north)

VGRD
Wind, south-to-north component (m/s) (referenced to true north)

HGHT
Geopotential height (m)

SLPR
Sea level pressure (QFF) (mb)

ALST
Altimeter setting (QNH) (in Hg)

PRES
Pressure (mb) (used for upper-level heights)

LATT
Latitude (deg)

LONG
Longitude (deg)

ELEV
Elevation (m)

TSEA
Temperature, sea-surface (deg C)

PC01 / PC02 / PC03 / PC06 / PC09
PC12 / PC15 / PC18 / PC24
Precipitation during the period given by the last two numbers, which represent hours.

PCXX
Precipitation (unknown time period; used in Australian AXF data)

WSWP
Wave period (sec)

WSWH
Wave height (m)

WWWP
Wind wave period (sec)

WWWH
Wind wave height (m)

WLP1
Sea swell period 1 (sec)

WLP2

Sea swell period 2 (sec)

WLH1
Sea swell height 1 (m)

WLH2
Sea swell height 2 (m)

WLD1
Sea swell direction 1 (screen relative)

WLD2
Sea swell direction 2 (screen relative)

Transformation commands

VKNT
m/s to kt

VMPH
m/s to mph

VKMH
m/s to km/h

FTOK / FTOC / CTOF / CTOK / KTOF / KTOC
convert deg F, deg C, or K to deg F, deg C, or K (first letter indicates which scale is being converted from, and fourth letter indicates which scale is being converted to)

CCFF
convert Celsius degree increments to Fahrenheit degree increments (this is a straight mutiplication by 9/5 and does not use the Celsius or Fahrenheit scale)

DEGF / DEGC
deg C to deg F, and from F to C respectively (do not use, will be superseded by CTOF and FTOC)

MAGN
Magnitude of a vector field (produces speed for a wind field)

DVRG
Divergence of a vector field

RVRT
Relative vorticity of a vector field (pure; used mainly at surface)

AVRT
Absolute vorticity of a vector field (adds Earth's rotation; used for upper air)

SMTH
Apply Haltiner smoother

SMTP=[number]

Allow this number of smoothing passes (default 1)

SMTC=[number]
Set smoothing coefficient (0 to 1 only) (default 0.5)

SSUM=[f1,f2]
Calculates sum of fields f1 and f2

SDIF=[f1,f2]
Calculates difference of fields f1 and f2

SAVG=[f1,f2]
Calculates average of fields f1 and f2

SMLT=[f1,f2]
Calculates product of fields f1 and f2

SDVD=[f1,f2]
Calculates quotient of fields f1 and f2

SADC=[f1,#]
Calculates sum of field f1 and any number #

SSBC=[f1,#]
Calculates difference of field f1 and any number #

SMLC=[f1,#]
Calculates product of field f1 and any number #
SDVC=[f1,#]
Calculates quotient of field f1 and any number #

Universal output commands

COLOR=r,g,b
Set draw color to color: r=red, g=green, b=blue (each is 0-255, with 0 being dark and 255 light)

STOR=n
Store field in slot n (1-9)

Scalar output commands

DATA
Data grid values

CONT
Contour (defaults to contour interval of 1)

VAON
Allow plotting of numeric values below minimum/maximum (default)

VAOF
Prohibit plotting of numeric values below minimum/maximum

NMCY
Plot highs and lows in special NMC font (default is according to Preferences > Analysis)

NMCN
Plot highs and lows in standard font (default is according to Preferences > Analysis)

HILO
Plots H or L above data at gridpoint maximum/minimum

HIID
Plots H above data at gridpoint maximum

LOWD
Plots L above data at gridpoint minimum

MXMN
Plots H or L above data at gridpoint maximum/minimum

MAXD
Plots H above data at gridpoint maximum

MIND
Plots L above data at gridpoint minimum

DVCV
Plots H or L above data at gridpoint maximum/minimum

DVVD
Plots H above data at gridpoint maximum

CVVD
Plots L above data at gridpoint minimum

PLMN
Plots H or L above data at gridpoint maximum/minimum

PLLD
Plots H above data at gridpoint maximum

MNND
Plots L above data at gridpoint minimum

OVER
Overlay basemap translucently (good for fills)

CINT=[number]
Contour interval (must be an nonzero positive number)

GRTN=[number]
Contours or fills greater than this number

LSTN=[number]
Contours or fills less than this number

EQUA=[number]

Plot a contour equal to this number

LINE=[number]
Set line width (must be nonzero positive integer)

FILL
Fill using fill color

SOLD
Plot contours as solid line

DASH
Plot contours as dashes

DOTS
Plot contours as dots

DADO
Plot contours as dash-dot

DADD
Plot contours as dash-dot-dot

FILL
Perform a floodfill

FILS=[number]
Set fillstyle to one of the following (must appear to right of FILL command): 0, Solid (default); 1, Cross; 2, Diagonal cross; 3, Diagonal 1; 4, Diagonal 2; 5, Horizontal stripes; 6, Vertical stripes

Vector output commands

BARB
Wind barbs (m/s)

BKNT
Wind barbs (m/s shown as kt)

BMPH
Wind barbs (m/s shown as mph)

BKMH
Wind barbs (m/s shown as km/h)

VECT
Vector grid

STRM
Streamline

APPENDIX H — Radar import tutorial

The list of radar resources is kept in the file digatmos.rdy.

Here is a quick tutorial on how to add a radar site. We Googled "south africa radar" and found a radar image page at http://metsys.weathersa.co.za . We go to the page for Durban and see that there is an image. Right-clicking on the image we see that the radar image is stored in http://metsys.weathersa.co.za/radar_image/DN.gif (which is good, as loopers and non-fixed filenames can be considerably more complicated to deal with). Now we need to get the latitude and longitude of this site. It's not anywhere on the page, however the website has a handy radar information page at http://metsys.weathersa.co.za/nwrn.htm. This shows Durban at 30.01S 30.93E. Make a note of that.

Now we need to import the radar image into a graphics program; we use PaintShop Pro. In your browser, right-click on the image and choose Copy Image. Then paste it in your software.

In another window, open Notepad and then open your digatmos.rdy file in the Digital Atmosphere directory. Start a new line at the top of the data block (anywhere in the list is fine, but entering new items at the top we can see the column headers more conveniently).

In your graphics program, position the cursor on the very center of the radar site and read the X/Y coordinates, wherever your graphics program displays it. This shows a center position of 304,367 (X=304,Y=367). Enter this into digatmos.rdy under XXX YYY. So far it should look like this:

Now we need to find the top left and bottom right of the part of the image containing valid radar information. This image has a border box enclosing the radar product; the legends are outside of it and the radar image is inside of it. We can use the border box. The top left is (0,54) and bottom right is (612,665). Enter this under LEFX,TOPY and RGTX,BOTY.

Now we determine the maximum range of the radar scan. This can be seen easily with the 200 km ring. So the range will be 200 km. Enter that under RNG. Now we need to determine a scale in pixels per km. This is an easy task since the range rings and site center are obvious. Since the leftmost extent of the 200 km ring is at X=0 and the radar center is X=304, this means that we have

304 pixels per 200 km of distance. Do the division and we get 304/200 = 1.52. Fit this figure under SCALE.

Now put the latitude and longitude under LATITU LONGITU. Note that if your figures came in degrees-minutes-seconds you need to convert them to decimal values before entering them here. Fortunately the South Africa radar information page gave us decimal degrees. Always use negative for westerly longitudes and southerly latitudes. So we will be entering -30.01 30.93.

Now let's get the URL of the image. Simply right-click on the radar image in your browser and choose Copy Image Location. Paste this under URL in digatmos.rdy. In this case the image is at http://metsys.weathersa.co.za/radar_image/DN.gif .

Under FMT we need to enter the image format type. Typically you just use the extension on the URL, which in this case is gif. Other types seen may be jpg and png. Some sources use the wrong image type on the filename, in which case the image will not display in Digital Atmosphere and you will have to see if the site is posting, say, a JPG using a PNG filename (this kind of thing is happening with Canadian radar images).

Now we need to develop a color table to tell Digital Atmosphere which radar colors contain information. Scroll to the bottom of the digatmos.rdy file and start a new TABLE= line using a value that is not in use. If you're using the default Digital Atmosphere digatmos.rdy file, you'll probably be starting a TABLE=05 line. So enter TABLE=05 followed by two forward-slashes and a note telling you what this table is for. We recommend:

TABLE=05 // South African radars

Now we need to enter the color information for each intensity level. The South African radar source has a handy scale on the right side. View this in your graphics program. Now you need to use whatever tool will let you hover over pixels and show you the color value using RGB numbers (i.e. three numbers, each ranging from 0, dark, to 255, bright, indicating the numerical level of red, green, and blue). In PaintShop Pro it is the eyedropper icon (pick up color). If you hover over the "0 dBz" level, which is gray, you should see it has R=90 G=89 B=90. We enter a line using this format:

LEVEL=dbz,red,green,blue,threshold

The red, green, and blue are self-explanatory. The dbz is the dBz level from the scale; it's only used for color mapping. If no scale is provided you can use 0 for weak echoes ranging up to 60 for heavy levels. Finally threshold is a value used to "accept" pixels that are close to the required R,G,B values... we will use 10. However it may be important to set this for JPG files where color drift may occur. Threshold should usually be 10, but you can increase it to 50 or 100 if lossy JPGs are used and "holes" are appearing in the generated radar images. Basically Digital Atmosphere looks at the numerical difference in red, blue, and green and adds up these differences (using the absolute value) to gauge the pixel against the threshold. So if you define RGB=10,10,10 and the program sees a pixel with RGB=30,30,30, this adds up to a difference of 60. The pixel will be treated as part of your level definition as long as the threshold value doesn't exceed 60.

When we are done defining all levels it will look like this:

```
TABLE=05 // South African radar
  LEVEL=00,090,089,090,10
  LEVEL=05,074,060,140,10
  LEVEL=10,000,089,000,10
  LEVEL=20,000,113,000,10
  LEVEL=30,008,125,222,10
  LEVEL=35,024,069,231,10
  LEVEL=36,107,012,198,10
  LEVEL=39,198,016,132,10
  LEVEL=42,189,101,132,10
  LEVEL=45,206,134,057,10
  LEVEL=48,247,195,049,10
  LEVEL=51,255,251,000,10
  LEVEL=54,255,154,090,10
  LEVEL=57,255,093,008,10
  LEVEL=60,255,052,024,10
  LEVEL=65,189,190,189,10
  LEVEL=70,214,211,214,10
```

Note that extraneous zeroes have been prefixed to make numbers two or three digits. This is optional, and has been done here to make the file look neater. We will also skip South Africa's 80 dBz since it matches the basemap color (white) and may give undesirable results.

Finally we need to hook up this table number (05) with the Durban radar entry above. Put this number under CO to point it at the table.

We're done! Now generate a map in Digital Atmosphere for Durban (the ICAO is FADN) and use a tight zoom level of about 300 or 400 nm. Now use Radar > Import Images and Clear All

and then check Durban.

Note that there are traces of radar range rings. This cannot be avoided since it is an artifact on the original image. The outer red radar range ring is provided by Digital Atmosphere to mark the maximum extent of radar information and can be shut off by putting RANGERING=0 instead of RANGERING=1 before the TABLE= entries in digatmos.rdy. The palette can also be changed in this section to something more desirable.

APPENDIX I — Importing satellite images

Digital Atmosphere is not able to automatically read satellite images and georeference them. This is an extremely complex function, so the user must develop techniques to accomplish this.

We cannot provide support for this, but we will present some suggestions on how to get started. Also see our user forums at www.weathergraphics.com/forum as many users have worked with this sort of task. The Map > Import command is central to working with satellite images as it allows the basemap to be replaced with any graphical image. However the image must correspond with the basemap that was replaced.

Help from Ton Lindemann
Users who wish to use satellite imagery as basemaps in DAWS from David Taylor' GeoSatSignal output may ask for a free set of .dmf setup files. The set comes with a sample map for each continent and ocean, except the polar regions. Just replace the sample map by GSS output and open the .dmf-file to have the image on the desktop in Digital Atmosphere. The winzipped file is around 720 kB and comes with a setuplist for GSS. It can be ordered free by sending an e-mail to: postbus@meteo-maarssen.nl (e-mail updated August 2019).

Help from Fred van den Bosch
In the RIG-journal 73 (June 2003) is an article by Thomas Scheelen (www.rig.org.uk). He uses some modules of David Taylor like HRPT-reader and Groundmap. My experiences are based on that article:

Setup. Download from http://www.satsignal.net/ the programs HRPT-reader and GroundMap and install them.

Download. Download files from http://www.saa.noaa.gov/. How to do this is described on http://www.satsignal.net/. On the page about HRPT-reader is a link to basic notes on using the SAA. The final results are one or more downloaded files.

HRPT-reader. Open a downloaded file. The main result is a false colour image. Save this image. On the background a location file is saved too. GroundMap. Open the location file from the previous step. Choose .Ortographic. as projection and use a suitable output size. The image is showed. Save the image. If Groundmap is not registered you have a few possibilities in output size. This means that you get a rather small image in DAWS. But you can see what is possible.

Initial Digital Atmosphere. Generate a map. Use for latitude and longitude the same values as in the download. Use for scale a size that generates more or less the same map as GroundMap. It is not so important at this moment. Give width en height the values from the download. Generate the map and if it.s ok, save it with <Map/Save map> as BMP.

Fine-tuning. Repeat the next steps until both maps fits exactly.

1.Choose icon .load map. and read the GroundMap image.

2.Choose <map/add base map>. This option will project the DA-map over the image and will surely not fit. Now we must try to make the DA-map fit. This is done by making changes in <Map/Generate map/Enter lat/lon.> :

3.Latitude. This will move the map in vertical direction

4.Longitude. This will move the map in horizontal direction.

5.Scale for resizing the map.

6.Make small changes in the steps 3, 4 and 5. After <OK> DA will generate a new map.

7.Continue with step 1.

Finishing. Save the DA-map for the last time. This must be done because every lay-out has its own base map and parameter-files. Always open this corresponding map before loading a picture with a different layout from GroundMap.

APPENDIX J — Color fills

This is a breakdown of the color fill method used in File > Preferences under the Misc 1 tab.

The colors are defined according to the plotted Value for the particular point on the map, which will always be in the range 0..1, where 0 is the lowest possible reading and 1 is the highest possible reading. This Value is fitted to a sine wave according to user defined parameters to determine the Red, Green, and Blue component of its color.

First the value (0 for minimum possible and 1 for maximum possible) is fitted to the sine wave to determine what the amplitude will be. Amplitude will always be in the range -1 to 1. Amplitude is determined by ph1 and ph2, which are in degrees. A greater difference between ph1 and ph2 will result in a more curved function, while a smaller difference will produce a flatter function. For basic users, the sine responses are as follows:

> Amplitude = sin([(ph2-ph1) * Value] + ph1)
>
> where
>   ph1 = a user defined value in degrees,
>   ph2 = a user defined value in degrees,
>   sin(0)=0, sin(90)=1, sin(180)=0, sin(270)=-1 .

Finally the amplitude is modified according to the user-defined scale and offset values to determine Color-Value, which must always be in the range 0..1 (0 is dark, 1 is bright). This means if an Amplitude value is negative, it must be offset so that it falls into the range 0..1. An out of bounds ColorValue is always rounded up or down so that it equals 0 or 1.

> ColorValue = (Amplitude * Scale) + Offset

Example: For a basic scale where cold temperatures are black and hot temperatures are bright red, set Red Ph1=0, Ph2=90, Scale=1, and Offset=0. Set the Green and Blue Scale to 0 and Offset to 0, which will always provide a value of 0 for these components.

