

## DX ToolBox Version 2.5.1    May 5, 2005

DX Toolbox searches the web for you, gathering information on solar and geomagnetic conditions that affect radio propagation. DX Toolbox also has several built in propagation forecasting tools. An active internet connection is required to use DX ToolBox.

It displays in real-time the following important readings:

- Solar Flux
- A-Index
- K-Index
- X-Ray Flux levels
- X-Ray flares
- Solar Wind
- Earth's Magnetic Field
- Radio Blackout conditions
- Geomagnetic Storm conditions
- Solar Radiation Storm conditions

In addition, the last month's worth of Solar Flux, A-Index, K-Index, Sun Spot Number, and background X-Ray Flux are plotted.

Maps showing auroral levels, as well as the maximum F layer frequency (related to MUF) over various parts of the world are also displayed. In addition, images of the Sun from the SOHO satellite are also shown.

A grayline map of the world is also available, showing the daylit, dark, and most importantly the grayline region, where propagation is often greatly enhanced.

Propagation conditions can be estimated between two points on the Earth.

DX ToolBox is free to try out. If you decide to continue using it, you then buy your copy for just \$24.99, which gives you a registration code to remove the reminder messages. Take a look at the Purchase part of this document for details on how to buy your copy.

DX ToolBox features several windows, each described below:

## Preferences

The first time you use DX ToolBox, you should set your preferences:

**Latitude:** The latitude of your location as a decimal number. Use a positive number if you are north of the equator, negative if south. For example, 39.5 for 39 degrees, 30 minutes.

**Longitude:** The longitude of your location as a decimal number. Use a positive number if you are east of the prime meridian, negative if west. For example, -77.25 for 77 degrees, 15 minutes west.

**UTC Offset:** The number of hours you are ahead of UTC. Enter a negative number if behind UTC. For example, -5 for EST, -4 for EDT.

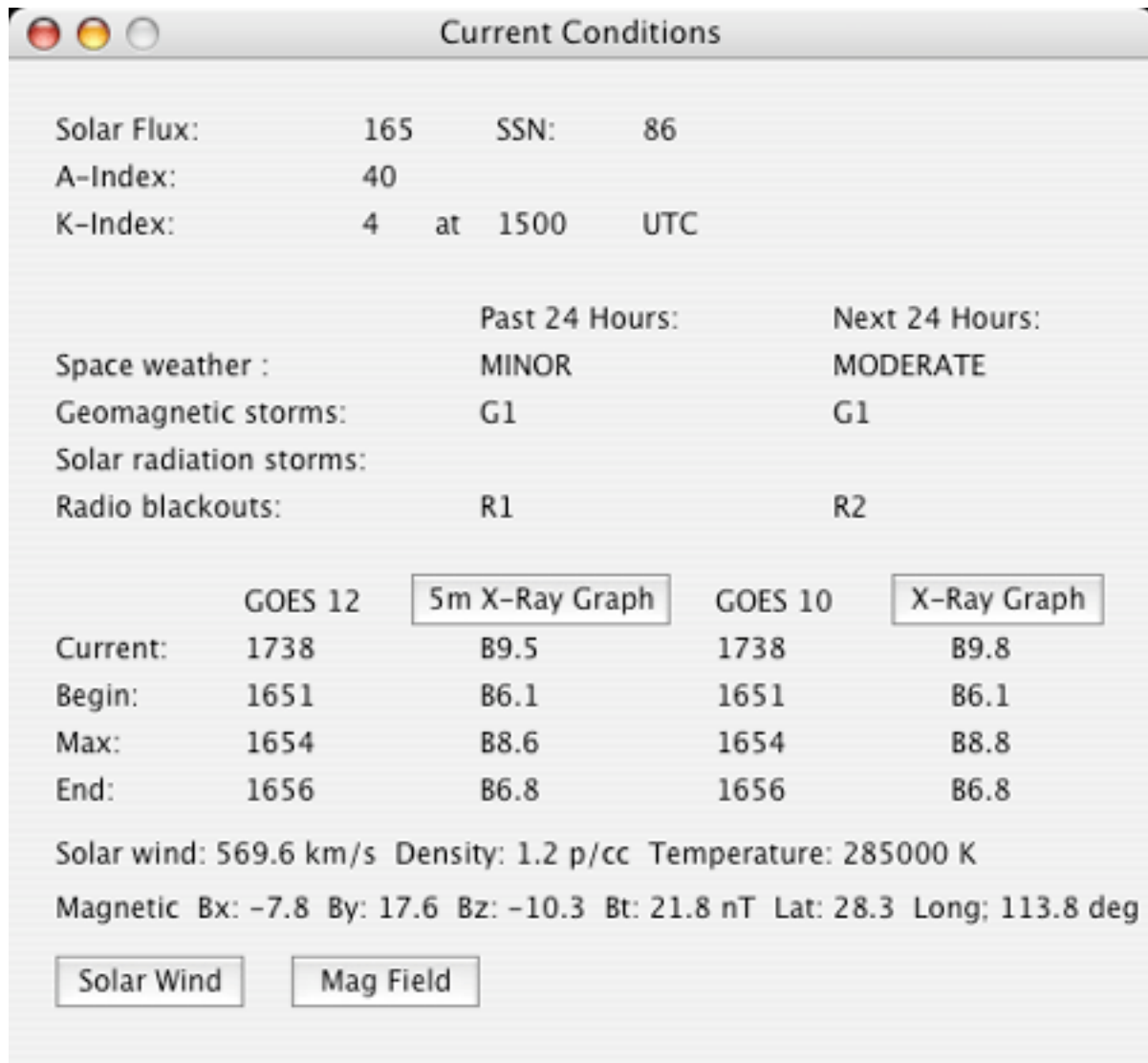
**Alarm Settings:** You can set thresholds for the K index, X-Ray flux, and Bz (z component of the Earth's magnetic field). If the current readings exceed these levels, and "Play Alert Sound" is checked in the Current Conditions window, an alert sound will be played if these values are exceeded. This can be used to alert you that a solar flare is occurring, or auroral conditions or poor propagation is expected. Here is how it works:

For the K index, enter a number from 1 to 9. If the K index reaches or exceeds this value, an alarm will sound.

For the X-Ray flux, enter either C, M, or X to specify the minimum flare intensity that will cause an alarm.

For Bz, enter the \*maximum\* Bz value. Usually, you will enter a negative number, since negative Bz values usually produce aurora conditions. For example, if you enter a value of -20, then any Bz value equal to -20, or more negative, will produce an alarm.

## Current Conditions



The Current Conditions window displays real-time readings for the following:

**Solar Flux:** A measurement of the energy output of the Sun at certain radio frequencies. This is an indication of how strong the ionosphere is. The higher the solar flux, the better able the ionosphere is able to reflect shortwave radio waves, and the higher the frequency of waves which may be reflected.

