

## DX ToolBox Version 5.1.0 February 9, 2018

DX Toolbox searches the world for you, gathering information on solar and geomagnetic conditions that affect radio propagation. DX Toolbox also has several built in propagation forecasting tools. There are also databases of SWBC stations, and NDBs. Plus much more! Please take a moment to read through this documentation to see all the DX Toolbox features. 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 daytime, 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 many windows, each described in a section in the following pages:



## 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.

**Add callsign prefixes instead of countries to location menus:** When checked, callsign prefixes will be used instead of country names, in the location menus. Note that DX ToolBox requires the cty.dat file for the country list. This file comes with the download, and must be kept in the same folder as the application itself.

**Proxy Support:** if you are behind a firewall and need to use a proxy for web access, you can check the Use Proxy box, and enter in the server address and port number. You must then quit and re-start DX ToolBox for the change to take effect. Only proxies that do not require authentication can be used.

**Gain Offset:** This value (in dB) will be added to all estimated signal levels. It can be used to adjust the values computed by DX ToolBox, if you believe they are too low or high for your uses.

**SdrDx Support:** Allows DX TooBox to get and set the frequency and mode in the SdrDx SDR app. See the section on SdrDx further down for detailed information. The Rcv and Send ports must be set to match the network settings in SdrDx for UDP mode. For TCP mode the TCP socket must match.

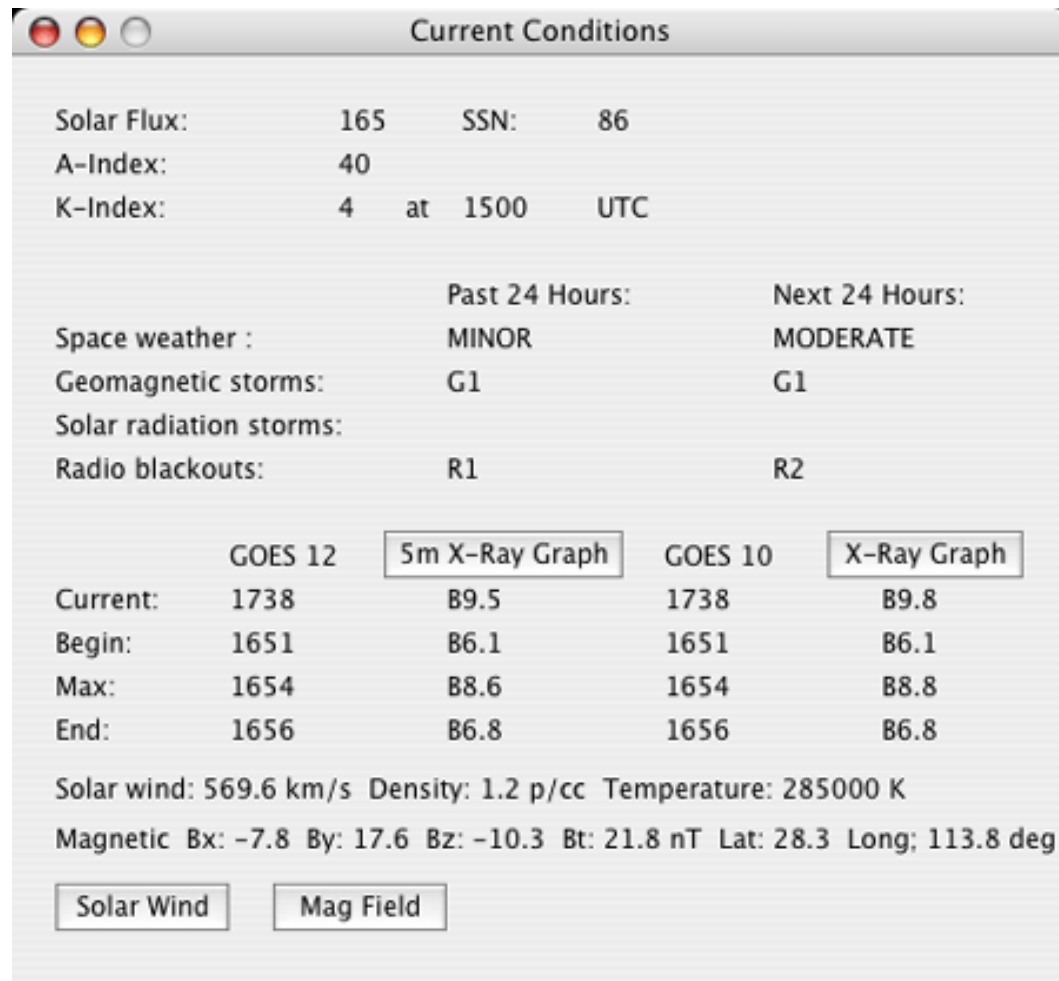
## Current Conditions

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 geo-magnetic 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.