APPENDIX K — Tabular weather data (comma delimited)

Digital Atmosphere is capable of importing observations from a comma-delimited database listing. This is excellent for weather observations exported out of a database or a spreadsheet. It is also suitable for Australian AXF weather data. This type of data is not ingested through standard data import but is instead plotted on demand from data located in custom.dat in the Application Data directory (this location is listed in Help > About).

If recognized as shown below, the data will be imported and available for viewing as long as it is imported as usual from the data directory or from a specified file.

The rules for this data are:

* Comma-delimited data only.
* Each line must correspond to one observation
* No extraneous commas are permitted (even within quote marks)
* The observation must contain the station's latitude and longitude.

To take advantage of this capability, you need to open the DIGATMOS.FMT file with a text editor and define the start sequence and the parameters that apply to that type of data.

Start sequence

You define the start sequence by placing a "start sequence" between brackets in the DIGATMOS.FMT file; for example if your database starts out with a piece of text containing "Joe's Data" you should start out with this:

[Joe's Data]

No database entries are read in until the start sequence is found.

Parameter list

To actually read the data, you will need to create a parameter list, such as this:

TMP=4
DWP=6

Each entry must be on its own line, and the list ends when the end of the file is reached or another start sequence is found. The example above indicates that the temperature can be found in column 4 and the dewpoint can be found in column 6.

Sample listing

Here is a sample of an entry in DIGATMOS.FMT which is used for Australian Bureau of Meteorology AXF data.

[synopData]
ICA=3
WMO=1
LAT=6
LON=7
ELE=9
TIM=5
DAT=4
TMP=22
DWP=23
WND=11
WNM=12
SKY=10
CIG=26
WXX=14
VIS=13

Valid parameters

ICA=xxx
ICAO of the station (for display purposes only)

WMO=xxx
WMO number of the station (for display purposes only)

LAT=xxx
Latitude, in hundreds of degrees (negative is southern hemisphere)

LON=xxx
Longitude, in hundreds of degrees (negative is western hemisphere)

LAX=xxx
Latitude, in regular format (negative is southern hemisphere)

LOX=xxx
Longitude, in regular format (negative is western hemisphere)

ELE=xxx
Elevation in meters (used only for potential temperature calculations)

TIM=xxx

Time in UTC (expressed as 450 for 4h50m and 1629 for 16h29m)

DAT=xxx
Day of month (expressed as "16" for September 16)

TMP=xxx
Temperature in degrees Celsius

DWP=xxx
Dewpoint in degrees Celsius

WND=xxx
Wind direction in degrees true

WNS=xxx
Wind speed in knots

WNM=xxx
Wind speed in meters/second

SKY=xxx
Total sky cover in oktas (9=obscured, 10=not available)

SLP=xxx
Sea-level pressure in millibars< FONT face= Courier>

CIG=xxx
Ceiling in hundreds of feet

WXX=xxx
Weather code; first and second digit equals ww weather code (e.g. 61 is light rain)

VIS=xxx
Visibility in meters

P01=xxx
Precipitation total in millimeters (past 1 hr)

P06=xxx
Precipitation total in millimeters (past 6 hr)

P12=xxx
Precipitation total in millimeters (past 12 hr)

P24=xxx
Precipitation total in millimeters (past 24 hr)

PXX=xxx
Precipitation total in millimeters (source-defined period; unknown to Digital Atmosphere)

PCP=xxx
Precipitation total in millimeters

PCT=xxx
Precipitation time period in hours

PTR=x
Pressure trend (equals a in app group)

PTN=xxx
Pressure tendency (in tens of millibars)

SNO=xxx
Snow depth in centimeters

CLL=x
Low cloud code

CLM=x
Middle cloud code

CLH=x
High cloud code

MAX=xxx
Maximum temperature, in degrees Celsius

MIN=xxx
Minimum temperature, in degrees Celsius

More on Australian AXF data

Information on Australian AXF data can be found here:
http://www.bom.gov.au/nmoc/Obs/IDY03000.doc
http://www.bom.gov.au/nmoc/Obs/IDY03090.doc
http://www.bom.gov.au/nmoc/Obs/IDY03100.doc

Note that there may be restrictions on the use of Australian data, so look into this before creating commercial products.

APPENDIX L — Tabular weather data (space delimited)

The master template file for space-delimited tabular weather data is found in the Digital Atmosphere Application Data directory under digatmos.tpl. It is applied to all data imported through File > Import and Data >Retrieve to locate embedded tables of space-delimited meteorological data.

The template file contains four columns: SPEC for the element type, V1 for column start (if applicable), V2 for length (if applicable), and T1 for text data (if applicable).

Element types

#DEF
Starts the definition of a table. On this #DEF row, give the table a name in T1; this name is used for display purposes.

#LEG
Defines a line that can be used as a legend for the table (such as a line that contains a date or valid time). Specify a keyword in T1 that is to be located on the line. When encountered, it will be used in legends.

#FLG
A scrap of text which, when encountered during importing, tells Digital Atmosphere that it is about to encounter a table. This flag must be encountered before any data can be imported. Specify the scrap of text in T1.

#BEG
Is a scrap of text which, when encountered during importing, tells Digital Atmosphere that a data table is starting immediately. Put the scrap in T1, and define the column where it must be seen in V1 and the length of the scrap in V2. Data import always ends on an empty line.

#DAT
Specified for each data element that will appear in a row of data. Give the field a name in T1 (this is used only for display purposes). Define the beginning column of the data in V1 and the length of the data in V2.

#MIS
Specifies characters that are used to denote missing data.

#LAT
Specifies where the latitude (decimal only) is found. Put the column start position in V1 and the field length in V2.

#LON
Similar to #LAT but for longitude.

Example

```
SPEC V1   V2   T1

#DEF -    -    Australian temperature data
#LEG -    -    Observations
#FLG -    -    IDCLCD0002
#BEG 66   2    :-
#MIS -    -    #*+
#LAT 67   6
#LON 60   6
#DAT 1    10   Date
#DAT 12   6    Stn_num
#DAT 23   40   Name
#DAT 81   5    max
#DAT 87   1    dc
#DAT 89   5    min
#DAT 95   1    dc
#DAT 97   5    terrmin
#DAT 103  1    dc
#DAT 105  1    of
#DAT 107  6    SLP_9_am
#DAT 114  5    T_9_am
#DAT 120  5    Td_9_am
#DAT 126  1    cld
#DAT 128  1    of
#DAT 130  6    SLP_3_pm
#DAT 137  5    T_3_pm
#DAT 143  5    Td_3_pm
#DAT 149  1    cld
#DAT 151  1    of

#DEF -    -    Australian rainfall data
#LEG -    -    Observations
#FLG -    -    IDCLRD00001
#BEG 66   2    :-
#MIS -    -    +
#LAT 67   6
#LON 60   6
#DAT 1    10   Date
#DAT 12   6    Stn_num
#DAT 23   40   Name
#DAT 81   5    Precipitation_mm
#DAT 87   1    PP
#DAT 89   1    DC
#DAT 91   1    OF
```

APPENDIX M — Exported analysis grids

Whenever an Analysis is performed on any data (scalar, isoplethed fields only), Digital Atmosphere always exports its output to GRID.TXT. The output can then be imported into spreadsheets or analyzed further by other methods.

The output consists of 900 points (30 by 30) representing the value at each point of X and Y in the geographic area shown in the workchart window. The X-axis is left-right in the window, pointing right, while the Y-axis is up-down in the window, pointing down. This means that the highest values of X and Y are found east and south, respectively. The latitude/longitude of each X and Y point in decimal format is shown, followed by the analyzed value at that point.

Here is a sample of output from GRID.TXT.

```
X  Y  LATITUDE LONGITUDE VALUE
0  0  42.435   -107.721  1012.79998779
0  1  42.471   -107.141  1012.84558105
0  2  42.505   -106.560  1012.92547607
0  3  42.537   -105.979  1013.08880615
```

APPENDIX N — Station plot fields

(blank)
Nothing will be plotted in this space

TEMP
Air temperature in whole degrees (C or F)

TEMP(10)
Air temperature in tenths (C or F)

DWPT
Dewpoint in whole degrees (C or F)

DWPT(10)
Dewpoint in tenths (C or F)

GUST
Wind gust (kt)

RH
Relative humidity (%)

MXR
Mixing ratio (g/kg)

THETA
Potential temperature (deg K)

THETAE
Equivalent potential temperature (theta-e) (deg K)

WINDCHILL
Wind chill

HEATINDEX
Heat index

SLP
Sea level pressure (mb) (plots tens, units, and tenths)

ALSTG
Altimeter setting (in Hg) (plots units, tenths, and hundredths)

WX
Pictogram of current weather type

VIS
Prevailing visibility (sm or m)

ELEV
Elevation (ft or m)

CIG
Ceiling (lowest layer more than half of sky) (hundreds of feet)

OKTAS
Cloud cover in oktas (eighths)

ID (added March 2019)
The software automatically chooses either an ICAO or WMO identifier based on the type of data (METAR, SYNOP, etc) being used to draw the plot.

ID(ICAO)
Station identifier (4-letter ICAO)

ID(WMO)
Station identifier (5-digit WMO)

PCP01/PCP06/PCP12/PCP18/PCP24
Precipitation during past 1/6/12/18/24 hours.

PTEND
Pictogram of pressure tendency during past 3 hours

CLD/L
Pictogram of low cloud type

CLD/M
Pictogram of middle cloud type

CLD/H
Pictogram of high cloud type

CLDHGT
Cloud height code (synoptic only) (see chart below)

CLDAMT
Cloud amount code (synoptic only) (see chart below)

SHIPDIR
Pictogram of direction of ship movement

SHIPSPD
Speed of ship movement (kt)

SEATEMP
Sea-surface temperature (C or F)

TEMPTYPE
Type of temperature measurement device

WAVEPD
Period of ocean waves (sec)

WAVEHGT
Height of ocean waves (ft or m)

SEAINSTHGT
Instrument-measured height of ocean waves (ft or m)

WINDPD
Ocean wind wave period (sec)

WINDHGT
Ocean wind wave height (ft or m)

SWELL1DIR
Direction of primary ocean swells (deg)

SWELL2DIR
Direction of secondary ocean swells (deg)

SWELL1PD
Primary ocean swell period (sec)

SWELL1HGT
Primary ocean swell height (ft or m)

SWELL2PD
Secondary ocean swell period (sec)

SWELL2HGT
Secondary ocean swell height (ft or m)

MINTEMP
Minimum temperature (C or F)

MAXTEMP
Maximum temperature (C or F)

GRNDSTATE
Ground state code (see below)

Ground state codes
0 Surface of ground dry (without cracks and no appreciable amount of dust or loose sand)
1 Surface of ground moist
2 Surface of ground wet
3 Flooded
4 Surface of ground frozen
5 Glaze on ground
6 Loose dry dust or sand not covering ground completely
7 Thin cover of loose dry dust or sand covering ground completely
8 Moderate or thick cover of loose dry dust or sand covering ground completely
9 Extremely dry with cracks
10 Ground predominantly covered by ice
11 Compact or wet snow (with or without ice) covering less than half of ground
12 Compact or wet snow (with or without ice) covering half to less than entire ground
13 Even layer of compact or wet snow covering ground completely
14 Uneven layer of compact or wet snow cover-ing ground completely
15 Loose dry snow covering less than half of ground
16 Loose dry snow covering at least half of ground but ground not completely covered
17 Even layer of loose dry snow covering ground completely
18 Uneven layer of loose dry snow covering ground completely
19 Snow covering ground completely; deep drifts

Synoptic cloud amount codes (CLDAMT) (Nh)
This category is defined as Nh; the amount of all the low cloud present, or, if no low cloud is present, the amount of all the middle clouds present. The figure is always in oktas (eighths). 9 is reserved for sky obscured by fog and/or other meteorological phenomena, and / is reserved for cloud cover being indiscernable for reasons other than fog or other meteorological phenomena, or observation is not made

Synoptic cloud height codes (CLDHGT) (h)
"h" is reserved for the height of the surface of the base of the lowest cloud seen. If the total sky cover is greater than 4/8ths, this figure is also transposed into the CIG slot, where they are plotted as "L" (.low cloud.) followed by a loose translation of the table below in hundreds of feet. This "L" differentiates it from true ceilings where "C", "E", or "M" is prefixed.

Code Meaning
0   0 to 50 m
1   50 to 100 m
2   100 to 200 m
3   200 to 300 m
4   300 to 600 m
5   600 to 1000 m
6   1000 to 1500 m
7   1500 to 2000 m
8   2000 to 2500 m
9   2500 m or more, or no clouds
/   Height of base of cloud not known, or base of clouds at a level lower and tops at a level higher than that of the station

APPENDIX O — Multilanguage support

Support for output of the chart legends in another language can be obtained by editing the language.txt file in the Digital Atmosphere directory. Simply create a new section header at the end of the file like:

[DANSK]

Then set the language by editing the Language= line at the top:

Language=DANSK

This tells Digital Atmosphere to only read sections following a [DANSK] block and ignore the rest of the file. You can have as many different sections and section headers as you like in the file.

To add the foreign language entries, copy all of the information in the English section and paste it below the new language header, then in the "Display as" column write the items as you wish them to be displayed. It is not necessary to edit items under "Name (not used in Dig Atm)" but you may edit the entries to make the file more readable for you.

If you do not intend to use Digital Atmosphere in English you may simply overwrite the English section with your own entries.

Note that there is no support for Unicode at this time (thus Cyrillic and other fonts cannot be plotted due to Unicode deficiencies in the compiler).

To change the language of the analysis options under "Analysis" you may edit the digatmos.mnu file directly. There is currently no support for displaying the main menu in other languages.

APPENDIX P — Raw data samples

Listed here are some examples of what kinds of data will be imported by Digital Atmosphere, depending on your checkmarks on the status panel. You can refer to these examples if you have any trouble getting Digital Atmosphere to read something or are unsure of what a particular product or bulletin should look like.

METAR data

This is the backbone of weather observation code worldwide. It is issued hourly from thousands of weather stations. A sample report will look like this:

KDFW 012353Z 17006KT 10SM FEW045 SCT070 SCT250 28/19 A3006 RMK AO2 SLP170 T02780194 10300 20272 55005=

Airways (SAO) data

This code was used prior to 1996 and formed the backbone of weather observation code in the United States and Canada. Support is still provided in Digital Atmosphere for backward compatibility. The data looks like this:

JFK SA 1150 250 SCT 7 113/44/21/2513/989=

SYNOP data

This format is used worldwide for surface and oceanic observations. Data appears as follows:

AAXX 02184
72376 32966 62806 10222 20117 38330 40163 58003 91753 333 10222 20144 555 90218=

SD RAREP radar reports

Also called hourly radar reports, RAREPS, and SD reports. Early versions of Digital Atmosphere do not import this type of data. Radar reports come from about 100 stations around the country. A few years ago, they were typed up by humans, but most of them are now centrally generated by computer based on data from NEXRAD radar sites around the country. This is what a radar report looks like:

MCI 0225 CELLS TRW/NEW 250/195 D10 C2330 MT 300
^OI22

FD winds aloft data

This is not an analysis of real conditions; rather it is numerical output from the National Centers for Environmental Prediction (formerly NMC) in Washington, DC. It is used primarily for aviation forecasting purposes, consisting of a coded wind and temperature forecast at 12 and 24 hours into the future. Nevertheless, it makes excellent forecasting charts in Digital Atmosphere.