**A-Index:** A measurement of the disturbance of the Earth's geo-magnetic field. Lower numbers are better. Higher numbers indicate poor conditions. The range of values is from 0 to 400. Only one A-Index value is computed for

each day, after the end of the day.

K-Index: Another measurement of the disturbance of the Earth's geomagnetic field. Lower numbers are better. Higher numbers indicate poor conditions. The range of values is from 1 to 9. A new K-Index value is computed every three hours.

The current space weather conditions, geomagnetic storms, solar radiation storms, and radio blackout conditions are reported, as well as the forecast for the next 24 hours. None means that there is no adverse weather for that condition.

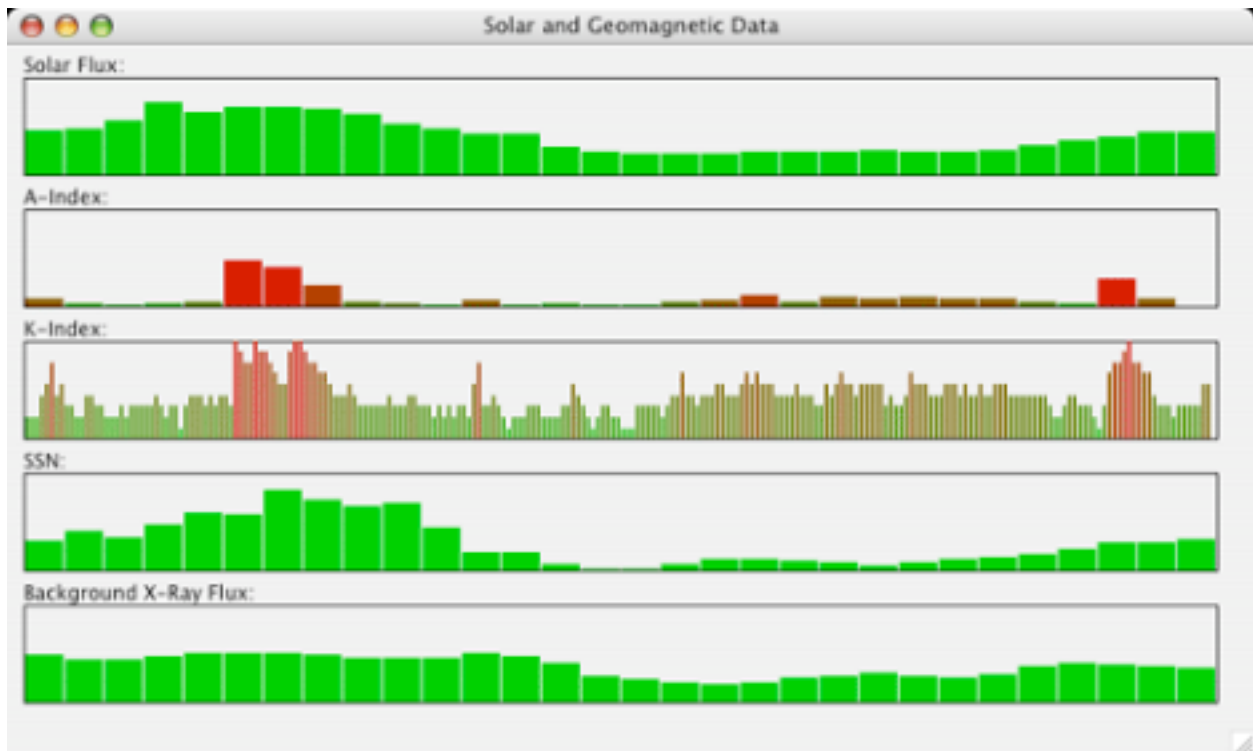
Next are x-ray readings from two Earth orbiting satellites. These show the current readings, as well as the time, duration, and intensity of the last detected solar flare.

Clicking the "X-Ray Graph" or "5m X-Ray" Graph button will bring up a window showing x-ray flux from the GOES satellites, at either a 1 or 5 minute update rate. High levels of x-ray flux generally lead to noisy conditions, and flares (large peaks) can cause blackouts over much or even all of the HF spectrum.

Clicking the "Solar Wind" or "Mag Field" buttons will bring up a window with a graph of values for the solar wind or the Earth's magnetic field.

Finally, solar wind and geomagnetic readings are shown. A Coronal Mass Ejection (CME) from the Sun, impacting the Earth, will cause an increase in solar wind speeds. If the geomagnetic field Z component is pointing South (negative) at this time, it is possible for auroral conditions to be produced.