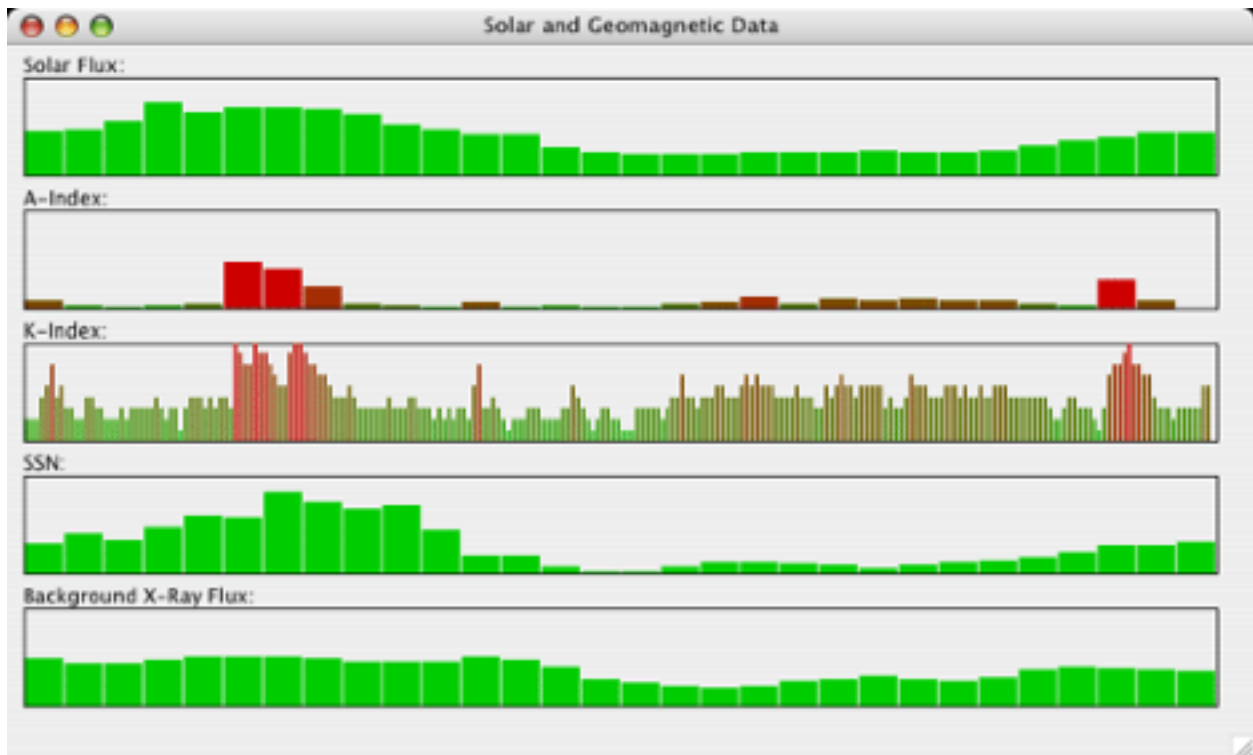
Next are x-ray readings from two Earth orbiting satellites. These show the current readings, as well as the time, duration, and intensity of the last detected solar flare.

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. Likewise there are buttons to display graphs of proton and electron flux readings.

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

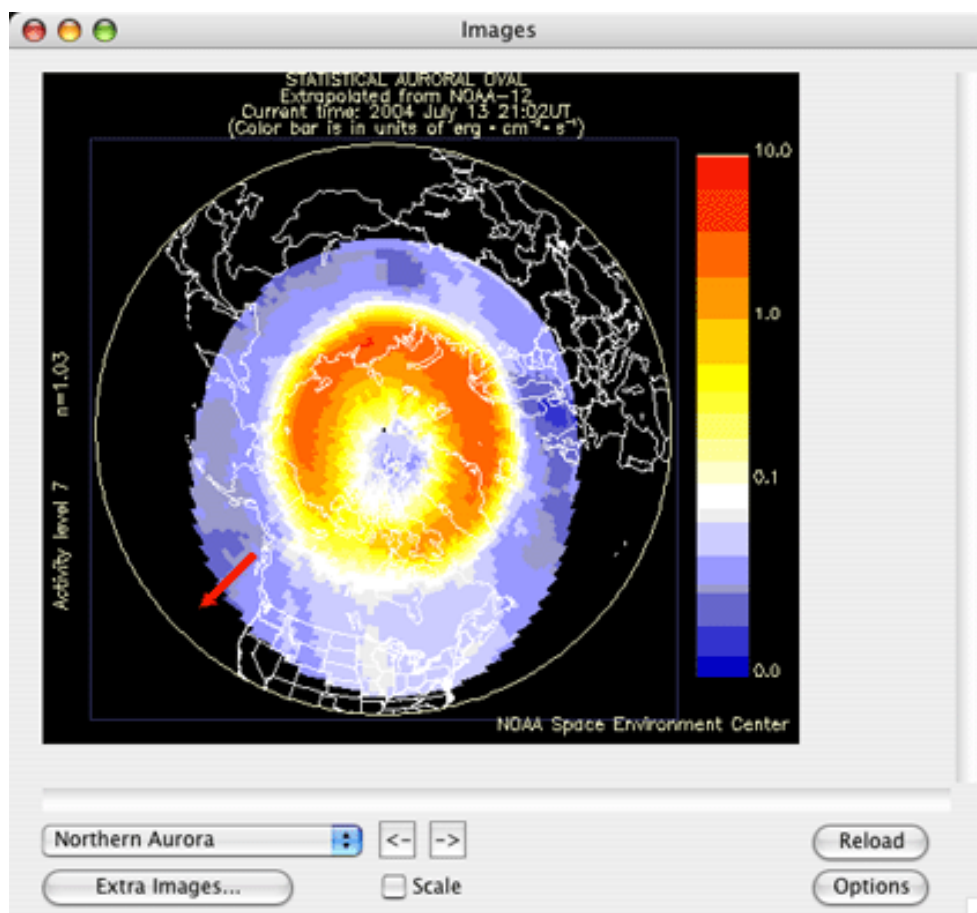
The Images window allows you to display several different images and graphs from the web, such as the extent of the auroral oval shown here. Other auroral and propagation related images are available by selecting them from the popup menu in the lower left corner of the window.