For Hours
ID Use Z From Now 3000 6000 9000 12000 18000 24000
2XG 09-18 00-09 3613 2911+06 2520+02 2430-03 2342-15 2462-26

Rawinsonde data

Also called TEMP or TTAA data. This is the backbone of upper-air observation reports, sent twice daily from hundreds of stations worldwide (several dozen in the United States alone). It is a highly numerical, coded set of data that is used extensively in meteorological operations and is used as input into the numerical forecast models. Here's an example of what it looks like:

72558 TTAA 69121 72558 99973 00821 30002 00130 ///// /////

92762 01611 03014 85444 01850 00521 70993 04159 30025 50559 etc..

Weather watches

Also called SPC watches, SELS watches, watch boxes, or even WWUS9 KMKC. This is an English bul-
letin produced by forecasters at the Storm Prediction Center (formerly NSSFC, the National Severe
Storms Forecast Center).

WWUS9 KMKC 141239
SEL7
MKC WW 141239
KSZ000-142000-

BULLETIN - IMMEDIATE BROADCAST REQUESTED
SEVERE THUNDERSTORM WATCH NUMBER 77
NATIONAL WEATHER SERVICE KANSAS CITY MO
639 AM CST THU MAR 14 1996

.A..THE STORM PREDICTION CENTER HAS ISSUED A SEVERE THUNDERSTORM WATCH FOR
PARTS OF EAST-CENTRAL AND SOUTHEASTERN KANSAS
EFFECTIVE THIS THURSDAY MORNING AND AFTERNOON UNTIL 200 PM CST.
LARGE HAIL...DANGEROUS LIGHTNING AND DAMAGING THUNDERSTORM WINDS
ARE POSSIBLE IN THESE AREAS.
THE SEVERE THUNDERSTORM WATCH AREA IS ALONG AND 45 STATUTE MILES
NORTH AND SOUTH OF A LINE FROM 45 MILES WEST OF EMPORIA KANSAS TO
45 MILES EAST OF CHANUTE KANSAS.

Convective outlook

The convective outlook is a bulletin produced by forecasters at the Storm Prediction Center (formerly
NSSFC, the National Severe Storms Forecast Center), and intended for use by other National Weather
Service meteorologists. Two are produced; one for the "today" time frame (Day 1), and another for
the "tomorrow" time frame (Day 2). It is one of the best sources of forecast information on the poten-
tial for severe thunderstorms.

ACUS1 KMKC 141441
SWODY1
MKC AC 141441

CONVECTIVE OUTLOOK...REF AFOS NMCGPH94O.
VALID 141500Z - 151200Z

REF WW NUMBER 0077...VALID TIL 2000Z

THERE IS A SLGT RISK OF SVR TSTMS TO THE RIGHT OF A LINE FROM PGO
OKC 30 NNE P28 35 ESE SLN OJC JEF MVN EVV BWG BNA MEM PBF PGO.
GEN TSTMS ARE FCST TO THE RIGHT OF A LINE FROM OXR FAT TPH ELY
15 NW PUC CAG LIC HLC FNB PIA FWA YNG DUJ DCA 25 W RIC RDU AND CBM
TXK FSI 60 NNE AMA RTN 10 SE ABQ 30 SSW DMN.

Model output data

These are numerical output bulletins from the National Center for Environmental Prediction (NCEP, for-
merly known as NMC), which describe forecast parameters at different locations around the country.
These bulletins are available on most weather databases. For those who want the "real thing" from the
supercomputers, full-fledged model output is in a binary format known as GRIB; these files are huge,
hard to obtain, and are not importable into Digital Atmosphere at this time.

```
652
FOUS72 KWBC 201200
OUTPUT FROM ETA 12Z JAN 20 96
TTPTTR1R2R3 VVVLI PSDDFF HHT1T3T5 TTPTTR1R2R3 VVVLI PSDDFF HHT1T3T5
SEA//928157 03005 131714 30989795 GEG//894554 03407 152312 25969490
06021947750 05304 021921 34009996 06000877354 02207 101416 29979693
12010957438 -1802 992315 30019995 12014928044 03104 021809 32999795
18006957340 01501 992612 30019995 18000957342 02502 012208 30999895
24005977941 02601 012517 28019995 24011957646 02502 022516 29999794
30010967941 01201 042819 27019894 30000957544 01001 042513 27009894
36005856037 -0202 102814 26019894 36004938141 01501 072607 27009794
42000794430 -0906 152811 25019793 42003837138 00703 123009 26009693
48000783339 -0510 182710 27009792 48000614637 00007 173109 24999491
```

ASUS frontal bulletin
Produced by the National Centers for Environmental Prediction.

```
515
ASUS1 KWBC 111919
CODSUS
VALID 111118Z
HIGHS 1030 41165 1030 38154 1027 45135 1025 31138 1035 6143 1022 3730
1033
5589 1030 6286
LOWS 979 46169 1017 38139 997 4257 997 3865 980 63172 987 66144 998
75113
1005 36102 1013 35112 998 7168
OCFNT WK 46169 46170 45171
COLD WK 45171 44170 42169 40169 40169 39168
WARM WK 45171 46172 47174 46178
COLD WK 38139 36140 33144 31149 31153
STNRY WK 4418 4525 4531 4741 4748 4653 4457 4160
TROF 4257 4151 3647 3145 2845
COLD WK 3865 3763 3463 3164 2869 2673 2478 2384
COLD WK 66144 64142 62142 59142 53145 48149 45153 42156 40162
STNRY WK 55116 59117 62121 65129 67138 69144 69155 68167 68176
STNRY WK 6291 6395 64101 64110 63117
OCFNT WK 76114 77111 78104 7895 7786 7680
COLD WK 36102 34103 32104 31106
TROF 36101 35101 32100 30101 28102 26102
COLD WK 7680 7574 7168 6866 6565 6365 5969 5672
STNRY WK 37103 38104 40106 40109 41111 43114 44117
WARM WK 38101 3999 3897 3795 3791
TROF 48112 51112 55112
TROF 5294 5095 4896 4498 4199
TROF 5571 5270 4968 4767
NNNN
```

Hurricane bulletin
Produced by the National Hurricane Center.

```
WTNT22 KNHC 060837
TCMAT2
TROPICAL DEPRESSION LARRY FORECAST/ADVISORY NUMBER  19
NWS TPC/NATIONAL HURRICANE CENTER MIAMI FL   AL172003
0900Z MON OCT 06 2003
TROPICAL DEPRESSION CENTER LOCATED NEAR 17.3N  94.0W AT 06/0900Z
POSITION ACCURATE WITHIN  50 NM
PRESENT MOVEMENT TOWARD THE SOUTH-SOUTHWEST OR 200 DEGREES AT   3 KT
ESTIMATED MINIMUM CENTRAL PRESSURE 1005 MB
MAX SUSTAINED WINDS  20 KT WITH GUSTS TO  25 KT...DISSIPATING
```

12 FT SEAS.. 0NE   0SE   0SW 100NW.
WINDS AND SEAS VARY GREATLY IN EACH QUADRANT. RADII IN NAUTICAL
MILES ARE THE LARGEST RADII EXPECTED ANYWHERE IN THAT QUADRANT.
REPEAT...CENTER LOCATED NEAR 17.3N 94.0W AT 06/0900Z
AT 06/0600Z CENTER WAS LOCATED NEAR 17.5N 93.9W
FORECAST VALID 06/1800Z 16.9N 94.1W...INLAND...DISSIPATING
MAX WIND 20 KT...GUSTS 25 KT.
FORECAST VALID 07/0600Z...DISSIPATED
REQUEST FOR 3 HOURLY SHIP REPORTS WITHIN 300 MILES OF 17.3N 94.0W
THIS IS THE LAST FORECAST/ADVISORY ISSUED BY THE
NATIONAL HURRICANE CENTER ON LARRY UNLESS REGENERATION OCCURS.
FORECASTER PASCH

APPENDIX Q — Version change summaries

Provided here is the best available listing of versions, in reverse chronological order.

In all changes, DIGATMOS.VER will be modified to bring the version up to date where the user's version can be compared with the latest release of DIGATMOS.VER online.

DA5 2023 V3.50a
Released 2023-06-06
* IMPORTED DATA: Double instances of existing observational data are eliminated during data import.
* Encapsulates all unreleased changes below.

DA5 2023 V3.50
Completed 2023-01-23 (special addition request)
* PLOTTING/ANALYSIS: Tendency for 1, 3, 6, and 12 hours is available if a surface dataset for two different times is imported. See below for specifics.
* PLOTTING/ANALYSIS: Surface pressure change added (increase blue, decrease red; time intervals of 1hr, 3hr, 6hr & 12hr)
* PLOTTING/ANALYSIS: Surface dewpoint change added (increase green, decrease brown; time intervals of 1hr, 3hr, 6hr & 12hr)
* PLOTTING/ANALYSIS: Surface temperature change added (increase red, decrease blue; intervals of 1hr, 3hr, 6hr & 12hr)
* PLOTTING/ANALYSIS: Dewpoint depression analysis for surface, 850, 700 and 500mb (5 to 0 only, green in color)
* PLOTTING/ANALYSIS: Height change 850, 700 and 500mb (decrease red, increase blue; intervals 12 and 24hr)
* Other files changed are DIGATMOS.MNU (to add in delta analysis options) and LANGUAGE.TXT (new chart names)
* The default OUTPUT.S00 etc files have been restructed and older versions are not compatible.

DA5 2022 V3.41
Unreleased pending more work - 2023-01-07
Work was frozen at this point as V3.41, there are no changes from V3.40 to V3.41.

DA5 2022 V3.40
Unreleased pending more work - Summer 2022
* RADAR: Adjusted radar sources. (7/20/22)
* ANALYSIS: Added in an experimental module to plot maximum temperatures (Data > Max/Min temperatures in set). This does not use the coded max/min temperature data but is determined by parsing all observations, and requires all available data to be ingested for all times. (7/20/22)
* SCRIPTING: Projection parameter must be specified at the beginning of MAKE command. Previous scripts which use the MAKE command can be changed simply by changing instances of "MAKE," to "MAKE,1,". (4/20/22)
* MAPPING: Added new options for plotting County Names, added overlay radar polygons, fixed digatmos.cxt to correct misplaced county labels and eliminate low level Virginia county names. (4/19/22)
* ANALYSIS: Fixed problem SDVC in digatmos.grf which was pulling in data from field 0 instead of 1 in SDVC. (7/9/21)

* IMPORT: Added support for retrieving basic WT-Meso data from NWSTG Lubbock bulletins, since the WT-Meso data has been pulled from public access and made proprietary. (5/20/21)
* MAPPING:: Fixed planetary map problem along 180 meridian (checking for -9999 null values, not just 9999). 20201030: Fixed station plots to make sure plots adhere to the specified time range; some plots had been slipping through due to changes in station plot display prioritization. (12/11/20)

DA5 2021 V3.34
Unreleased pending more work - April 2022
* Updated version from 2021 V3.33 to 2022 V3.34 in combination with fix for sounding File Not Found error. The sounding module was still accessing location-identifier-list.csv. This V3.34 was released to the user requesting a fix but I was not able to complete posting the update publicly. (4/4/22)

DA5 2021 V3.33
GRIB and Fleetcode improvements
Released 2021-07?
* GRIB: Added more GRIB products, and updated the links to reflect changes to the GFS data that caused data to not be found.
* GRIB: Changed behavior of GRIB form to not reset the form. This allows user to more easily modify successive GRIB downloads.
* GRIB: Added GRIBGRID display command so users can see the extent of the available data.
* GRIB: Sea level pressure command corrected to SDVC=0:100 instead of SDVC=1:100, which caused it to pass the wrong field to the mathematical calculations and not plot.
* GRIB: Added thickness product from CMC GEM and a thickness display command in the DIGATMOS.GRF file.
* FLEETCODE: Added antialiased lines to Fleetcode isopleth plotting. These do not draw entirely correctly as the spline segments have to be generated in small steps, but it does improve the look slightly.
* PLOTTING OF TEMPERATURE EXTREMES ADDED: Located under Data > WPC Temperature Records.

DA5 2021 V3.32 - "Fleetcode Update"
Released 2021-04-19
* IAC/FLEET PLOTTING: Barb/pip fronts have been restored based on testing.
* IAC/FLEET PLOTTING: User is now provided the choice of either barb/pip or non-barb/pip in the Data > Fleetcode menu option. The latter should be selected if the fronts are believed to not be pointing the right direction. The WMO code format does not explicitly provide for frontal direction, so this uses the left/right hand rules (relative to the line) that ASXX21 EGRR seems to be following.
* IAC/FLEET PLOTTING: Problems with spurious and broken fronts and isopleths have been resolved. It occurred when nonstandard line spacings existed in the source Fleetcode bulletin, causing the cleaned-up bulletin to get rebuilt incorrectly. The ingest now ignores null lines.
* IAC/FLEET PLOTTING: Non-barbed stationary front type used in IAC/FLEET plots changed to a more frequent spacing so as to reduce visual confusion with cold and

warm fronts.
* IAC/FLEET PLOTTING: Troughs and waves in IAC/FLEET now use a more fine-grained dash line so as to stand out from isobars.
* IAC/FLEET PLOTTING: Isobar labels have been shifted upward 7 pixels so as to not be obscured by the line.

DA5 2021 V3.31
Released 2021-04-13
* Baseline release for spring 2021 for new round of maintenance. Foremost issue is fixing reports of FLEET code diagnostic plot issues. If there are bugs at this point with FLEET we will issue V3.31a, V3.31b, etc.
* Distributables now released as ZIPs due to reports of Microsoft Edge generating false security notifications when EXE is run from the browser (likely this is Microsoft trying to strongarm developers into buying code signing certifications).

DA5 2020 V3.30
Released 2020-08-14 (unreleased dev version started as V3.21/V3.22a beginning 2019-11)
* Sporadic download problems are known to exist since V3.20. This manifests itself as downloads "skipping" about 1 to 5% of the time (surface data, SPC data, etc) producing an empty download file. V3.30 uses the same download code base as V3.20 and I actually reverted some unreleased inhouse changes back to a 2/27/19 code set. I will be subcontracting this out for the next version so it's finally fixed. Feedback from our users about this issue, negative or positive, is requested; email tim.vasquez@weathergraphics.com. It would be helpful to know how often you see this program, along with your Windows version, Dig Atm version (to confirm which one), and any other details. (2020-08-14)
* Included a starter planetary map in the AppData \ planetary subdirectory. (2020-08)
* Identifiers have been brought current through July 2020 (August 2020 for FAA identifiers). (2020-08)
* File >Station Tables > Import MLID has been adjusted to support the adjusted MLID table format beginning August 2019, while providing backward compatability with the old MLID structure. The code now uses the header rows to identify the correct columns. (2020-08)
* Exported station listings are now provided with the installer, located in the Application Data directory (see Help > About) under station-list-icao.txt and station-list-wmo.txt. These will confirm whether a station is included. They are automatically regenerated if a new MLID file is imported. (2020-08)
* Installer is packaged with a default US topographic map produced by the planetary map set. (2020-08-14)
* Default first-run app width has been widened. (2020-08-14)
* Pro vs. Pro Patch builds have been eliminated. Defense Mapping Agency map tiles have been pushed out to a separate optional map add-on, and this will shrink the Professional builds to the same size as Standard builds and the installer script. (2020-08)
* Plotting of SPC Storm Reports (live from SPC) is available. This is accomplished in Data > SPC Storm Reports. The archive goes back to June 1, 1999 and covers everything up to today's date, often with live data. (2020-08)
* GRIB2 support has been added. This is a preliminary capability that will be improved once I evaluate it and decide further how to implement it. This was done

by removing the old GRIB1 code base and interface, and added a File > Import GRIB Data panel which encapsulates all GRIB display. Automated scripting of GRIB data is not yet available, and it will be some time before it can be developed. (2020-06-24)
* Removed code that sets window state on startup (maximized, normal) as this was causing errors on startup. (2020-06-24)
* Startup forces the number of charts on startup to at least 1 (cc=0 in temp.idx), as problems are sometimes introduced by a corrupted window state and saved to temp.idx as cc=-1. (2020-06-24)
* Analysis menu paints with correct styling now. (2020-05)
* Fixed the DIGATMOS.RUL file so that the DELETE action does not have to be spelled specifically as DEL, now DELETE will also work. This amibiguity caused some problems where users previously added a station to be flagged and nothing happened. (2020-05)
* Added extended frontal analysis support (2020-03-31)
* New frontal support requires STY files must now contain an 'ams' 'bnd' and 'dry' entry for air mass, boundaries, and drylines, respectively, to work properly. These have been updated in all internal and distribution versions, with distribution versions set to use standard Verdana fonts. By accepting the new style files with the installer, users will receive the new changes. Users who continue to use older style files without adding these lines may receive minor errors or unusually formatted text when attempting to plot air mass markings, drylines, or boundaries. Users who wish to manually edit their existing files can copy/paste the default lines below. (2020-05)

```
ams  Air mass markings      064-064-064              36 Verdana
dry  Drylines               136-045-023  3
bnd  Boundaries             000-000-000  3
```

* Working to fix graticule for hurricane chart and adapt anti-aliasing for graticule.
* Updating Climatology > Hurricane plots and adding frequency. Will need to switch out old hurricane files for new ones.
* User may specify the data directory in Preferences > General. This is now stored in the registry and is no longer hardcoded as WorkingDirectory+'data\'. Any bugs related to missing data during data import may be associated with this change.
* Removed new bug caused by changes in previous version in which ship synoptic winds were always assumed to be in m/s.
* Wind barb plotting adjusted to vary line width according to station model scale.