## Solar and Geomagnetic Data

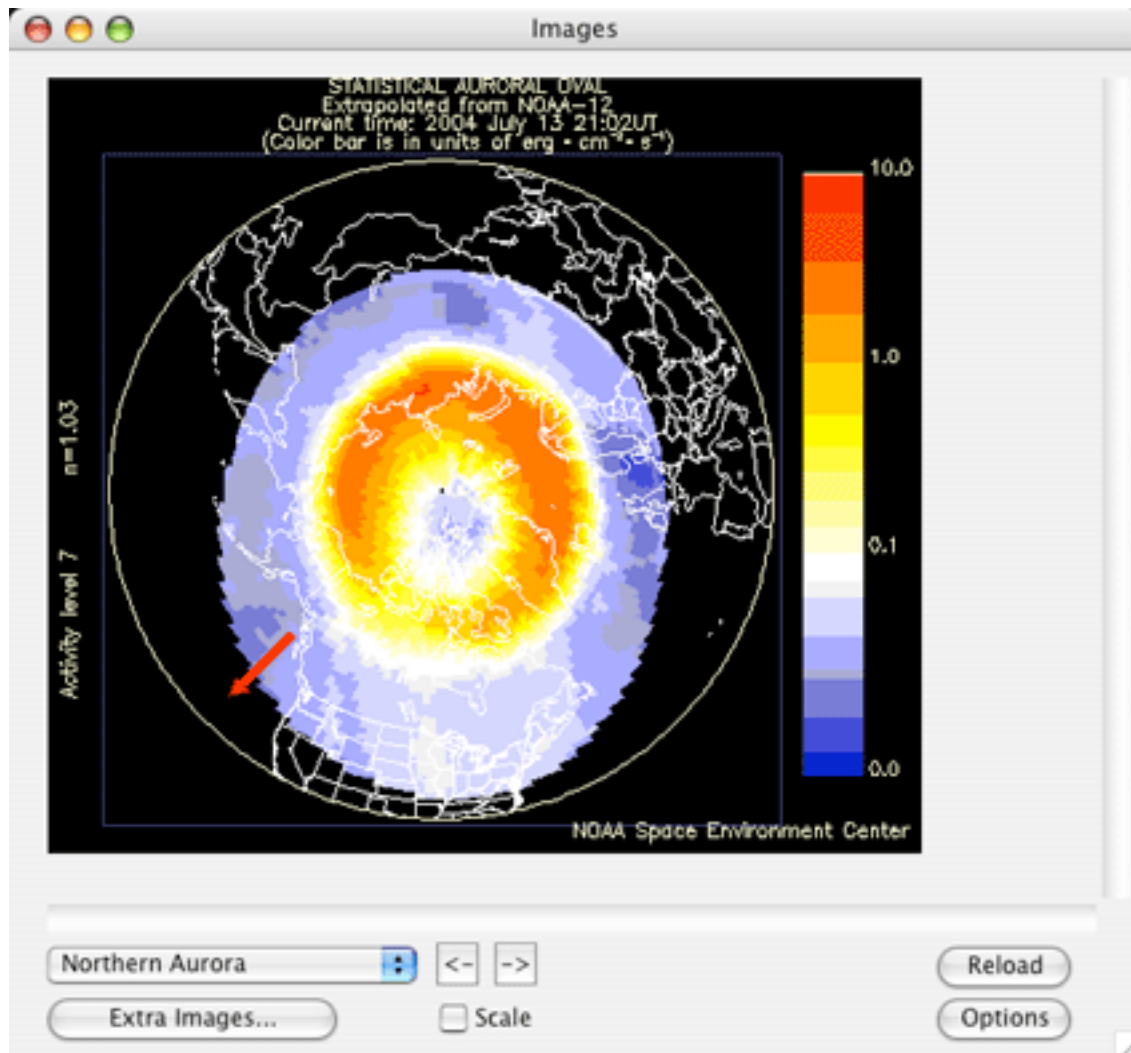


This window graphs five important values - the daily Solar Flux, A-Index, Sun Spot Number, and Background X-Ray Flux readings, as well as the K-Index readings produced every three hours.

The higher the solar flux and SSN, the higher the frequencies that will be reflected by the ionosphere. The lower the A and K Index values and Background X-Ray Flux, the better the overall shortwave radio conditions.

Hi K-Index values, especially in the 7-9 range, can indicate that auroral conditions are possible.

## Images



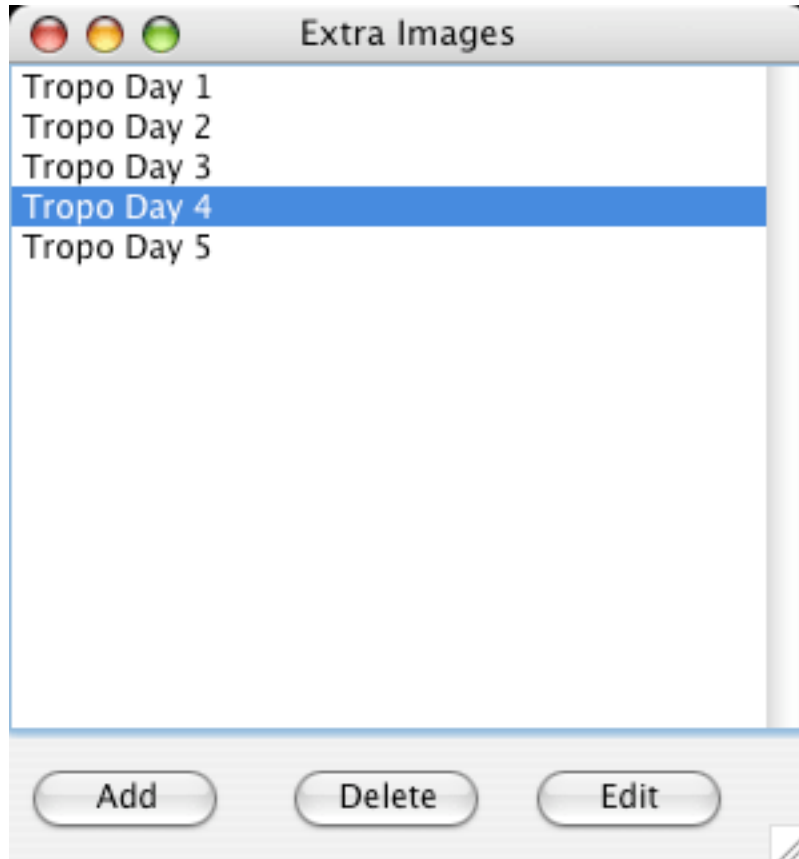
The Images window allows you to display several different images and graphs from the web, such as the extent of the auroral oval shown here. Other auroral and propagation related images are available by selecting them from the popup menu in the lower left corner of the window.

It takes several moments to load these images when DX ToolBox is started, especially on a slow (dialup) internet connection. Clicking the Reload button will reload all of the images.

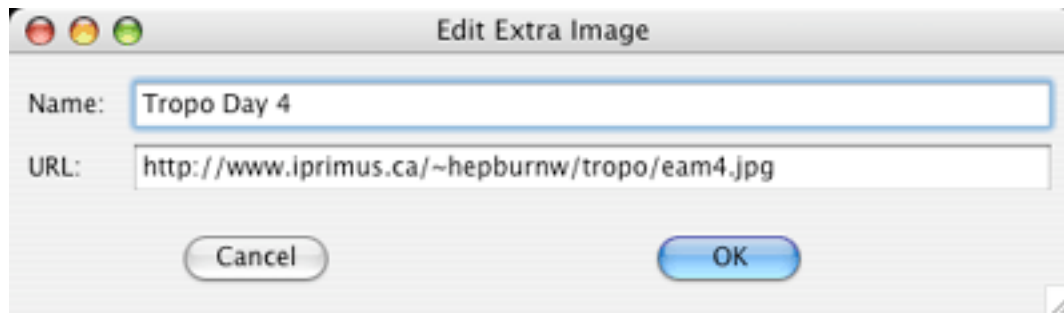
The right and left arrow buttons let you shift through the loaded pictures. If

the Scale checkbox is clicked, the images will be scaled to the size of the window,

Clicking on the Options button will bring up a list of all of the images, you can select which are loaded by checking the box next to that image name. You can also specify additional images to load. Click on the Extra Images button, and you will see a window like the following:



Click on the Add button, and you will get another window, allowing you to enter in a name for the image, and the URL to load:

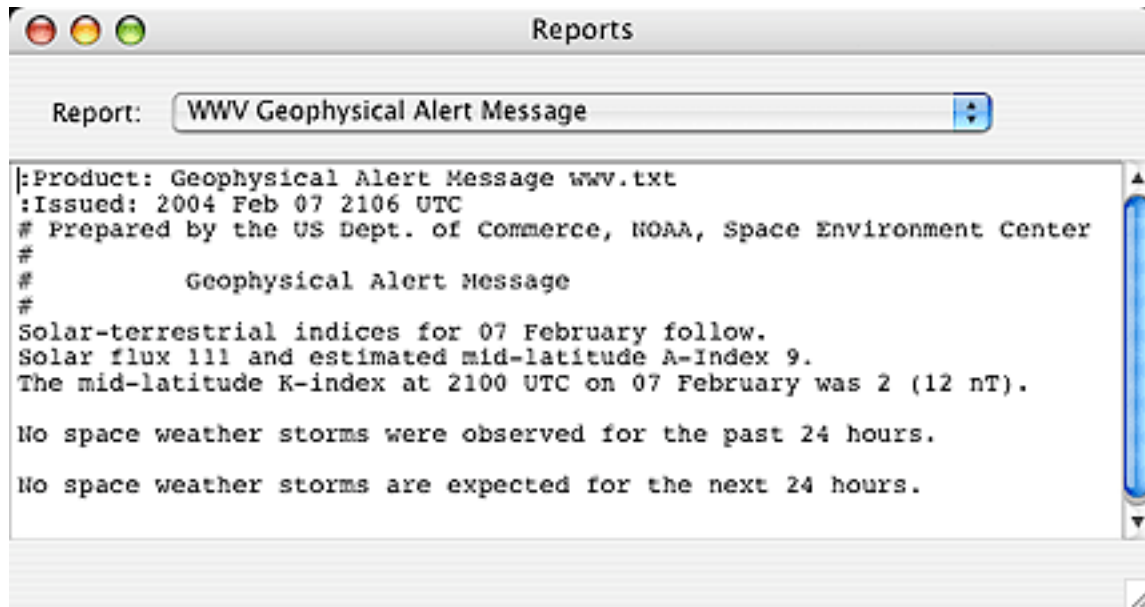


You can usually copy the URL from your web browser, and paste it into the URL line. After adding additional images, be sure to close and re-open the Images window for the changes to take effect.



## Reports

The reports windows lets you look at many different text reports that continue useful information related to propagation conditions:



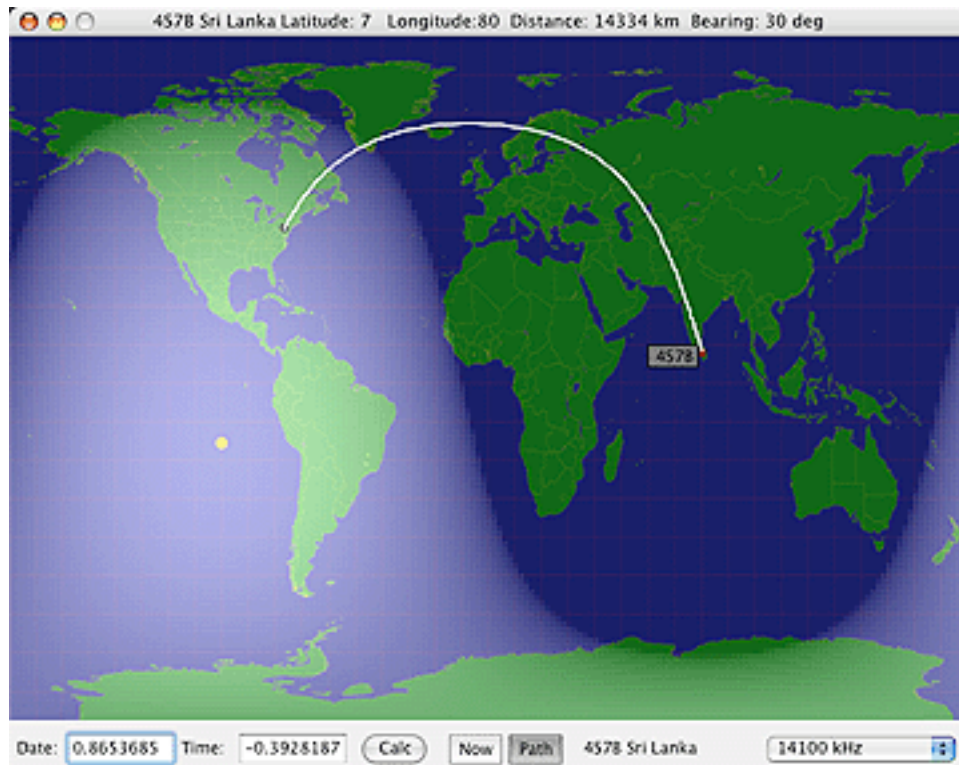
Just select the report from the popup menu. It will take a few moments for all of the reports to be loaded, you can watch the download status at the bottom of the window.

The following reports are available:

- WWV Geophysical Alert
- 27 Day Space Outlook
- 45 Day AP Forecast
- Geomagnetic Data
- Daily Geomagnetic Data
- Daily Particle Data
- Daily Solar Data
- GEOALERT
- Daily Magnetometer Analysis Reports
- Hourly Magnetometer Analysis Reports
- Predicted Sunspot Numbers and Radio Flux
- Report of Solar-Geophysical Activity
- Solar and Geophysical Activity Summary
- Solar Region Summary

Weekly Highlights and Forecasts  
Current Space Weather Indices  
Space Weather Event Reports  
Daily Space Weather Indices  
Summary of Space Weather Observations  
3-day Space Weather Predictions

## Grayline Map



This window displays a map of the world, showing the day and night regions, and the important grayline region between the two.

Propagation is generally enhanced between regions in the grayline. That is, if you are in the grayline, then often you will find excellent propagation conditions to/from other locations also in the grayline.

Due to the tilt of the Earth's axis, the shape of the grayline changes throughout the year, so that certain stations may only be in the grayline along with your location at specific times of the year, if at all.

When the Now checkbox is checked, the map will update in real-time.

Otherwise, you can enter a date and time in the appropriate boxes, and click the Calc button, to be shown the grayline conditions for that date and time.