DA5 2019 V3.20
Released 2019-03-07
* Emergency support to add handling for https URLs (TLS/SSL) downloading, which allows radar and certain surface data to be downloaded once again.
* Prioritized station display has been moved from digatmos.pri into the Station Rules (see below). The digatmos.pri file is now obsolete.
* Added the station plot element "ID", which is different from ID(ICAO) and ID(WMO) in that either an ICAO or WMO is automatically selected based on the type of data used for the station plot.
* Adds analysis commands CTOF, FTOC, KTOF, KTOC, CTOK, and FTOK for conversions between Celsius, Fahrenheit, and Kelvin. The DEGF and DEGC commands are retained but are superseded by CTOF and

FTOC respectively.
* Added analysis menu option for potential temperature analysis in Fahrenheit.
* Fix Import Directory / update manual <---- appears to work as designed
* Help button removed from View Raw Data dialog since documentation is now in PDF form.
* Added user interface for Station Rules under Data > Edit Station Rules. Added information in user manual.
* Added analysis support for new wind chill formula, old formula, and Canadian formula, and also the Australian apparent temperature. The new analysis menu scripting commands are WCHL, WCHO, WCHC, and HAAT, respectively.
* Handling of buoy handling improved, better integration with SYNOP data. In order to do this, the QUEUE.SYN and OUTPUT.SYN data structures had to be changed. All WMO numbers as viewed in QC are now prefixed with "W-", all ship synoptic with "S-", and buoy data with "B-". Unnamed buoys are assigned a temporary numerical station name based on their coordinates.
* The DIGATMOS.RUL file has been adjusted to allow the new prefixed SYNOP/SHIP/BUOY station names, which are longer. Numerical stations are always assumed to be WMO stations; ship and buoy stations must use the prefixes above. Columns are no longer locked to fixed positions and are purely space-delimited now.
* Removed two bad buoy stations in the Barrow, Alaska area by editing the DIGATMOS.RUL file.
* Updated identifier database to 2/10/2019 (WMO, ICAO, and FAA)
* Fixed missing hint text for speed buttons (appears when user hovers over them with mouse).
* SFUK30 and SFUK31 lightning data source was removed from Data > Retrieve Data. This Met Office system was terminated in 2008.
* Fixed station tables to correct Canadian stations 71641 and 71098 (changed within Environment Canada but not published with WMO).
* Added MADIS mirror source to Data > Retrieve Data panel.
* Adds line breaks in Software Update message to make dialog more readable; allows line breaks to be added to update message.
* Added DENSITY scripting command. This controls the Data Plot Crowding slider bar. Usage is DENSITY,position where position equals 0, all the way left (sparse) to 100, all the way right (plot all data).
* Plaintext MADIS processing has been optimized to work faster. [Using arrays based on station ID's first letter].
* Antarctic data: Legacy support for SSEC Antarctic data in DIGATMOS.URX has been deleted since the URL (http://amrc.ssec.wisc.edu/~amrc/9018.txt) is gone and the file-by-file loop is no longer required. The data appears to be mirrored at ftp://amrc.ssec.wisc.edu/archive/YYYY/MMDD/AWS.Wallops.YYYY.MM.DD.HZ.txt however this is a new non-standard table, and an ingest algorithm needs to be written.
* Antarctica data import support is removed since the file structure (from the late 1990s) and data is gone.

DA5 2019 V3.10a
Released 2019-02-01
* Contour > Wind > Streamline: Removed temporary block on code that was accidentally left in place.
* General debugging: Added code to prevent infinite loop (program hang) while drawing antialiased lines.
* Registry: Adjusted code to cease using registry key DigAtmEquinox for miscellaneous data; uses main registry

path now.
* Station Identifiers: Edited code to provide proper processing of ICAO identifiers with a number in the second position (K1A5, etc).
* Historical Data: Modified File > Historical Data to use install location supplied by the new Historical Archives installer, and gives user a method of manually selecting the dataset location (which can now be installed anywhere).
* Historical Data: Added code to plot Historical Data date on bottom right of workchart.
* Station plots: Sky condition of -9999 (missing) is now plotted with crosshair symbol.

DA5 2019 V3.10
Released 2019-01-30 or later
* Updated data sources (digatmos.urx) to remove old sources and add WeatherGraphics data server.
* Updated station plot wind barbs to use antialiased lines. The station circle has not been changed yet.
* Added code to prevent infinite loop (program hang) while drawing antialiased lines.
* More debugging work and bug fixes forthcoming in February.

DA5 2018 V3.09
Released 2018-10-08 or later
* Anti-aliased isoplething added throughout the analysis module.
* Set variable (non-integer) analysis contour widths; changed SLP contours to 1.5px wide.
* Added 8100px planetary map to /planetary directory; set default topographic directory to planetary directory.
* Enabled Data > Set Comment; documented in manual.
* Enabled launching of User Manual in Help > About. Deprecated the CHM help and removed it from the installer.
* Rearranged some menu items.
* Extensive changes to the User Manual. Developed a couple of new sections including the planetary map section.
* On 1/27/2019 generated a STD build and put it in /www/wg/dl. PRO existed already.

2018 v3.08a
Released 2018-09-20
* Isolated and fixed a longtime bug in which a few stations were omitted during data import due to array bounding problems. Also fixed station indexes to separate out numbers (A..Z,#) to (0..9,A..Z). Added diagnostic dump function to check station table contents. Changed relevant parts of import1 and stntable units.
* Fixed bug in buoy import code to ingest all of the data portions
* Added bad buoy stations to DIGATMOS.RUL so SLPs don't get plotted
* Increased Surface Radius in Preferences > Analysis from 100 to 2000 nm so that Barnes and Cressman work better in oceanic analyses (should be increased significantly when data sparse areas are in the analysis; increase Reduction to provide fine-scale data at same time if there are also stations close to each other)
* Added Auto Station Radius setting to Preferences > Analysis to support automatic handling of Weighted, Barnes, and Cressman at different zoom scales. If checked, the station radius will be treated as 20% of the mean window size, but actual station spacing may vary depending on the number of observations that were imported.
* Added a Station Radius Bias slider in the right lower

side of the Analysis Preferences panel which lets the user adjust the Auto Station Radius by this percentage for all future calculations. Station radius is the radius around a gridpoint in which observations are accepted for that location; it may be subject to weighting and reduction (in which successive passes are made at progressively smaller radii down to zero). Setting it too high will produce sensitivity to high wavelengths with overly smoothed fields; setting it too low will produce sensitivity to low wavelengths with noisy fields.
* Added Copy To Clipboard to Troubleshoot Data; allowed Ctrl+A selection.

2018 v3.08
Released 2018-08-15
* Full update of station tables, including many changes in Canada
* Eliminated a few random analysis

RELATED CHANGES: Master Location Index had bad station locations (updated MLID 3.1.1c to 3.2.0)

METAR stations:
CYBC CYCC CYCG CYDC CYEL CYHD CYKJ
CYNE CYPQ CYPW CYPY CYQL CYXH CYYH
CYZR DAFI DATG EFPN EFRV EKVB LEMU
LOKN LTAE LZKC MHSC MMTC MMTX MUBS
MUSL OIBH PAFS RJNO SCNY SCPF SCQE
SCRL SHCY VDKH VEJT VTUP VYNT YCDR
YPLC YSTW ZPLJ

Check SYNOP stations:
71081 71908 72469 72501 72558 72649
74389 74560 (thanks to rschmidt)

Fixed SYNOP locations at:
02949 06654 11184 17120 29771 33946
47739 48357 48969 59431 61697 62018
68541 71001 71023 71033 71036 71038
71056 71072 71085 71136 71141 71142
71151 71167 71174 71187 71196 71208
71220 71247 71250 71267 71268 71272
71290 71292 71293 71304 71366 71369
71398 71410 71436 71488 71499 71513
71527 71559 71582 71584 71587 71608
71610 71613 71618 71629 71632 71634
71649 71675 71681 71684 71685 71686
71689 71691 71693 71718 71736 71802
71843 71874 71884 71886 71888 71903
71905 71920 71921 71933 71941 71947
71956 72506 72607 74484 74646 74735
76640 78312 85766 85864 94674 94762
94864 97072 97120 97796

WMO Pub 9 listings are erroneous for these stations and are not acceptable:
34434 42423 60535 60621 62002 62007
72257 74724

WMO Pub 9 listing is doubtful:
58660

WMO Pub 9 has inverted longitude sign and is not acceptable:
04017 65536

VERSION 2018 v3.07 (INTERNAL)
6/26/2018

* Added Auto Aspect settings to Map > Generate Map > Height to size the aspect ratio for various paper sizes.

VERSION 2018 v3.06a
6/25/2018
* Three text lines were set to visible = false; fixed this

VERSION 2018 v3.06
6/24/2018
* Developed import routine for Digital Atmosphere Historical Data
* Added thorough debugging information to About form
* Removed time debugging from Preferences > Misc 1 and moved to About form
* Quality Control window has been resized to handle Aero controls without producing scrollbars.
TO DO -- Add checks to the time legend stamp, remove c:\sfc-packed directory and store data

VERSION 2018 v3.05 (INTERNAL)
5-19-2018
* Increased line length limit of graphics commands (digatmos.mnu) from 255 to 9999 characters
   - This will eliminate unpredictable results with complex commands that are cut off.
* Added anti-aliasing for Analysis isopleth lines equalling a width of 1.
* Added starter scripts to provide shading for moisture (need to buffer analysis grids to help them run faster).

VERSION 2018 v3.04 (INTERNAL)
3-16-2018
* Removed diagnostic grid from cross section analysis

VERSION 2018 v3.03 (INTERNAL)
3-01-2018
* Fixed default map not plotting elements in correct location.
* Toolbox color scheme adjusted from purples to blues.

VERSION 2018 v3.02 (INTERNAL)
2-14-2018
* A few minor corrections before Denver conference release

VERSION 2018 v3.01
Early February 2018
* Reworked cross-section analysis. Added RH, lapse rate, in-plane winds, etc.

VERSION 2018 v3.00
January 2018
* Establishes update of Digital Atmosphere
* Fixes WSR-88D NEXRAD code changes

VERSION 2017 3.0
Main release of versions below.
- Testing in Windows 10.
- Preferences form is slightly larger to accommodate Windows 10 controls.

VERSION 2017 2.30a/b/c/d/e
Build tests

VERSION 2017 2.30
(Coding start date 6/1/2015 - Release date 9/20/2017)
Continued update/revision work of revisions that started with V2.11. It was decided with this update to

get rid of the TMS menu framework, but after seeing it did not detract from menu appearance in Windows 8 it was decided to leave it alone.
  - The Level III radar module with dual-polarization products has been completed and updated through Build 17 (added 8-Sep-17)
- Extensive work on documentation
 - Added colon to next NMC character position (font.012)
- Extensive GUI control panel work to slim it and improve appearance.
- Added hovering hints to speed bar.
- BELOW are changes before December 2016.
- Updated data sources, removed old ones (Albany, FSU), changed URLs (NWS, Texas Tech). These changes are also reflected in the DIGATMOS.URX file so older versions can use this.
- Data > Data Retrieval dialog delete function fixed (was inoperative)
- Data > Data Retrieval window optimized so that cursor returns to active row upon a deletion or edit.
- Extensive development of the PDF manual.
- Geography rendering (Map > Generate) is much faster.
- Radar module has been revised to provide fixes for new coding changes.
- Format of DIGATMOS.NXC has been changed. DIGAT-MOS.RAD has been updated.
- Color theme has been adjusted to a gray/silver contemporary look.
- Changed color scheme from blue to a more subdued dark gray / gray.
- Made a change to allow Analysis menu options to inherit the menu style.
- Paired this release with a drastic update in the program documentation to bring it up to date. Focus will be on a PDF manual, and it will be created as a shortcut in tandem with the program.
- Added support for Shapefile attribute matching; also removed an Application.ProcessMessages block in the Shapefile module that was slowing down the process somewhat.
- Removed support for GPS as it is based on old 9-pin COM port technology and most users have upgraded to USB devices, which are not yet supported by Digital Atmosphere.
- Changed Climatology menu to Tools. Restructured menus to move certain data functions from the File menu to the Data menu, and tools from the File menu to the Tools menu.
- Internet data source table has been updated to change frontal bulletin source from hpc.ncep.noaa.gov to wpc.ncep.noaa.gov.
- Added status message for Map > Copy Markings To Basemap.
- Changed default font set to Calibri.
- Set legend font style to bold.

VERSION 2.14
compiled 05-Jul-17 (Not released)
- MAIN CHANGES: Contains brand new updated station tables, a new
     radar data package,
- Interim release to fix the accidental registered version on the website and a lack of a Pro version for 2.12/2.13
- GPS component and menu have been removed as those use obsolete COM ports
- Color tables in DIGATMOS.NEX have been changed to the GRLevelX format to allow more standardization. All types of radar products are contained in this single file.
- Printer configuration is temporarily not working

VERSION 3.00
This is the parallel Delphi 7 version (see Delphi 7 Fork below, 2013) which has not been released since there are dependencies in the radar module that have not been addressed.

VERSION 2.13
began 23-Feb-15
 - Fixed problem with elevation data not being extracted from location identifier tables (so no wet bulb / mixing ratio / theta E)
 - Added wet bulb to station plots.

VERSION 2.12
began 23-Dec-14 released 23-Dec-14 as public release of 2.11
- Includes the 2.11 snow depth plot option.
- Added support for new Master Location Identifer Database format
- Implemented 12/30/2014 release of MLID location database
MANIFEST CHANGES:
master-location-identifier-database.csv (add)

VERSION 2.11
began 23-Dec-14 released 23-Dec-14
- Begun as a continuattion of V2.09. The Delphi 7 fork was dropped and the Delphi 5 code base was retained to avoid having to rewrite dependencies for Delphi 7 and prolonging the release date.
- Adds snow depth plot display option in Preferences station plot model).

DELPHI 7 FORK - 2012-2013
Between August 2012 and June 2013 a parallel version (V3.00-V3.01) was developed under Delphi 7. In 2014 it was decided to set this aside due to problems with dependencies (zlib, etc) and so the more important issues could be addressed.

VERSION 2.10
began 04-Dec-09
- Enhanced scripting; added DELETE script command for file delete; allowed use of absolute filename in script execution commands

VERSION 2.09
Began 12-Oct-09
Began work on DIFAX graphic engine (Weatherpipe type utility) for Pro version and completed most of it.
MANIFEST CHANGES
DIGATMOS.DFY (add)
DIGATMOS.DFZ (add)

VERSION 2.08
25-Jul-09
This updates affects the Professional Edition only.
- Cross Section > Copy To Clipboard function now works.
- Added Cross Section > Save To File (allows GIF, PNG, JPG, and BMP).

VERSION 2.07
18-Jul-09
- Adds cross-section capability under Data > Cross Section (requires radiosonde data and a line segment dragged on the map).
- Fixes problem with Workchart levels & times not being remembered fully when program is started; active levels and time selections were displayed but were not set internally, thus 500 mb plots would not appear, even with

500 mb showing in Active Level window, unless it was reselected
- Preferences > Analysis > Auto smoothing setting is now saved across sessions
- NEW FILES: Adds the file DIGATMOS.ELX to support the cross section module.

VERSION 2.06
22-May-09
- Fixed issue with soundings for WMO stations 00000-09999 (Northern Europe) not plotting in V2.04-2.05. This was caused by different handling of WMO identifier leading zeroes, which are often stripped out by spreadsheets such as Excel when preparing station identifier lists. Any further issues with Northern Europe SYNOP or upper air may be attributable to this issue; this issue will be monitored.
- Hardened filtering of miscellaneous text in METAR import; this will produce fewer spurious results in the Station Data > Audit module.
- Further updates to station identifier list; provided updated list and station package. The identifier list now contains almost all ICAOs currently being transmitted. Work will now be done to finalize and document the location identifier format and fix other Dig Atm bugs reported.

VERSION 2.05
20-May-09
- Adjusted Sounding window so that it is in the screen center.
- Fixed a problem with soundings not plotting in V2.04; this was due to the station table format changing and the sounding module being unable to validate the chosen WMO code. This has been fixed.
- Removed faulty line of code that interfered with scripting (Unable to Create File error) whenever a URL was in the script line
- Fixed handling of custom data in Analysis module; Barnes/Cressman/etc were using value stacks for grid 0 instead of 1/2/3
- Adds a new menu option (DIGATMOS.MNU) for custom data, data type CUSX, which is imported from the existing CUSTOM.DAT file rather than from the OUTPUT.*** imported/formatted data. This can be used in addition to CUST in script files.
- Added more stations to location-identifier-list.csv and recompiled tables.
- Added a datafile edit capability (File > Station tables > Audit) to assist users with identifying stations that did not import due to missing data in the location identifier list. This only evaluates the data against the current station table ingested into Digital Atmosphere.
- Added FAA identifier tables, added DIGATMOS.SXF and DIGATMOS.STF to build. This allows more accurate handling of airways and 3-letter identifiers and separates them internally to prevent mixups.
- Some new stations in location identifer list; will continue to add more in the days/weeks ahead. Station indexes rebuilt.

VERSION 2.04
17-May-09
- Added the new LIL.CSV Location Identifier List and will begin phasing out the old DIGATMOS.STN file. Made appropriate changes in File > Station Tables menu to give user the option of importing the new LIL.CSV or an older .STN table. The LIL.CSV list is still in a draft form and is still in development.

VERSION 2.03
10-Apr-09 (Unreleased)
This version contains enhancements to scripting commands.
- If you use scripts that use the LOOP command, you *MUST* be aware of the following scripting changes before using script files.
- In scripting, support has been added for a LOOP... END block. Previously "LOOP" would run the entire file as a loop. Now all content between the LOOP command and an END command are run. Multiple loops are supported, but nested loops are not supported.
- The LOOP command now requires 4-digit years. It is as follows:

      LOOP,yyyy,mm,dd,hh,span,iterations
    where
       yyyy = loop start 4-digit year
       mm = loop start numerical month
       dd = loop start numerical day of month
       hh = loop start hour
       hours = span of loop from start to finish in hours (may exceed 24)
       interval = interval of timestep in hours (e.g. 1=hourly, 24=daily)
- Added EXIT scripting command to exit the program.
- Scripting: User may now choose @YYX or @YYYYX token to choose between a 2-digit year or 4-digit year expression.
- Scripting lines which begin with //, #, :, or ; are treated as comments
- Scripting now allows comments to exist at the end of lines; these comments must begin with //
- Checked SOUNDING scripting command. This is NOT an interactive display and only exports silently to a graphics file. Users may use the SOUNDING command as follows:

    SOUNDING,station,filename,omitdate,omittrace
      where
       station = ICAO
       filename = fully qualified output filename, GIF, JPG, or PNG
       omitdate = use false to display date, true to omit date
       omittrace = use false to display lifted trace, true to omit it
- Add DIGATMOS.TSL temporary station table to manifest (used by sounding routine)
- DIGATMOS.MNU is altered to remove numerous %2 and %3 entries that caused the "deg F" and "deg C" toolbar speed buttons to produce jumbled isotherm plots.
- (Need to add checks to delete OUTPUT.FSL file)
- Script file execution is adjusted so that if an exception (error) is thrown the script file will get closed properly, mitigating Error 32 (sharing violation) afterward.
- MADIS data throws "Read Beyond End Of File" error. This was found to be due to a change in NOAA MADIS coding where an extra integer (purpose unknown) has been inserted after Precipitation and before Weather. Code has been fixed to handle this.

VERSION 2.02
2.02 16-Mar-09 -
- Added code to prevent infinite loop during QC, Preferences Form, or Calculator form display
- Removed bug in setting height of QC form
- Added a test to see whether a DIGATMOS.STN file exists in both the Program Directory and Applications

Data directory, which is checked on a File > Recompile Tables operation, and ask the user which one to import.

VERSION 2.01
04-Mar-09
  - Added new setting in File > Preferences > Maps tab called "Professional map tile root location" to allow DA to find GNC/ONC/JNC/TPC/JOG tiles.
  - Shifted default tile map root to the Program Files directory hierarchy instead of the Local Application Data directory to allow maps to be available when overwriting old Digital Atmosphere Professional installations.

VERSION 2.00
 27-Feb-09
  - NAMING: Dropped the Equinox name. The file folder architecture of this Digital Atmosphere series is different than the Equinox line. Thus we are reverting to the basic Digital Atmosphere nomenclature for simplicity's sake.
  - NEW FEATURE: Program detects if the Scheduler is on at shutdown. When the program is started again, the Scheduler resumes operation about five seconds after startup.
  - NEW FEATURE: Digital Atmosphere "remembers" across sessions the settings for the Workchart Panel for Active, Isentropic, Surface, Upper, and Forecast time and level dropdown boxes.
  - FIX: Data date/time detection changes have been made. Date/time is established ONLY during file import, internet retrieve, or script download, as follows. If none of the special conditions are met then the date/time is presumed to be the current clock UTC time.
      -- INTERNET RETRIEVE: Obtained from the time tokens.
      -- FILE IMPORT: Obtained from any file imported that contains an
        8-digit number at the start of the filename, which is presumed
        to signify a yymmddhh group.
      -- SCRIPT DOWNLOAD: Obtained from any 8-digit number in the URL, which   is presumed to signify a yymmddhh group.
  - FIX: Changed digatmos.mse so that Haiti is set to longitude -73, not +73
  - FIX: Fixed the QC and Calculator form so that scroll bars (which may occur in certain Windows skins) will not appear. Could not test this inhouse.
  - Only a full release is provided; no patch from previous versions is available due to the change in file folder architecture.

EQUINOX V1.52 BETA
26-Feb-09
  - NEW FEATURE: User-defined analysis domain size. All Digital Atmosphere versions prior to this one used a fixed 30 x 30 domain. The user can choose a finer analysis resolution in File > Preferences > Analysis > Analysis Domain Size. About 50 x 50 is sufficient for most purposes; resolutions exceeding 100 x 100 will appear "noisy" and may require excessive filtering. It is not advisable to set the resolution finer than the resolution of the observation network, as this will cause mathematical noise.
  - FIX: Fixed problem with blank okta station symbol being plotted if sky condition was unknown (oktas=10) in TrueType mode... this problem goes back through all Equinox versions.
  - FIX: Fixed the Preferences form so that scroll bars (which may occur in certain Windows skins) will not appear. Could not test this inhouse.

  - FIX: Established proper display of version number (V1.51 showed as V1.50)

EQUINOX V1.51 BETA
21-Feb-09
  - Preferences will be reset. Preferences are now being established in the registry HKCU\DigAtmEquinox key instead of HKCU\DAFusion. This will allow Digital Atmosphere to co-exist independently of older versions. Older preferences will NOT be imported.
  - Changed setup program to require admin privileges, since correct font installation under XP/2000/Vista requires power user or admin privileges.
  - Fixed extra solidus in ImportData module that may cause a \\data.usr not found error.
  - Fixed Mercator isoplething issues caused by unnecessary checks against drawing isopleths in part of the canvas that's in outer space.
  - Changed the set of default data (OUTPUT. files) to conform to the new internal surface data class definition (older OUTPUT files cause a read beyond end of file error if not refreshed by downloading new data).

EQUINOX V1.50 BETA
01-Feb-09
  - The scheme for folders for Digital Atmosphere has been changed, making it fully compatible with the User Account Control restrictions of Windows Vista. No longer is all working content placed in a single Digital Atmosphere directory. Instead it is placed in CSIDL_LOCAL_APPDATA, which under Vista is C:\[User]\UserName\AppData\Local and in XP is C:\Documents and Settings\[User]\Local Settings\Application Data. Users wishing to tinker with Digital Atmosphere files will need to look in this directory to make modifications. (12/18/08,2/1/09)
  - When a required file is not found (testfile unit), Digital Atmosphere suggests an e-mail address to report the problem to. This has been updated. (2/1/09)
  - Infiletype variable in import module changed from 100 to 255 length to handle much larger filenames. (2/1/09)
  - The setting for File > Font Mode is now remembered across sessions (default is TrueType fonts). (2/1/09)
  - Repaired Mercator projection to allow correct display across the 180 degree meridian. This has not been fully tested. (2/1/09)
  - Cosmetic: changed Digital Atmosphere window title to use a pipe (|) instead of two dashes (--) between the version number and software type. (2/1/09)

VERSION Equinox 1.10a
(May 24, 2007)
    Micropatch to fix corrupted handling of downloaded radar data (data was downloaded into obs.001, obs.002 etc and program needed to find these in nids.001, nids.002, etc.
    Added description element into version change message, so users can decide whether a download is needed when a notification is received.

VERSION Equinox 1.10
(May 18, 2007)
    Numerous fixes and repairs, including fixes for handling of climatological daily data from SYNOP reports.

VERSION Equinox 1.05
(January 17, 2007)
    A few new Mexican radars in the northwest provinces have been added to DIGATMOS.RDY. Not all radars are active, as Mexico's radar network is not reliable.

Internet > Retrieve shows how many items are selected.

Map > Overlay > Points now uses a more capable file format. See the help under Map > Add Point. It allows the use of lines, attributes that can be changed, and shortcuts.

Map > Overlay > Points now prompts for a filename. Editing is no longer done in the program as editing flow was unclear.

Contour labels are now plotted at the top of closed contours.

Removed digatmos.ptt from project; it is superfluous.

Adjusted digatmos.nex to put clear air mode on the same palette as precipitation mode to allow for a standardized mosaic.

Entering "------" for a color in digatmos.nex keeps that color level from plotting. This can be used to allow for a unified mosaic color scheme.

Added code to prevent Digital Atmosphere from generating zero-value serial numbers.

Added handling for METAR unknown precipitation (UP). This will plot as two solidii (//) and will carry weather code 100. I saw lots of UP reports from Texas during the January 15 2007 sleet event; UP is most likely sleet.

Changes made to WSR-88D plotting module to allow various raster data (most notably Composite Reflectivity) to plot correctly. The module now determines polygon positioning based on the number of rows in the raster table as well as the resolution for the product as defined in digatmos.nxc. Also added progress bar updating on raster data.

In Radar > (product) logic is added to detect and discard old radar scans so as not to mess up mosaics. An RPG product that is more than 15 minutes older than the preceding RPG products being plotted will be discarded and a message will appear in the status window showing it was discarded. The weakness is if the plotted site is the very first to be plotted, it will be used since no other comparisions are available.

A tutorial has been added for the Radar > Import Image menu option on how to add radars , using the example of Durban, South Africa. This will be of considerable interest to international users.

Started preliminary work on importing GRIB2 data . This module does not work and will not plot, however the file will be handled with probably no errors.

Muted menu colors slightly to reduce blue and red saturation.

VERSION Equinox 1.04
(January 7, 2007)

Preferences > Annotations > "H" and "L" characters now plot correctly. The software was defaulting to "H" and "L" rather than using the characters shown here.

Removed possible error in installer related to "tutorial" directory. This was returning a harmless error.

Incorrectly plotted coordinates when using older Digital Atmosphere charts (from early Fusion and before) has been fixed by adding sanity checks to the load function for *.dmf map data. If the rotation value is out of bounds (<-360 or >360 deg), which may be the case in earlier versions where the rotation value was not specified, it will set it to zero and correct the source file, permanently fixing the problem for that map.

Diagnosed slight positioning errors in contour labels and highs/lows and fixed them.

VERSION Equinox 1.03
((January 6, 2007)

METAR visibility values are now correctly ingested.

Fixed script LOAD command which was only loading in the image and not loading the background map and resizing the window.

Eliminated redundant labels in the chart title stack to prevent multiple display of the exact same chart title.

Fixed problem with GRN or TEMPO in METAR being interpreted as GR and PO weather types.

Improper time token entries in Internet Retrieve (using one instead of two digits) will be automatically detected and corrected.

View Last Radar Product fixed, so as to plot the last -radar- product. A Window > Replot Last Product command has been added to replot any last product.

Added "Window > Allow Digital Atmosphere to run in background" command which prevents Digital Atmosphere from popping up (such as during scripting operations) and regaining focus. Right now this only suppresses the "plotting radar" message... if you see Digital Atmosphere pop up at other times, please send detailed information.

Tutorial directory and sample.txt file added to build.

VERSION Equinox 1.02
(January 2, 2007)

Emergency patch as Internet > Retrieve was non-functional due to problem in URL preprocessor.

VERSION Equinox 1.01
(January 2, 2007)

When all workcharts are closed and then new ones are created, there is now proper handling of the workchart and its background map. The user no longer gets an empty frame.

Added ability to auto-retrieve historical (past 1-2 weeks) radar images based on date-time selection from Radar > Set Date-Time and presence of an archival source in the digatmos.rad resource file. If these are selected then choosing a radar product will cause historical data to be accessed via the Internet.   This is slightly slow because the data directory will have to be analyzed to find the closest matching file time.

Password security has been introduced on scripting and internet resource URLs. This allows you to devise your scripts so that they can be traded without compromising login information, and so that they execute onscreen without being insecure. They can be used for not only passwords, but account names, server names, and so forth. Your list of sensitive data must be maintained in DIGATMOS.PWD. On each line, write token=value where token is a name created by you and value is the actual value to be substituted. When %%token %% (your token word surrounded by double-percent signs) is found in a URL, it is replaced with the equivalent value that you defined. Digital Atmosphere will display the %%token %% marker, so don't name tokens with sensitive information.