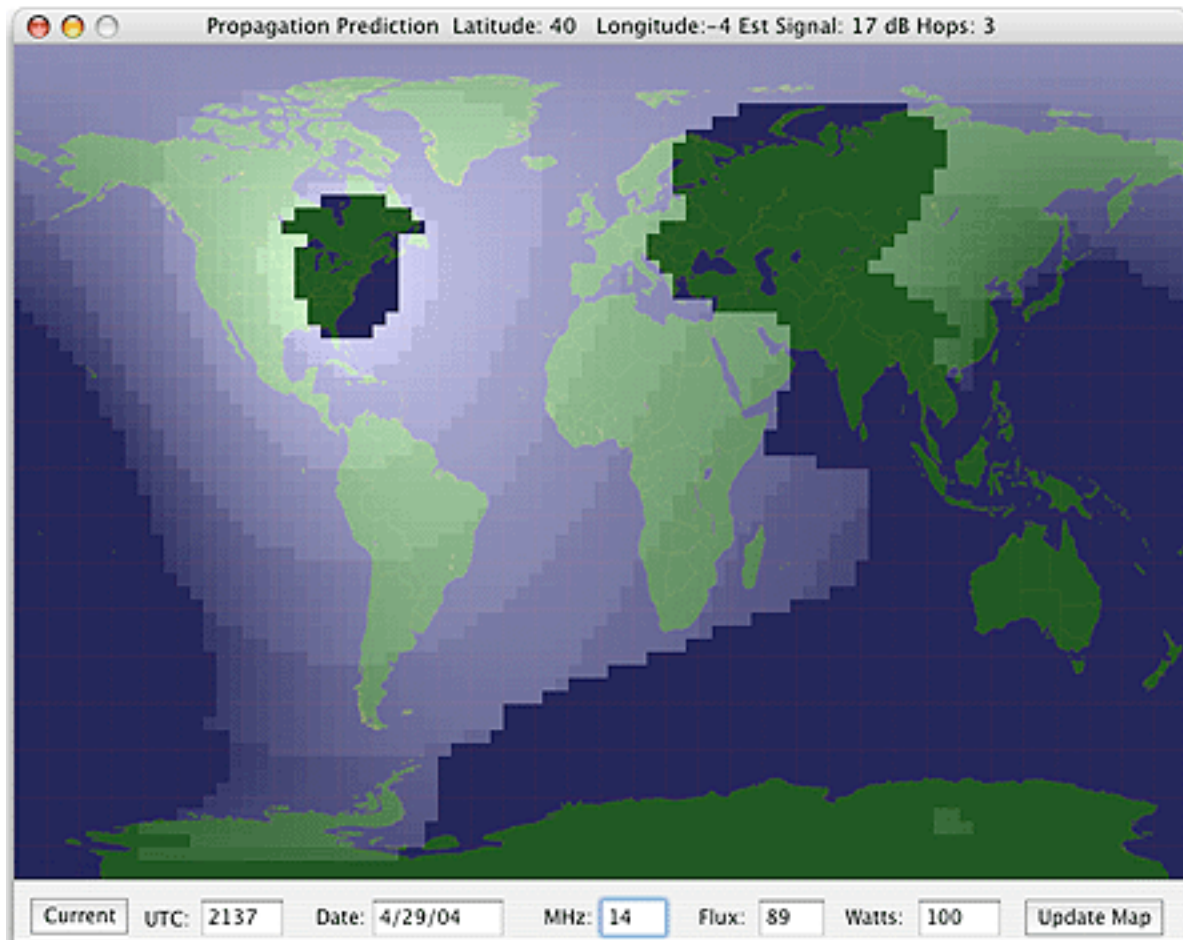
If you select a frequency from the pop-up menu in the lower right corner of the window, the map will update every 10 seconds, showing the location of the currently active NCDXF/IARU beacon for that frequency. The call of the

beacon is also displayed to the left of the pop-up menu.

If you have the Path checkbox checked, then the great circle (shortest) path between your location and the other station will be drawn, with the beam heading in the title bar of the window, along with the distance in kilometers. The other station is either the currently active beacon, or determined by the position of the mouse cursor over the map of the world. A more faint line will also be drawn showing the long path.

Clicking on a location will bring up the Propagation Path calculator, to help estimate the propagation conditions between your location and that location.

## Propagation Prediction Window

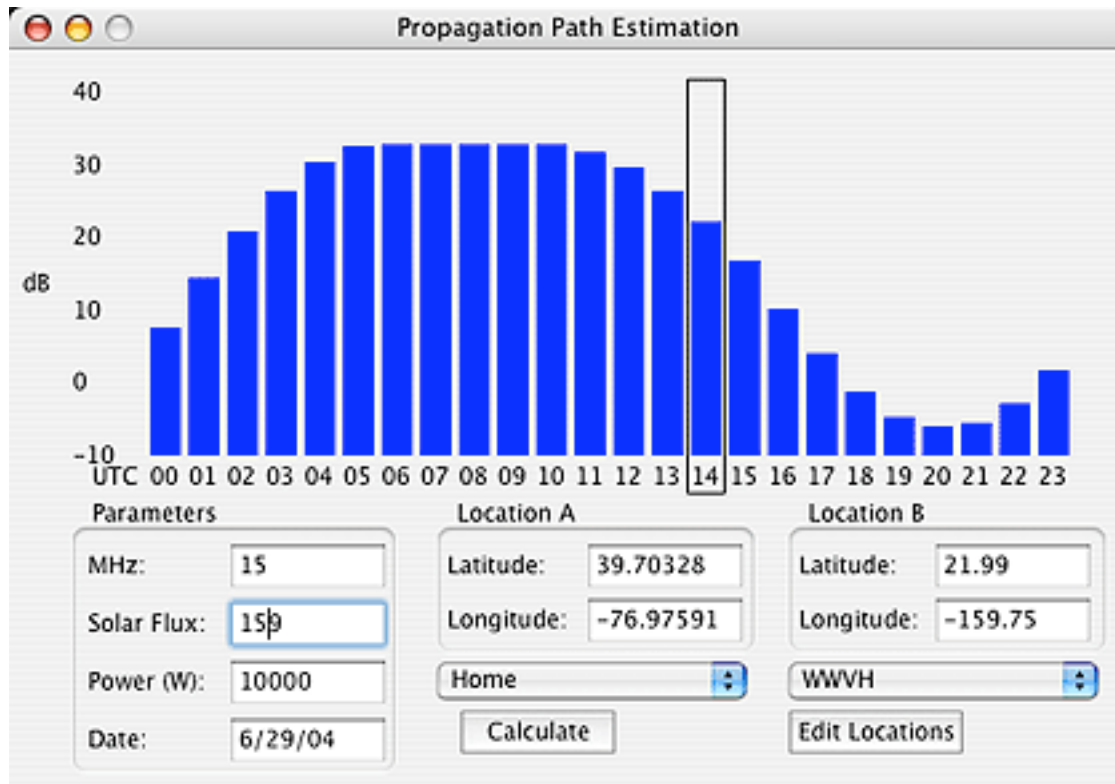


This window allows you to estimate the propagation conditions between two points on the Earth. The required information is the current solar flux, the desired frequency in MHz, the transmitter power level, and the current date and time. Enter this information, and press the Update Map button. The displayed map shows the estimated signal. Your location is taken from the Preferences, and the solar flux is automatically grabbed from the Current Conditions Window. You can of course change these values, as well as the time and date. Clicking on the Current button will place the current date and time in those fields.