VERSION Equinox 1.00
(January 1, 2007)

Help files converted from WinHelp to CHM to ensure compatibility with Vista. This removes dependencies on Winhlp32.exe. (12/22/06)

Fixed analysis labels to provide correct centering of individual labels and correct coloring. (12/27/06)

Fixed problem with Canadian radar data import. Canada made some changes sometime in November 2006. This required some structural changes and a small change to the digatmos.rdy file. Part of this was to allow users to explicitly define the image type, since Canada's radar imagery was a GIF file but was actually a PNG object. (12/28/06)

Support is added for NCEP high-res front bulletins. These are provided at http://www.hpc.ncep.noaa.gov/ discussions/codsus_hr and described at http://www.hpc. ncep.noaa.gov/html/read_coded_bull_hr.shtml . With these new bulletins, frontal positions are located to the nearest tenth of a degree (6 nm resolution) rather than nearest whole degree (60 nm). There is no need to use the older format. (12/29/06)

Fixed Error 103 problem with GRIB import caused when certain data is not found in a file. This was caused by incorrect file handling. (12/29/06)

Added support for public ECMWF data by making appropriate entries in digatmos.grd. Also introduced support for scaling of units based on digatmos.grd entries.

Enabled support for Preferences > Maps > Label Graticule. (12/29/06)

Fixed incorrect symbol type used for thunderstorms in METAR reports. Digital Atmosphere was mapping TSRA, TSSN, TSGR, etc to the ww code 91-94 sections rather than 95-99. This has been fixed. (12/29/06)

Added thread processing command to code just before FTP uploads to allow system to catch up. This was resulting in null FTP uploads. (12/29/06)

Enabled "check for updates" module to compare program version number with production version number on website and ask user once whether they want to update. (12/29/06)

Added import of MADIS data direct from FSL (NOAA). This is included in a new Internet Retrieval resource list.

Improved Internet Retrieval system to stream downloads into individual files, so binary files (like MADIS and future GRIB/BUFR) can be properly handled. Files are captured under different names in /data and are processed out to the Digital Atmosphere home directory under obs.asc, obs.bin, and nids.bin. The obs.*, nids.*, and madis.000 files are deleted before each new download. This also allows better management of content inside /data directory. (12/30/06-12/31/06)

Added pointer URL search function in Internet > Retrieve. This was necessitated by the way SPC carries convective outlooks, and the fact that no static pages for this product exists. In Internet > Retrieve, URLs with a space in the middle are handled as pointer URLs. See the Internet > Retrieve help for more information. (12/30/06)

Fixed convective outlook plotting. Changes in entire bulletin format prevented the plotting routine from working. (12/30/06)

FUSION 0.6h
11-Nov-06
Resets expiration date (60 days from first run).

FUSION 0.6e3
05-Jul-06
Added queue.iac and temp.iac to the build so that if no FLEET data has been imported, system will not cause an error when user displays FLEET data.

FUSION 0.6e2
04-Jul-06
Added PNG support (import/export)

A METAR VRB wind (basically any wind direction that is assigned an internal wind direction value of -9999) is now omitted from plots and objective analyses.

Additional code has been added to catch METAR lines which omit the wind block; up until now these have been discarded.

FUSION 0.6e1
03-Jul-06
* This does the first and foremost important thing of resetting all 30-day expirations for the evaluation. Obviously I cannot make the release unlimited, as software pirates would have a field day with any unlimited version posted on our website. You can contact me if you're a registered user and need a key.
* Also I have set up the compiler system under a new computer and a fresh Win 2000 OS. This release is rebuilt under that machine. If anything looks squirrely, let me know and I'll see what happened.

WORKSTATION V1.0b
(March 24 2004)
* Adds support for RVRT, AVRT, DVRG script commands. Fixed internal handling of fields to provide more uniform use of u,v,z format and prevent any surprise problems.
* Fixed gust problem in METAR import routine.
* Fixed Recompile Tables to remove something that was commented out, preventing digatmos.stn from being imported.
* Updated this help file accordingly.

WORKSTATION
(Dec 2003 - March 2004)
***** Hundreds of changes were made which are too numerous to list. *****

WORKSTATION 0.32alpha
(15 Nov 2003)
* Algorithm added to read the server directory when a front bulletin is being imported. If a server directory structure is accessed on the same path as the file desired, the time tokens are discarded and the last file in the directory list is queued for download. [This is a significant development in the Digital Atmosphere line that allows DA to consistently obtain the latest frontal bulletin from a standard server that allows directory listings. It has been a much-needed capability. Digital Atmosphere depends on a consistent appearance of a directory listing, and this algorithm may not work if a server begins listing four-digit years in the directory listing, goes to a strange directory format, or the last file on the page is not the latest frontal bulletin. If this occurs please contact me with details.]
* The weather symbol fonts have been thoroughly reworked. Fonts have been scaled down in relative size and left/right bounds have been repaired on a few symbols. Fonts now include pressure tendency and cloud code symbols. This allows integration of full station plot data. In summary, ASCII slots 040-049 contain augmented sky cover symbols; 050-059 contain automated sky cover symbols; 060-068 contain pressure tendency; 069 the symbol for automated observation with no sky cover report; 071-079 contain low clouds; 081-089 contain middle clouds; and 091-099 contain high clouds; and 100-199 contain standard WMO weather symbols. IF YOU INSTALL THE PATCH AND ARE STILL MISSING CLOUD AND PRESSURE TENDENCY SYMBOLS, PLEASE DELETE THE "WeatherSymbols" FONT FROM YOUR CONTROL PANEL > FONTS AND REINSTALL THE PATCH -- AND

NOTIFY ME OF THE PROBLEM. [The new fonts allows further improvements to plotting functionality in the Alpha version.]

* Digital Atmosphere plotting module has been revised to handle the new fonts and to add pressure tendency, pressure trend, and cloud symbols back into the plots. [This further enhances functionality in the Alpha version.]

* A checkbox for Suspend Highs/Lows has been added to the "Fronts" Toolbar Control Panel as well as to Preferences > Analysis (which cannot be saved as a preference since it is for temporary use only. [Allows user to defeat plotting of High/Low labels on the map on demand, for example, when plotting the NCEP Fronts bulletin together with a METAR isobar analysis -- this prevents a duplicate field of H and L symbols from appearing on the map]

* A bug has been removed where a sky cover = 10 (automated with no sky cover result) created no station marking (in the classic DA a crosshair was plotted). This uses the new font symbol of a small circle with crosshair (ASCII 69). [Fixes station plots in the Alpha version where a station is not marked by any station circle or square.]

* Created a separate, independent download algorithm (not tied to the main download system) to allow internal downloads to a site (such as of a directory listing) without creating a programming mess. [May fix problems with erratic download behavior (including missing datasets) when trying to download NEXRAD radar data.]

* Hourglass has been added during Map > Generate operations. [Helps give user feedback as to when the system is busy.]

* Spacing of elements in a station plot has been expanded by 10%. [Allows station plot to be slightly less cluttered and maximizes ability to display weather symbols.]

* Bug was removed where a weather condition of 1 to 4 resulted in no weather symbol but left a blank area in the WX symbol area (pressing out the visibility value when set to "smart" and causing a value to be shown). 1 to 4 are now treated as no weather value. [Invisible "hijacking" of the weather symbol slot is now prevented.]

* Adds the missing USMAP.BMP file required for the Radar > Internet Radar Settings to show its information. [Fixes a bug in the Alpha release where going to Radar > Internet Radar Settings shows sites but no background map.]

* A correction was made to the front import module to fix an infinite loop during processing of frontal data. Also adds code to prevent writing of spurious frontal data. [Fixes lockups during data import. Fixes range check errors during data import. Fixes stray segments on frontal depictions.]

WORKSTATION 0.31alpha
(15 Oct 2003)

* This version entails a vast retooling of the GRIB module. It allows much faster, convenient access to GRIB datasets. As usual, GRIB data is imported through the File > Import GRIB module. From there, the changes are significant. First, a GRIB field must be chosen on the Grib Control panel (on the toolbox) -- see below for more info. All of the packaged fields are stripped out into individual field files (GRID.001...GRID.999 in the /grids subdirectory), with an index provided in /grids/grid.idx and /grids/grid.dat. From there they may

be accessed and viewed at any time. Since they are plaintext, users may adapt these field files for other purposes. To summarize, here are the latest changes in this update:

* The GRIB module has been thoroughly reworked to spool gridded data directly out to files in \grids subdirectory. This allows the data to be instantly selected and plotted, without the need for re-import. Importing more GRIB data replaces the gridded data selections with new data.

* Wind direction fields are now automatically separated into their own special fields, providing that the correct U/V components can be located.

* Scheme of DIGATMOS.GRD modified so that >PARAM parameters can be resolved to Digital Atmosphere contour Styles.

* Added control panel for GRIB on Toolbox > Control. Allows selection of gridded data that has been previously converted through File > Import GRIB. By checking either "Plot" or "Contour", the field will be displayed immediately when selected. Otherwise it can be viewed after being selected using Plot > Custom data or Contour > Custom Data.

* SPECIAL NOTE -- CONTOUR INTERVALS FOR ANALYSIS FIELDS, especially with GRIB data, need to be checked and are not complete!!! I have to resolve all of the measurement units between the GRIB data, the internal formats, and the Styles.

* SPECIAL NOTE -- Custom Data Plots and Contours no longer work except when GRIB data is selected. This will be fixed.

VERSION WORKSTATION 0.3alpha
(12 Oct 2003)

* Numerous improvements were made to the GRIB module (File > Import GRIB). It appears to be working now with the NCEP AWIPS Eta grid and globalmarinenet GRIB files. A bug was fixed in which bitmap data (particularly for marine grids) was ignored, resulting in bad plots. Fixed a corruption of wind output in which components rather than polar vectors were written to the custom data file, resulting in bad GRIB wind plots. Help documentation has been updated. The author would like inputs on how the GRIB module is working.

* Fixed Contour > Custom Data so that it works with GRIB and other data. This will be worked on so that it uses parameter intervals defined in user settings.

* Removed crowding algorithm from Data > Custom Data. GRIB wind plots now contain the entire grid (and may be illegible if the grid is dense enough). This will be replaced with a more flexible user-defined method.

* Got some rudimentary isopleth labels working in the Contour module. This will need more work to tie in better with the Style settings.

* A Styles panel was developed and implemented to manage the Styles settings. Changes are reflected in the help documentation.

* The parameter lat/long was added to the default styles. A master default style (styles\master.stx) was added.

VERSION WORKSTATION
0.2alpha (07 Oct 2003)

* Adds Shapefile import capability. Documentation for this added to manual.

* Corrected Help > About window.

* Fixes front page tab so that Data/Control is on front rather than diagnostics.

VERSION WORKSTATION 0.1alpha
(Sep 2003)
* ERRONEOUS SYNOPTIC WEATHER VALUES, PARTICU-
LARLY IN BUOYS, WAS ELIMATED. The T/Td extraction
routines, as well as pressure, pressure tendency, rainfall,
and so forth were looking at the whole report rather than
just Section 1 and as a result if a 10xxx, 11xxx, 20xxx,
or 21xxx group was omitted in Section 1, it would be
pulled out of other sections if a similar group existed,
and thus a false T or Td was encoded. The routine was
changed to only look at Section 1 and ignore other sec-
tions.
* NEXRAD RADAR SUPPORT has been added. Stations
are selected in a selection panel, and are retained within
the program permanently whenever a radar source is
selected in Internet > Retrieve. Users can also manually
select a radar file for import.
* OCEAN FILL PROBLEMS are now largely eliminated.
This is because the mapping routines use polygons in-
stead of vectors now.
* A MULTIPLE DOCUMENT INTERFACE HAS BEEN RE-
INSTATED to allow multiple maps to be worked with
simultaneously.
* NEW WEATHER TYPE FACES HAVE BEEN ADDED. This is
reflected in your Windows Fonts folder.
* THE LAST DATA DIRECTORY USED DURING A
FILE>IMPORT FILE ROUTINE IS REMEMBERED. This is
handy for users who constantly access the same data
directory all the time.
* SOME CHANGES TO MASTER STATION LIST (created
Edition 51 and afterward).
* DOCUMENTATION CORRECTED to delete obsolete infor-
mation such as time zone settings, etc.
* METAR IMPORT ADDS ABILITY TO HANDLE "RECENT"
PRECIPITATION/OBSCURATION TYPES. Now the module
looks for REDZ, RERA, RESN, RERASN, REFZ, RESH, RE-
SHRA, RESHSN, REGR, REFG, and RETS.
* METAR IMPORT HANDLED Q9 BUT NOT Q0 QNH PRES-
SURES, E.G. Q0984, Q0993, ETC. This support has been
added.
* METAR IMPORT GUSTS ABOVE 100 ARE NOW HAN-
DLED.
* METAR IMPORT OF P0000 PRECIPITATION WAS PLOT-
TED AS TRACE. Fixed to represent a zero amount.
* STILL ON THE DRAWING BOARD....
* · TRY TO ADD A WAY OF HANDLING WINDS WITH NO
DIRECTION... A REMARK NEAR THE STATION PLOT?

VERSION 2K2 0.5beta
(Feb 2002)
* Uses significantly enhanced topography/terrain engine.
* Parses Australian AXF surface data, indicated by [syn-
opData] or [metar2Data] and ended by [$] and defined
by formats in DIGATMOS.FMT.
* Changed program icon.
* Moved many user controls from toolbar to side panel.
* Parses Australian weather collective bulletin produced
by Australian Bureau of Meteorology.
* Parses FM45-IV (analysis) and FM46-IV (forecast) fleet
code (see http://www.fleetcode.com/fleetcodedefinition.
html for more info).
* Import routines drastically improved and streamlined,
allowing full content of all METAR reports to be ingested
(which in turn improves reliability of high/low/rainfall
data from METARs).
* Plots earth shadows, depicting sunset/sunrise termina-
tor line and twilight terminator.
* Adds GRIB import routines

* User can right-click on the map and choose "Recenter
Map" to move the view.
* Deletes Daytime Saving item in General Preferences;
all time conversions are now totally transparent to the
user; the user only needs to make sure their computer
is set to the right time and time zone in the Windows
Control Panel.
* Added wet bulb temperature
* Numerous other changes and tweaks (not yet docu-
mented)

VERSION 2000 - V1.0a maintenance
(4/16/01)
* Added "mixed" grid option in Preferences > Maps.
* Adds revised station tables.

VERSION 2000 - V1.0a
(1/20/01)
* Eliminates problem reported in V1.0 with left third of
screen occasionally being blotted out at random.
* Analysis > Export Last Analysis has been removed and
in its place the text output is always written to GRID.TXT.
* Added SLEEP command to Scripting (see Appendix /
Scripting section).
* Corrected program so that a timer script will only
execute ONCE per scheduled time interval. The previous
version would keep re-executing the script as long as the
current time was the scheduled execution time.
* Added rule file (DIGATMOS.RUL) with rules for import-
ing observations.
* Minor enhancements to tracking of metric vs. English
units for purposes of product labelling
* Added COM4 to COM8 in EMWIN Ingest
* Allows up to 1000 stations in DIGATMOS.PRI priority
table
* Adds Map > Import command to allow satellite photos,
etc, to be "underlaid"
* Map > Generate By Lat/Lon now allows latitude, longi-
tude, and zoom to be numerically tweaked and advanced
settings to be "reset" with one button click.
* Enhanced fills for Australia
* Script timer has been renamed to "Scheduler".
* Scheduler now allows multiple script names along with
the usual multiple execution times; documentation has
been added in this manual under Appendix / Scripting.
* Digital Atmosphere now caches a map as soon as it is
created so that it will be available on reloading Digital
Atmosphere (this applies both in Generate by Lat/Long
and Generate dropdown menu).
* Vorticity and divergence now color appropriately as in
earlier versions (with inverted shades for negative diver-
gence). A solid zero-line has also been added.
* Divergence and vorticity have now been added to the
Analysis > Wind menu for more convenient access.
* Divergence has been recalibrated and plots in 10**-6
m-2
* A bug in the scripting which prevented wind analysis
(grids and streamlines) from plotting is now fixed.

BETA 1/21/01 FIXES
* Problem with Map > Save in 1/20/01 release fixed
* Conflict with Alt- shortcut keys for main menu fixed
* Added script command SFCPLOTMODEL for loading
surface plot models (see Appendix / Scripting)
* Script commands for convective outlooks and MVFR/IFR
depiction (dy1, dy2, cig) added to documentation.
* Printing capabilities have been fully restored and diag-
nostic gridboxes on printouts are eliminated. Print button
has been fixed.

VERSION 2000 - V1.0
(12/3/00):
* Option added to File > Preferences > Analysis to allow transparent fonts
* Slight changes made to remove plotting of extra pixel line at bottom of NMC fonts
* Errors under Win 98 with File > Get Archived Data and EMWIN ZIS extraction fixed
* EMWIN ingest capabilities improved with regards to extraction of ZIS files (previous versions were error-prone)
* Map > Generate by Station fixed
* Option for 1000-500 mb thickness added in File > Preferences > Contours
* MVFR/IFR contour labels were invisible with certain contour font combinations; this is fixed

VERSION 2000 beta 3
(12/2/00):

NEW FEATURES . . . . .
* Added EMWIN ingest engine (in EMWIN > Ingest)
* EMWIN upper air (upr*.*) added to File > Import EMWIN data
* Added command to clear out data directory (File > Clear data directory)
* Frontal workchart toolbox added (in Data > Frontal bulletins and right-click menu)
* 1000-500 mb thickness added (in Analysis > Temperature > Thickness); upper air data is required
* Calculator now allows station pressure, wind chill, and heat index calculations entirely in metric
* Replaced .CXN, .CXP county name label file with editable .CXT file
* Moved county name label for Ventura County (California) westward slightly
* Added aspect ratio to Map > Generate Map
* Color palettes in Preferences > Colors are now saved and loaded with maps (with .ATP file)
* Added more information in help file
* Added Dutch weather station corrections in DIGATMOS.STN
* Drop a file from Windows explorer onto a running copy of Digital Atmosphere to import that file
* When a convective outlook indicates "NO TSTMS" this is plotted on the map
* Print capability re-enabled (was disabled during beta tests)

ERROR FIXES
* Error: File not found error in File > Get Archive Data / FIXED
* Error: Old links for UNCA in DIGATMOS.SLZ Internet retrieval table / FIXED
* Error: Altimeter setting H/L values round to nearest inch / FIXED
* Error: Map > Generate Map "offset settings may produce bad results / FIXED
* Error: If edge of Earth is seen in a generated map, ocean fills do not work correctly / FIXED
* Error: DRSN (drifting snow) in METAR not properly recognized by Dig Atm / FIXED
* Error: Help does not work for Map > Information button / FIXED
* Error: Map > Information produces some bad results / FIXED
* Error: QC rubberband keeps appearing erratically / FIXED; NOW DISAPPEARS ON RELEASE OF MOUSE-CLICK
* Error: When cancelling in Map > Generate map, corrupt results occur / FIXED

VERSION 2000 beta 2
(11/25/00):
* Sea data now nullified in METAR reports so garbage doesn't appear in station plots with sea elements
* Beta bug with Analysis > Wind > Wind Speed not working is fixed
* Celsius/English beta problems fixed (in plotting and climatology extract)
* Beta testers need to check their station plot elements and change TEMP/DWPT/VIS to match valid choices
* Elevation can now be plotted in meters or feet according to English/metric preferences
* Climatology > Extract Data now gives option of plotting the data or analyzing it
* Additional options in File > Preferences > Analysis to let users specify isopleth fonts as "small" and/or "negative"
* Added remaining font files as well as font preferences
* Fixed problem with streamline thicknesses changing "randomly"
* Added option in File > Preferences > Meteorological > "Geopotential height in full meters only"
* Geostrophic height contouring algorithms improved to eliminate irregularities along margins
* Added upper highs/lows
* Added tutorial directory with tutorial files
* Re-instated and improved serial/key routines

VERSION 2000 beta 1
(11/11/00):
* Added photorealistic topography
* Fixed zoom bar on map settings panel not working
* Added file drag and drop capability from Windows Explorer
* Fixed outer space fill
* Fixed "Quit Searching" in Climatology graph
* Added NCEP legacy fonts to isoplething routines for labelling of lines
* Added "Thick Contours" option in File > Preferences > Analysis (makes isopleths twice as wide)
* Added easter egg (Shift-Ctrl-F7)
* Changed FTP timeout from 1000 to 15 seconds, so a quicker response occurs if a connection is hung
* Vastly improved isentropic analysis (in "Level" drop-down on toolbar)
* Added freeform horizontal analysis (in "Level" drop-down on toolbar)
* Corrected and improved 3-D atmosphere build (in Analysis menu)
* Reinstated and improved roaming sounding
* Satellite wind observation import provided
* Slight bug in contouring fixed (prevented random charts from drawing any contour lines)
* Changed "Wind Speed" analysis so that it uses a gridded x/y wind field for better accuracy
* Documentation provided in dual formats: context-sensitive Windows Help and PDF format.
* Numerous additions, edits, and improvements to help documentation.
* Added capability for user to modify Gradient Fills in analysis (in File > Preferences > Misc).
* Added capability to import and plot SATOB observations (NOAA/NESDIS format).
* Added scripting commands for ISOPLETH and GRADIENT

* Added extra surface station plot element which is available to user (in extreme lower left of plot)
* Added import of sea surface data from SYNOP reports
* Changes have been made to allow saving and loading of upper plot models
* Added capability to plot h and Nh code forms from SYNOP; corresponding additions in Preferences
* Changed temperature and precipitation units to a single "English or metric" choice
* Added streamlines
* Added capability to plot fronts, highs, and lows from ASUS1 KWBC bulletin

VERSION 2.3.3 (MAINTENANCE RELEASE) — BUILD #1015

(10/1/99):
* Quality control was improved to change point/point clicking to mouse dragging. A distance meter enhanced this capability.

VERSION 2.3.2 (MAINTENANCE RELEASE) — BUILD #989

(9/23/99):
    The main purpose of this release was to get rid of a memory violation reported by six users (which consisted of various forms of "Invalid pointer" and "Access violation" errors when Digital Atmosphere was started). This was finally traced to coding errors in the creation of new maps. In addition to a fix for the problem, this release has some additional enhancements.
* "Invalid pointer" and "access violation" errors eliminated.
* Status bar can be made visible or non-visible (View > Status Bar).
* The data directory is now *always* the "data" subdirectory under Digital Atmosphere. Any data should always be placed in here unless it is being received by EMWIN or is a single file to be chosen manually by the user.
* In the synoptic decoder, dewpoints are now omitted if they exceed the temperature.
* File > Retrieve Data used to not process warning data, while File > Import EMWIN Directory, File > Import File, and the schedulers did. This has been fixed.
* The number of importable files during one pass has been increased from 100 to 150 files.
* METAR reports without times but times in FOS headers are now parsed properly.
* Font face/sizes in EMWIN Bulletins and View Raw Data can now be specified in Preferences > Fonts.
* A new feature, Map > Information, provides detailed information about the map projection currently shown.
* Another new feature, "Show distance", allows users to determine the distance between two points on the map. Identify each of the two points by right-clicking and choosing "Set point", then choose "Show distance". The distance will be shown in nm, sm, and km.
* Under the View menu, the selections for Speed Buttons, Time Toolbar, Wind Toolbar, and Status Bar are saved when the user exits the program, then restored when the program is started again.

VERSION 2.3.1 (MAINTENANCE RELEASE) — BUILD #930

(8/29/99):
* Fixed problem where 24-hr precipitation data in METAR reports wasn't recognized.
* Readme file updated with new information.
* Error message during Emwin Scheduler when no warning files are found has been eliminated.

* Map tiles have been consolidated from 365 down to 25 files, saving 10 MB of disk space when installed (fewer wasted blocks in the file allocation tables). Some users may see a slight slowdown when generating new maps. The new tiles are binary and cannot be edited. Users who need to add map information should use the more convenient Custom Overlay files (see the Data chapter under Overlay Custom Overlay).

VERSION 2.3 FINAL — BUILD #918

(8/20/99):
* Added two binary files required for program operation (DIGATMOS.GCI and OUTPUT.WRQ).
* Adjusted effects of "smart visibility plot" to only take effect when left-center slot contains visibility data, weather symbols, or a blank entry. This way other data (dewpoints, etc) residing in this slot does not get blanked out when no weather is present. The user may still have to adjust the contents of the far left slot for optimum appearance.
* File > Quality Control now allows editing of pressure tendency, pressure trend, precipitation amount and period, cloud codes, and mb and ft levels.
* Inability of File > Preferences > Contours settings to save has been rectified; settings will always be saved whenever "Ok" is clicked.
* Fixed a problem with inability to do station plots of FD data; and inability to plot 24 hour FD contours/grids.
* Added code that prevents "stack overflow error" and execution of warning import when OUTPUT.WRQ is missing.
* Precipitation contours are now indicated in the legend, along with the units of measure (inches or mm).
* In Internet > Retrieve Data, an "Uncheck All" button has been added.

BUILD #907

(8/18/99):
* AIREP reports have been enabled. These are usually found in upper air files and can help fill in wind patterns across oceanic regions.
* "Round AIREP reports within xxx mb of a standard level" has been added. When checked, and the user produces a constant pressure map, Digital Atmosphere will include all AIREP reports that are within the specified number of millibars of the constant pressure level being used (i.e. an AIREP at 278 mb will be included in a 300 mb plot/contour if the box is checked and the value is 22 mb or greater). If unchecked, then all reports have to be exactly equal to the constant pressure level being used (i.e. an AIREP at 492 mb would not be included in a 500 mb chart). This will help users control the quality and variety of data being included in upper air charts.
* "Data > View Sounding" and map popup menu item "Show Sounding" have been re-enabled.
* About 25 new EMWIN text products added to the DIGATMOS.EMP EMWIN product lookup list. This will add many new product descriptions to "EMWIN > Get EMWIN Bulletin".
* Digital Atmosphere now recognizes "SN" intermediate synoptic header in addition to "SA" and "SM" when determining times for synoptic reports. (Thanks to Hans-Stefan Lichius)
* Preferences > Meteorological option for "Round synoptic reports to nearest 6 hours when importing" has been corrected to "round to nearest 3 hours". Rounding operations have always been to nearest 3 hours.
* Data > Warnings has been adjusted to import warning datasets correctly. EMWIN users who keep seeing out-

dated warnings on their maps should change the purge intervals in their EMWIN reception software.
* The option "Default data time selection" in File > Preferences > General is now functional again.

BUILD #885
(8/16/99):
* If main window is maximized, the window is no longer resized when a new chart is loaded.
* Emwin Scheduler -- on receipt of new EMWIN data, the map did not erase; this has been fixed.
* MVFR/IFR contour analysis has been fixed.
* An "Access Violation" that popped up during import of some RCM (NEXRAD) datasets was fixed by adding code to quality-check incoming data. (Thanks in part to Wayne Cotterly
* Some problems with precipitation contouring in synoptic reports was fixed; additional code was written so that Digital Atmosphere could differentiate missing reports from zero and zero from nonzero amounts. (Thanks to Hans-Stefan Lichius)
* In an effort to consolidate internal data processing, upper air split files (OUTPUT.H00, H85, F18, etc) are no longer used. This will solve QC problems where RAOB reports can't be deleted. Users with slow computers will notice delays when plotting rawinsonde reports (due to the large size of the upper air output file). Since the code has been rewritten slightly there is a slight chance this fix could introduce errors, so testers should note any plots or contours that "don't seem to do anything". (Thanks to Phil Rider)
* Rawinsonde data elements with solidii encoded anywhere in the element (rather than just the first position) are thrown out. For example, Katmandu was encoding heights like "5085/", corrupting upper air contours.
* Scalars (temperature, wind speed, etc) could not be contoured with FD data due to an unwanted line of test code. This has been removed. (Thanks to Phil Rider)
* Various buoys, such as those in the Arctic ocean, omit the wind (0ddff) group, confusing Digital Atmosphere and making it plot erroneous winds and sky condition. This has been fixed.
* EMWIN imagewrites were saving to the DA directory, not the directory specified in Preferences. Fixed. (Thanks to Jesse Ferrell)
* Scheduled internet retrieval was not making its panel appear during retrieval; this has been fixed. (Thanks to Wayne Cotterly)
* Derived fields (vorticity and convergence) are now functional.
* Radar status annotations now work with RCM data. (Thanks to Jesse Ferrell)
* TVS signature will always be plotted in red. (Thanks to Jesse Ferrell)
* A "Preferences" speed button has been added. (Thanks to George Sobala)
* On the wind toolbar, wind vectors (as opposed to just barbs) now work again. (Thanks to George Sobala)
* When any map is loaded, all settings (not just lat/long/zoom) are transferred to the Generate Map panel in case the user wants to tweak the map. Also fixed the inverted transferred latitude. (Thanks to George Phillips)
* Menu item "View > Remove last product" has been added so that you can delete the last contour or plot.
* I could not duplicate the "Invalid filename" on "save station plot" in Preferences. For users that continue to have problems, please go to the Preferences > Misc tab

and check "Diagnostic -- Show filename when loading/saving station plots". Then when you save or load the station plot, report the message that it shows.
* SPECIAL NOTES: Users may mistake station plot minus signs as decimal points, particularly with pressure tendency.