As you move the cursor around the map, it will display the estimated signal level in dB. The assumptions are that the receive bandwidth is about 2.5 kHz, and the minimum sensitivity of the receiver is -123 dBm, typical for most modern receivers.

Please note that propagation is a lot like weather forecasting, except it is rarely even that accurate! But it will give you a good guide as to what propagation conditions can be expected.

## Propagation Path Estimation



This window allows the propagation for a particular path to be estimated. Enter the frequency in MHz, solar flux, transmitter power, date, and the two locations (location A is pre-set to your location as set in the Preferences) and click Calculate. A plot for the entire day will be generated showing estimated signal levels.

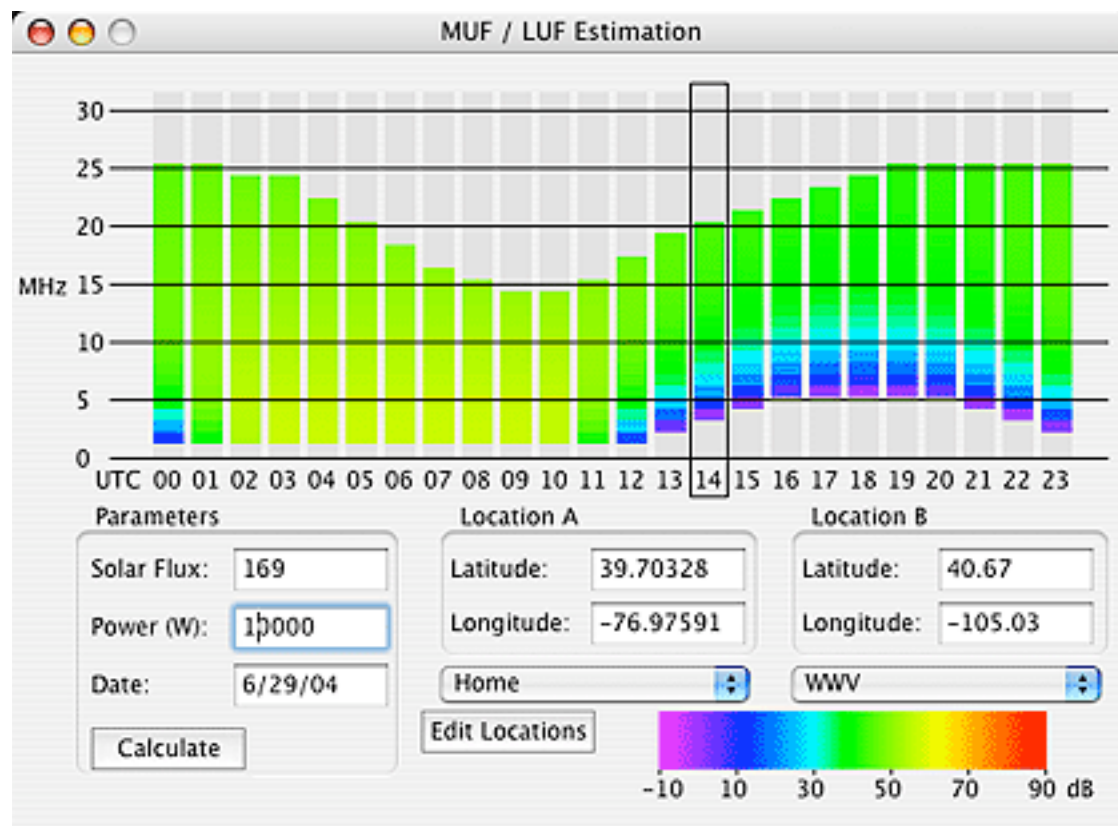
You can also bring this window up by clicking on a location on either the Grayline Map window or the Propagation Map window. Location A will be filled in with your location (as entered into the Preferences) and Location B will be filled in with the latitude and longitude of the location you clicked.

The popup menus can be used to select a location. Click on the Edit Locations button to add, change, or delete a location. You'll need to close and re-open this window for the changes to take effect.

## MUF / LUF Estimation Window

This window allows the signal strength for a particular path to be estimated for the range of frequencies over which propagation is expected.

Enter the solar flux, transmitter power, date, and the two locations (location A is pre-set to your location as set in the Preferences) and click Calculate. A plot for the entire day will be generated showing estimated signal levels for the range of frequencies. The color mapping ranges from violet for a weak signal, to red for a strong signal, using the same color order as in a visible light rainbow (violet, blue, green, yellow, orange, red).

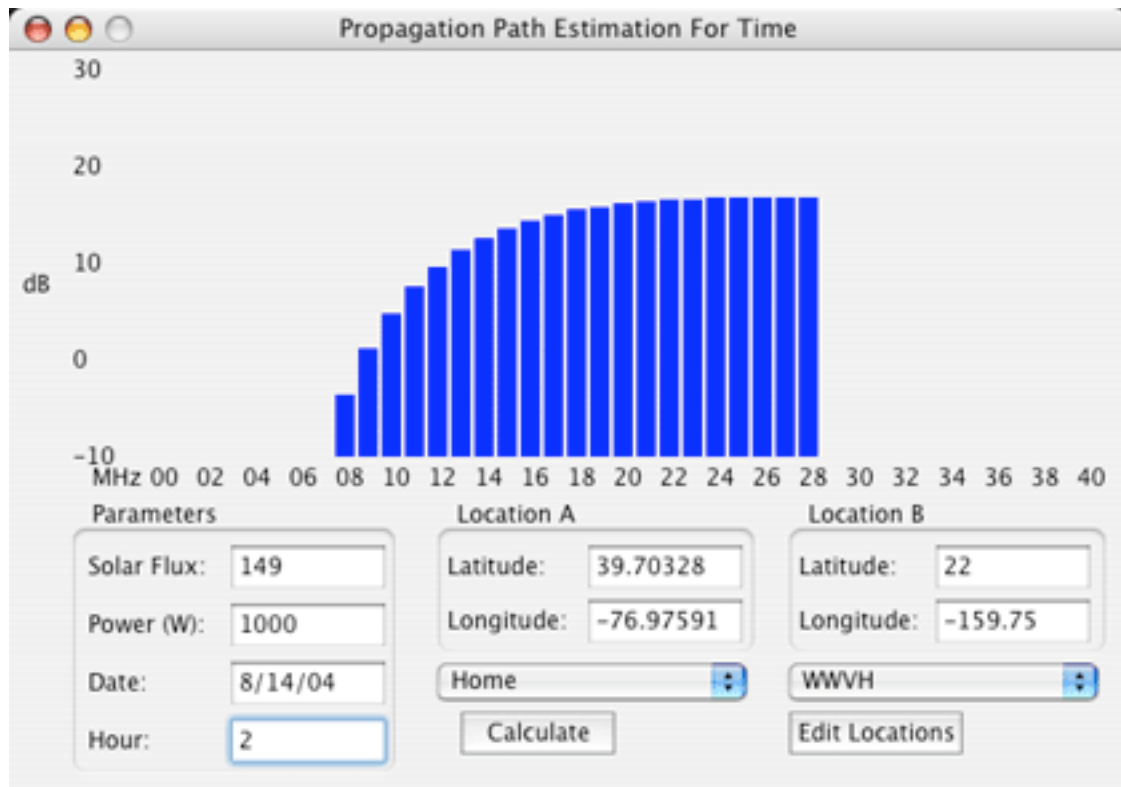


The popup menus can be used to select a location.