BUILD # 864
(8/08/99):
* Added a "Generate Map" dropdown box on the Speed Button toolbar. Clicking on any of these entries causes a map for the area to be generated, using the default map width/height specified in File/Preferences/Map. The entries for the "Generate Map" dropdown box come from a new file called DIGATMOS.MSE. Users may freely modify this file. Column 1-3 is for the latitude (south hemisphere negative). Column 5-8 is for the longitude (west hemisphere negative). Column 10-14 is for the zoom width in miles. Column 15-65 is for the descriptive name. Users may add saved maps to this list by simply leaving the first 3 columns blank, then for a descriptive name use an asterisk followed by the filename (without any dot or extensions), for example, *mymap .
* Added a Preferences entry under the Map tab for Default Width and Default Height. This specifies default image size settings for new maps that will be generated.
* Reworked the Preferences/Station Plot/"Save" segment, as some users have reported that the plot model is incorrectly saved. Could not duplicate this problem but made adjustments to code.
* Eliminated problems with importing FD and Model data (this was a consequence of improvements made to the data import algorithms in Build #849.
* Build number now shown on splash screen.
* PROBLEMS REMAINING: Internet links except for Retrieve Data are dead; locks up using data retrieval window with FSU SAO ticked.
* SUMMARY: New files required to run this build: DIGATMOS.MSE

BUILD # 849
(8/6/99):
* Synoptic and buoy recognition module reworked. You should see a greater number of synoptic observations, and especially buoy (ZZYY) observations that now work. Please let me know if you see any problems.
* Eliminated "Access Violation" during View Raw Data/Find. Corrected code to link in a missing component. (Thanks to John Glaveskas, Trevor Cousens, Geert Vandebrande)
* Legend was not cleared when generating a new chart; this has been fixed. (Thanks to Geert Vandebrande)
* Eliminated problems with Digital Atmosphere resolving FD data times. Corrected code to properly evaluate FD forecast hours. (Thanks to John Souza)
* Quality control has been fixed. Some stations would not get QC'd, and this was due to a problem in the mouse coordinate variables and has been fixed. (Thanks to Michael Welch and Trevor Cousens)
* Relative humidity in station plots produced an invalid floating point operation; this was fixed. (Thanks to Michael Welch)
* Television plot city font size was not set correctly; this has been fixed but not verified. (Thanks to Jesse Ferrell)

* The location to set Television font colors was not obvious. A note has been placed in "Preferences" under "Fonts" and in the User Manual to indicate where this is done. (Thanks to Robert Dale)
* Television plots are now centered horizontally. Also a bug where observation times were being ignored in television plots, leading to blank maps, has been fixed. (Thanks to Robert Dale)
* Removed "Status window on top" menu item, which is obsolete. (Thanks to Robert Dale).
* An error was found in the synoptic cloud code import; this was fixed. (Thanks to Michael Welch)
* Stations without sky condition report plotted without a center symbol; a plus is now plotted at the observation location. The newest (8/05/99 or later) version of DIGATMOS.SYI is required.
* Topography now works. (Thanks to Hendricus Lulofs and Trevor Cousens)
* At the end of a File/RecompileTables operation it seems that Windows locks up. This is because Digital Atmosphere is sorting the Warnings table. A progress message has been added, and the status window no longer truncates long progress messages. The ICAO/WMO sorting algorithm has also been speeded up. (Thanks to John Glaveskas)
* Large maps were not framed correctly when loading such as at startup. This has been fixed by forcing the image object width to equal the bitmap width. (Thanks to Hendricus Lulofs and Geert Vandebrande)
* Internet retrieval list (DIGATMOS.SLZ) enhancements: Added UCAR upper air (thanks to Robert Schmidt), added Albany buoy.
* Digital Atmosphere now parses the RCM file when the EMWIN Scheduler is running. (Thanks to Robert Dale)
* User must specify the EMWIN directory for warnings; this allows compatibility with software such as RealEMWIN. This option is in File/Preferences/General. (Thanks to Robert Dale)
* Speed button toolbar can now be hidden or unhidden (see View menu item). (Thanks to Robert Schmidt).
* All fonts used in contouring operations are now set in Preferences, Fonts under "Annotations". Only the font type is used; the size is ignored. (Thanks to Robert Schmidt)
* Internet sites which don't report the filesize in some headers (such as IWIN and FSU) no longer produce unusual progress results during download; program now reports "unknown". (Thanks to Verna Young and Mark Hayes)
* Digital Atmosphere no longer tries to resize itself after generating a new map when maximized. (Thanks to Robert Dale)

* VARIOUS ISSUES STILL TO BE RESOLVED: "Bitmap image not valid" will still appear when viewing EMWIN products -- this is because the functionality has been temporarily disabled; geostrophic wind field feathers not available; SKEW-T, CAPE and other extended analysis stuff has not been restored yet; will not import a V2.2 map; Data/Warning causes "Illegal function" error; hidden toolbars reappear at startup (this is not a bug but an item suggested and will be evaluated); unusually high heights (above 580 dam) such as with what we are seeing this summer are inverted to 480+ dam.

* OTHER NOTES. I am on the lookout for errors where a data directory, data product, or error message shows a path with two solidii, for example, c:\program_files\ digatm\data\\ or c:\digatm\data\\infile.txt. This has cropped up a couple of times but I haven't found the source of it. It will cause non-found datafile errors and so forth.

CHANGES FOR V2.2 to V2.3 BETA INITIAL (JUNE 1999)
* Multiple chart forms eliminated. This was performed to simplify numerous algorithms within Digital Atmosphere, reduce the complexity of our source code, and enable further development of other key areas of the program. The vast majority of users indicated that they preferred one map at a time.
* Status panel deleted and toolbars added. It was decided that the status panel, which has always been a part of Digital Atmosphere, was too awkward, cluttered, and frequently got in the way. It has been replaced by two toolbars: a time toolbar and a wind toolbar. They can be hidden or displayed in the "View" dropdown menu.
* Tab ordering improved. The tabbing order of controls in the map customization screens were improved so that navigation without the mouse would be much easier.
* Automated version numbering. This is mostly an internal change that isn't of interest to most users. Version and build numbers listed on the Splash Screen and About Screen are now extracted directly from the application file. This is the same data seen when you choose "Properties" and "Version" from Windows Explorer.
* A new registration authentication scheme has been enabled. To register your copy, you will need to go to Help, Register to find out their individual serial number, then contact us for a key number. Note that this keying scheme is subject to change.
* RCM NEXRAD radar parsing has been vastly improved. The algorithms were edited, tested, and tweaked to give a high level of competency in parsing NEXRAD RCM data. Furthermore the algorithms extract cell, mesocyclone, TVS, hail, and wind data from the datasets. RCM data is not available at most weather data servers, but it can be found in the SAORCMUS.TXT file regularly transmitted by EMWIN (this is also available at http://emwin.cira.colostate.edu/rxfiles/SAORCMUS.TXT, which has been placed in the new Internet data retrieval panel).
* New NEXRAD site codes added to the station tables. About 40 new RCM station codes have been added. This fills in many radar gaps that existed in earlier Digital Atmosphere versions.
* NEXRAD VAD/VWP wind parsing has been added. Simply import an RCM file and plot using "Analysis" for time and a valid FL for level. These reports can then be plotted or analyzed. Although this is an incredible tool for filling in gaps between rawinsonde stations and rawinsonde times, NEXRAD winds are usually missing where there are no droplets, dust, insects, or birds to yield a velocity measurement (such as high aloft or in dry regions).
* The level selector can contain FD winds, RCM winds, or both. This is chosen with the "R", "F", and "All" buttons next to the level selector. Use it when, for example, you want to look at NEXRAD VAD/VWP winds aloft and don't want to accidentally click on an FD wind level. You would simply hit the "R" button to pare down the list.
* Major improvements in the Internet data retrieval panel. The panel now uses true HTTP binary transfer to connect with weather data sites, delivering much swifter, more reliable data downloads than in previous Digital Atmosphere versions. It also allows FTP sites to be accessed. For those few users who need to specify a port number and/or user ID & password, you must append the User ID, Password, and Port to the end, all separated with "$$". Example: ftp://ftp.mysite.com/pub/data.txt$

$myusername$$mypassword$$port). If you decide to specify a port number, you must specify a username and ID.

* New formats added to "Export map". In earlier versions you could save your map as a BMP or a JPG. In addition to those, you can now save PCX, PNG, and TIF (uncompressed and packbits) formats. The packbits TIF format generally offers the best format for desktop publishing purposes. The GIF and LZW TIF formats were not included because they are proprietary technologies and require licensing from Unisys.

* Map can be copied to the clipboard. This can be found in the menu under "Map" and "Copy to Clipboard". When the map is in the clipboard it can be pasted into other Windows applications.

* Fonts in Preferences improved. The interface has been changed slightly, and we have added the ability to let you set "annotations" fonts, which are seen when you plot custom map points and city overlays, and county name fonts.

* County name overlays added. You can now add county names on your map. The county name text will be truncated automatically according to the map scale (to see more of each county name, make a more-zoomed in map). The font color is controlled by the "county overlay" setting in Preferences/Map and the font name/size is controlled by the "county name" setting in Preferences/Fonts.

* Custom geography added. This is done in the WeatherGraphix style, with custom geography residing in DIGATMOS.PLR. Edit this file to make changes. Note that longitude in the west hemisphere is negative; files imported from WeatherGraphix will need to have the longitude signs inverted. The color of the line is controlled by the "roads and custom lines" setting in Preferences/Map.

* Contour labelling algorithm improved. Previous versions of Digital Atmosphere plotted isopleth labels only at the chart edges, making closed contours difficult to interpret. Digital Atmosphere will now plot labels in many closed contour patterns.

* Data tables now produced. These are stored in OUTPUT.SFC (surface) and OUTPUT.UPR (upper) every time you import data. These tables can be parsed using your own applications or can be brought into spreadsheets and databases.

* Precipitation data now available. Data from the synoptic 6xxxx group is now imported into Digital Atmosphere and can be plotted or contoured. Note that most U.S. and Canada stations report 6-hour precipitation.

* Precipitation inches/millimeters choice added in Preferences/Meteorological. This applies to precipitation plots and contours.

* Pressure tendency, and low, middle, and high cloud symbols have been added. These can be plotted if they are part of the surface plot in Preferences/Station Plots. The pressure tendency can be analyzed and contoured.

* Maps can be automatically exported when the program is in automatic mode. You simply specify the target file in Preferences/General under Autosave (a complete directory and filename is required), and check the Autosave box. The graphics type is determined by the extension of your filename (BMP, JPG, PNG, PCX, or TIF). Every time the map is refreshed automatically, the completed map will be exported to your target file.

* Previous versions of Digital Atmosphere had trouble identifying some warnings. This occurred when warning bulletins did not end with the "NNNN" termination sequence (this recently began appearing on EMWIN); therefore warnings piled up in the first warning text slot. This has been fixed; a new header now can substitute for an "NNNN" termination sequence.

CHANGES FOR V2.1C BETA to V2.2
(FEBRUARY 1999)

* Preferences buttons for the FOUS level have been added. This is located in Preferences, Meteorological. This allows a level aloft (such as the T3 and T5, and R2 and R3 levels) to be plotted or analyzed. Note that since the T3/R2 and T5/R3 levels aren't exactly the same, you should avoid calculations which cause the temperature and relative humidity to be combined (for example, dewpoint analyses).

* Preferences buttons for the default time select have been added. It is located in Preferences, General. Using these buttons you can pick something else besides "Automatic" time select to appear on the status panel when Digital Atmosphere is started.

* Cursor lat/long can be determined by right-clicking the map. Using the pop-up menu simply choose "Cursor location" and an information box will appear.

* Nondiscrimination between ETA and NGM data during contour operations has been fixed. Earlier versions did not discriminate between ETA and NGM data (according to the status panel) during contour operations.

* Appropriate labelling is now applied to charts when a contour of model data is done.

* The registration information box contained within the program for new users has been updated to reflect a new E-mail address and minor changes in sales policies.

* Default color preferences have been fine-tuned to get rid of contour line colors that match the background.

CHANGES FOR V2.1A BETA to V2.1B BETA
(FEBRUARY 1999)

* The lat/long grid interval can now be controlled. This is done in "Preferences", "Maps".

* A range check error that occurs during analysis of rawinsonde data has been fixed.

* The File, Print option has been fixed. The diagnostics window in the beta version has been disabled. The "inverse print" option had to be deleted due to an inability to make it work successfully without considerable programming. Many PostScript drivers allow you to force the printer to make negative printouts.

* Wind feathers are reversed in the South Hemisphere to meet standard convention. One note, however -- in the Analyze, Wind Grid section, the routines have to make the feathers a uniform style, so the center position of the background map is what determines the style rather than each gridpoint location.

* The status panel now uses "Automatic" for default time selection. It's assumed that most people will only want to use "Show Contents First" in special cases.

* A Data Check interval has been added in Preferences in the General tab. In earlier versions, Digital Atmosphere checked for new data every 20 seconds. This is now user-specifiable.

* During find operations in "View Raw Data", the cursor is now an hourglass.

* New station tables are now packaged with the upgrade. This consists of DIGATMOS.RIX, DIGATMOS.STI, DIGATMOS.STW, DIGATMOS.SXI, and DIGATMOS.SXW. This fixes some persistent "range check" errors with surface data that were present in the beta version.

* The Internet alphanumeric product retrieval list (DIGAT-MOS.SLZ) has been updated slightly.
* Soundings have been reinstated. The sounding window contains a box where you can enter the desired station and easily view consecutive stations.
* Background maps now plot after a gradient analysis.
* You can now overlay the base map without erasing the graphics, thanks to the new Map command "Add base-map".
* The status bar at the bottom of the screen has been restructured. It now holds a progress bar detailing all on-going operations, the task progress, and the ingest mode currently in use. Additional status notifications have been added throughout the analysis module and other pro-cesses.

CHANGES FOR V2.1B BETA to V2.1C BETA
(FEBRUARY 1999)
* Isentropic analysis has been reinstated. The isentropic level can be selected from the Status Panel under "active level". You will be prompted for a level in whole Kelvin degrees. While this level is active, all analysis operations will pertain to parameters on that particular isentropic surface. The two most useful parameters under Analysis are "isentropic height" and "wind grid".
* Isentropic height has been added as an Analysis op-tion. This analyzes the height of datapoints in mb at the Active Level. Therefore its only suggested use is when an isentropic level has been entered into the Status Panel. Its color scheme currently follows the 500 mb contour scheme.
* A Composed CAPE option has been added in Analysis. This "builds" a 3-dimensional representation of the at-mosphere based on existing observations and calculates CAPE at each gridpoint, rather than calculating CAPE at each station.
* CAPE, LCL, and 0-6 km mean wind are now functional and can be accessed under the Analysis menu.
* A bug has been fixed where the toolbar Print button had no effect.
* A bug has been fixed where analysis gradient fills with no isopleths produced no background map.

CHANGES FOR V2.1 to V2.1A BETA
(JANUARY 1999)
* Documentation is now contained entirely in an Adobe Acrobat document. The manual was extensively rewritten and updated.
* Lat/long grid usage is now controlled by the Prefer-ences, Color checkbox. The "none" radio button under lat/long grid has been removed.
* New time tokens for Internet data products have been introduced. They allow you to specify the latest synoptic or intermediate synoptic time. You can also specify the previous hour as a base token.
* You can easily override the time settings used in Inter-net time tokens to gain access to data files for different hours. The variables that will be used are now shown in the Internet Data Retrieval window.
* Contour color and attribute settings are now in Pref-erences — "Contour", for easy access. Advanced users only — if you delete DIGATMOS.CGZ, Digital Atmosphere will automatically make a new one when you open the Preferences window by importing your older DIGATMOS.CCL settings file. This is how you can preserve your color schemes when you upgrade.
* You can pick a range of hours to analyze or plot, rather than just a specific one, when manually selecting an ob-servation time. This is great for data-sparse areas.

* View EMWIN bulletins using a nested tree structure similar to File Explorer, rather than the older series of dropdown menus. These bulletins also show the plain-English description of each region, as well as a more complete description of each product, so you can easily see what product you'll be getting.
* Extensive changes have been made in the station tables, DIGATMOS.STN. Three-letter ISO-3166 coun-try code identifiers are now being used, and the time zone entries have been reformatted and filled to support upcoming capabilities. Absolutely no attempt should be made to import station tables using the old format with-out converting them to the new format. Various stations have also been added worldwide.
* There are no longer overflow problems with the View Raw Data window. Imported data greater than 64K in size used to generate a "text exceeds memo capacity" er-ror when the user viewed it through File, View Raw Data. The viewer has been replaced with a new 32-bit compo-nent which does away with the error.
* Sporadic range check errors during data imports have been eliminated. The error was caused when erratic WMO numbers in synoptic data were looked up in a station table.
* An import is automatically done after retrieving Inter-net data. This eliminates an extra step that the user had to do in the past.
* It is now impossible for a station plot to appear at the intersection of the equator and the prime meridian. Oc-casionally when a report can't be processed correctly, Digital Atmosphere is forced to assume it has a latitude and longitude of zero.
* You can now adjust the lowest possible METAR pres-sure, under the Preferences, Meteorological tab, to change how the hundreds place of a coded METAR sea level pressure is determined. This is useful when contour-ing very low or very high pressure.
* Model output thicknesses between 4800 m and 4999 m are now handled correctly. Since they are coded as hundreds and tens, earlier Digital Atmosphere versions simply assumed the thousands place was "5".
* You can now specify to create a map centered on a particular station. This is similar to how maps are created in WeatherGraphix. Maps can still be generated using lat and long.

Documentation on older versions not available in this ver-sion history.