You can also bring this window up by holding down the shift key while clicking on a location on either the Grayline Map window or the Propagation Map window. Location A will be filled in with your location (as entered into the Preferences) and Location B will be filled in with the latitude and longitude of the location you clicked.



## Propagation Path Estimation For Time Window



This window allows the propagation for a particular path to be estimated. Enter the solar flux, transmitter power, date, the current UTC hour, and the two locations (location A is pre-set to your location as set in the Preferences) and click Calculate. A plot for that hour of the specified day will be generated showing estimated signal levels between 0 and 40 MHz.

You can also bring this window up by control-clicking on a location on either the Grayline Map window or the Propagation Map window. Location A will be filled in with your location (as entered into the Preferences) and Location B will be filled in with the latitude and longitude of the location you clicked.

The popup menus can be used to select a location. Click on the Edit Locations button to add, change, or delete a location. You'll need to close and re-open this window for the changes to take effect.

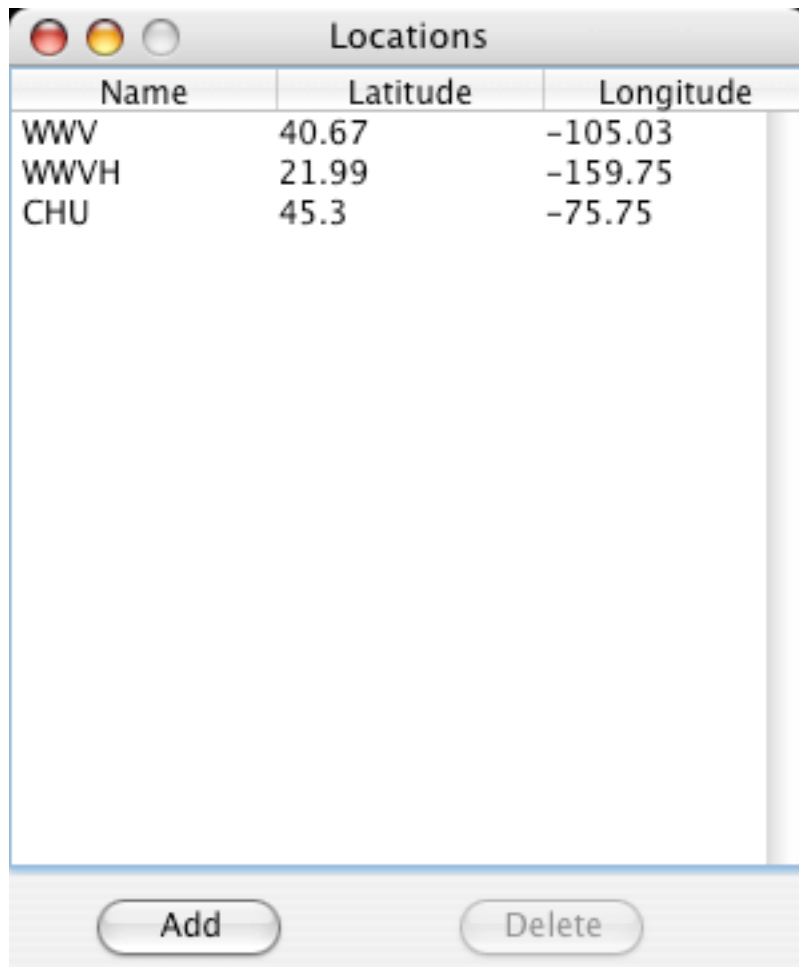
## Locations Window

This window allows you to add, edit, and delete locations that appear in popup menus. To add a new location, click the add button, and then type in the location name, latitude (N is positive, S is negative), and longitude (E is positive, W is negative).

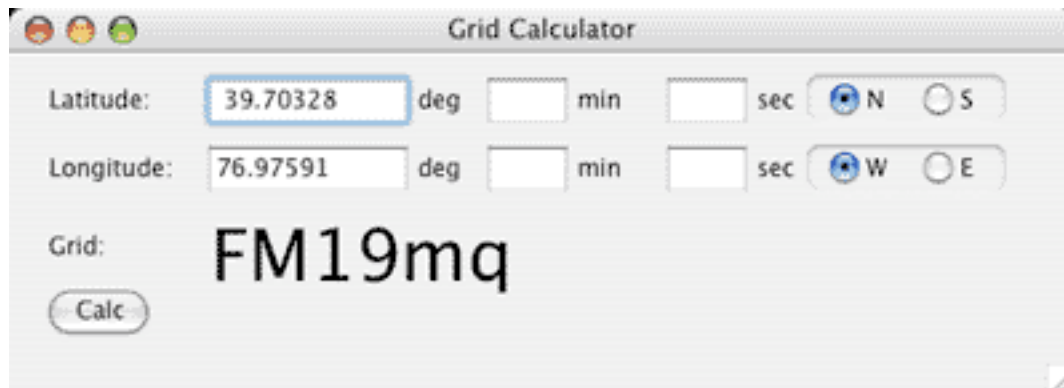
To edit a location, double click on that location in this window.

To delete a location, click on the location in this window, and then click the Delete button.

You can have a maximum of 100 locations



## Grid Calculations



The screenshot shows a window titled "Grid Calculator". It contains three input fields for coordinates: "Latitude:" with the value "39.70328", "Longitude:" with the value "76.97591", and "Grid:" with the value "FM19mq". Each coordinate field is followed by units "deg", "min", and "sec", and a direction selector (N/S for latitude, W/E for longitude). The "Latitude:" field is highlighted with a blue border. A "Calc" button is located below the "Grid:" field.

The Grid Calculator lets you determine the grid square from the longitude and latitude. You can enter them as decimal numbers as shown in the above example, or enter integer values for the degrees, minutes, and seconds.

There is also the Grid Square and Time Zone Map which shows a map of the world, with the grids marked out. The time zones are also shown.

You can type a 4 digit grid square into the text box and click the **Jump To** button, and the map will be re-centered (roughly) at that grid square location.

## Mac OS X Dock

If you are running Mac OS X, the DX ToolBox icon will automatically cycle through displaying the various current conditions, making it easy to check on them:



## Purchase

You can buy your copy of DX ToolBox for only \$24.99, allowing the use on a single computer. If you wish to run DX ToolBox on multiple computers, you must obtain a license for each system, or the appropriate site license.

Site licenses are also available, allowing copies to be run on multiple computers at a single location (for example, a school or university, or office). Please contact Black Cat Systems for pricing and details about site licensing.

By paying for your copy of DX ToolBox, you'll help support our efforts to develop new versions with additional information. When you purchase, you'll be entitled to use all new releases and updates to DX ToolBox released over the next year, free of charge.

When you purchase and receive your registration code, select **Enter Registration...** from the **Edit** menu, and enter the code. If you purchase DX ToolBox and don't get your registration code within a day or two, please send us an email at [info@blackcatsystems.com](mailto:info@blackcatsystems.com).

Thanks again for giving DX ToolBox a try.

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Westminster, MD 21158

email: [info@blackcatsystems.com](mailto:info@blackcatsystems.com)  
Web: <http://www.blackcatsystems.com/software/dxtoolbox.html>

## Purchasing by Check or Money Order

To order by check, please fill out and mail the following form, along with your payment. You can pay with a wide variety of cash from different countries but at present if you pay via check, it must be a check or money order drawn in US Dollars on a US bank, no exceptions. While there is the risk of loss in the mail, currency is also OK, including foreign currency.

Please make sure you include your email address with your payment. That way we can send the registration code to you. If you do not send us a valid email address, we have no way to send you the code.

----- DX ToolBox CHECK / MONEY-ORDER ORDER FORM -----

I would like to buy \_\_\_\_\_ copies of DX ToolBox @ \$24.99 apiece (does not include CD-ROM).

If you would like a CD-ROM, please add \$10.00 to your order and check here:\_\_\_\_\_ (Only Macintosh versions are on CD-ROM)

Total amount enclosed: \_\_\_\_\_ in US funds.

Please send my registration code to:

Name: \_\_\_\_\_

Address: \_\_\_\_\_

City: \_\_\_\_\_ State: \_\_\_\_\_

Zip or Postal Code: \_\_\_\_\_ Country: \_\_\_\_\_

Operating System: \_\_\_\_\_

Email address: \_\_\_\_\_

Including your email address is VERY important as this is how we will contact you with your registration code.

Please make checks or money orders out to: Black Cat Systems. Checks are only accepted from residents of the USA.

Mail this form, along with payment, to:

Black Cat Systems  
4708 Trail Court  
Westminster, MD 21158  
USA

## Purchase Online

To buy online with a credit card, go to the following URL:

<http://www.blackcatsystems.com/register/dxtoolbox.html>

You will be sent to our order page at Kagi or SWREG. They handle our credit card payment processing.

Please make sure you include your email address when you purchase online. That way we can send the registration code to you. If you do not send us a valid email address, we have no way to send you the code.

## Revision History

July 28, 2005 - 2.5.1:

UTC time displayed in Current Conditions window.

Several minor bug fixes.

May 5, 2005 - 2.5.0:

You can enter a grid square and have the map jump to that location.

Current conditions window reports "None" for no adverse conditions.

Grayline window: 'Now' and 'Path' are checkboxes instead of buttons.

November 24, 2004 - 2.4.1:

Fixed a bug in the Windows version which could cause a crash when the Images window is opened.

November 18, 2004 - 2.4.0:

Won't try to use internet if no active connection.

Added audio alert on K Index, Bz, X-Ray Flux.

Added Alert window.

Resets dock icon (Mac OS X) when you quit.

Windows now have the metal look in Mac OS X.

October 7, 2004 - 2.3.0:

Long path displayed on grayline graph.

Clicking on prop map copies tx power to other chart windows.

Can enter commas now instead of periods if internationalized.

Images now ddisplay with correct number of colors.

August 23, 2004 - 2.2.0:

Added Propagation Path Estimation For Time window.

Images can now be scaled to the window size.

Added left/right arrow buttons to scan through images.

A Index graph is now logarithmic.

Dock icons change color with current conditions.

Added graphs of solar wind and magnetic field values.

Fixed a bug that could cause images to not load under Windows.



July 13, 2004 - 2.1.0:

Added ability to specify additional images to load.

Reduced time between loading each image.

Clicking on the map to bring up the Propagation Path Estimation window now updates the frequency in that window.

June 29, 2004 - 2.0.0:

Can now use cmd-W (control-W on Windows) to close a window.

Current time boxed in MUF/LUF and Propagation Path windows.

Added locations popup menu to MUF/LUF and Propagation Path windows.

June 6, 2004 - 1.9.0:

Added MUF / LUF Estimation Window.

May 7, 2004 - 1.8.0:

Added display of GOES x-ray flux graphs.

Changes made to OSX version so it can run on OS9 systems as a carbon application.

May 1, 2004 - 1.7.0:

Added propagation forecast map.

Added propagation path forecast window.

Fixed a bug with display of reports on Windows machines.

April 13, 2004 - 1.6.0:

Added grid lookup window.

Added grid map window.

February 16, 2004 - 1.5.0:

Added reports window.

Sped up the update of the grayline window.

February 1, 2004 - 1.4.0:

Added NCDXF/IARU Beacon display to Grayline window.

Added Sun Spot Number (SSN) to Current Conditions window.

Under Mac OS X, the icon in the Dock displays various real-time information, updating every two seconds.

Added plot of great circle path, distance, beam heading.

Added update in OSX Dock.

January 15, 2004 - 1.3.1:

Added additional SOHO satellite images of the Sun.

Fixed bugs on grayline map dealing with sign of the longitude.

Fixed bug with display of images not showing enough colors.

January 7, 2004 - 1.3.0:

Added additional SOHO satellite images of the Sun.

December 26, 2003 - 1.2.1:

Added window to select which images are loaded.

Added several SOHO solar images

Several small bug fixes.

December 21, 2003 - 1.2.0:

Added MUF/LUF window.

December 16, 2003 - 1.1.1:

Fixed a bug that could cause a crash in Mac OS 8/9.

December 14, 2003 - 1.1.0:

Added grayline map.

December 5, 2003 - 1.0.2:

Fixed a bug in the Windows version which could cause a crash when launched.

December 3, 2003 - 1.0.1:

Windows menu now contains each window, whether visible or not, so closed windows can be re-opened.

November 22, 2003 - 1.0.0:

Initial Release.

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