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.

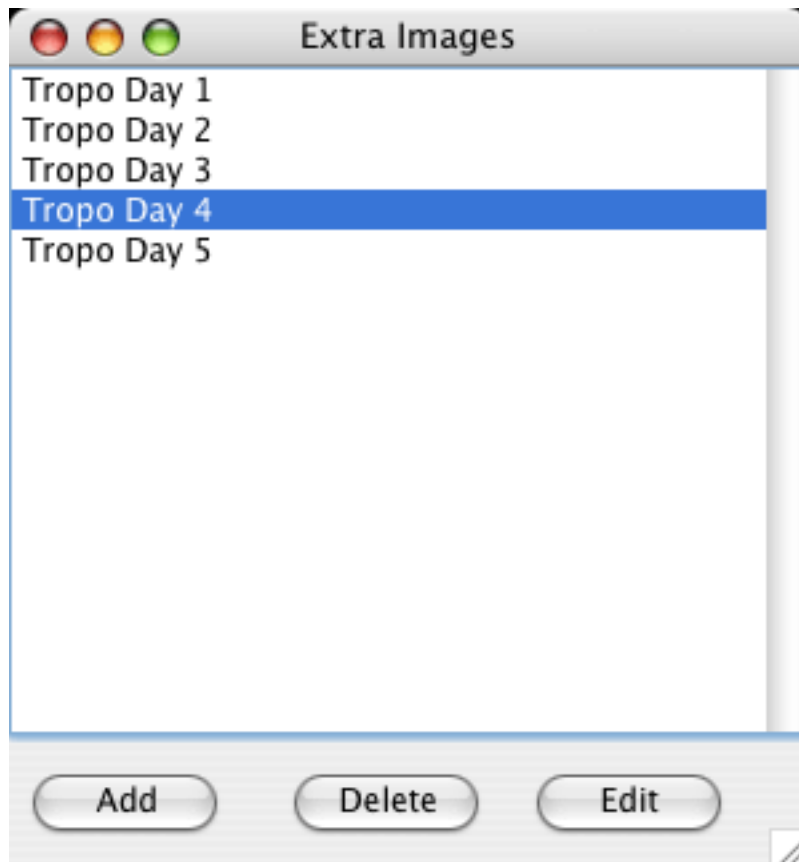
The right and left arrow buttons let you shift through the loaded pictures. If the Scale checkbox is clicked, the images will be scaled to the size of the window,

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:

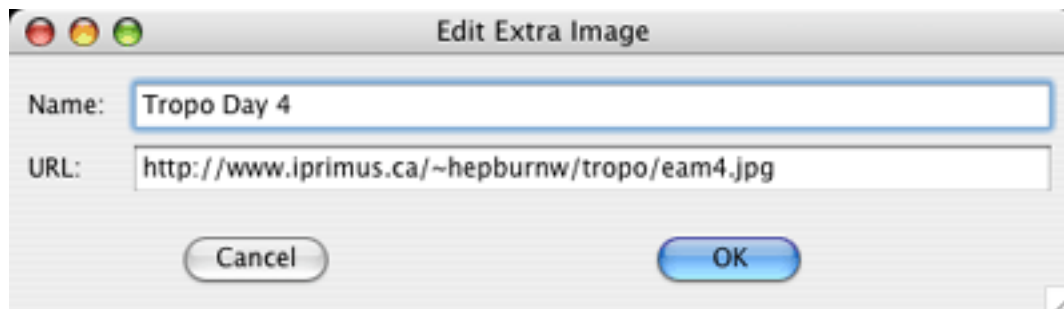






Click on the Add button, and you will get another window, allowing you to enter in a name for the image, and the URL to load:

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 window lets you look at many different text reports that contain 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

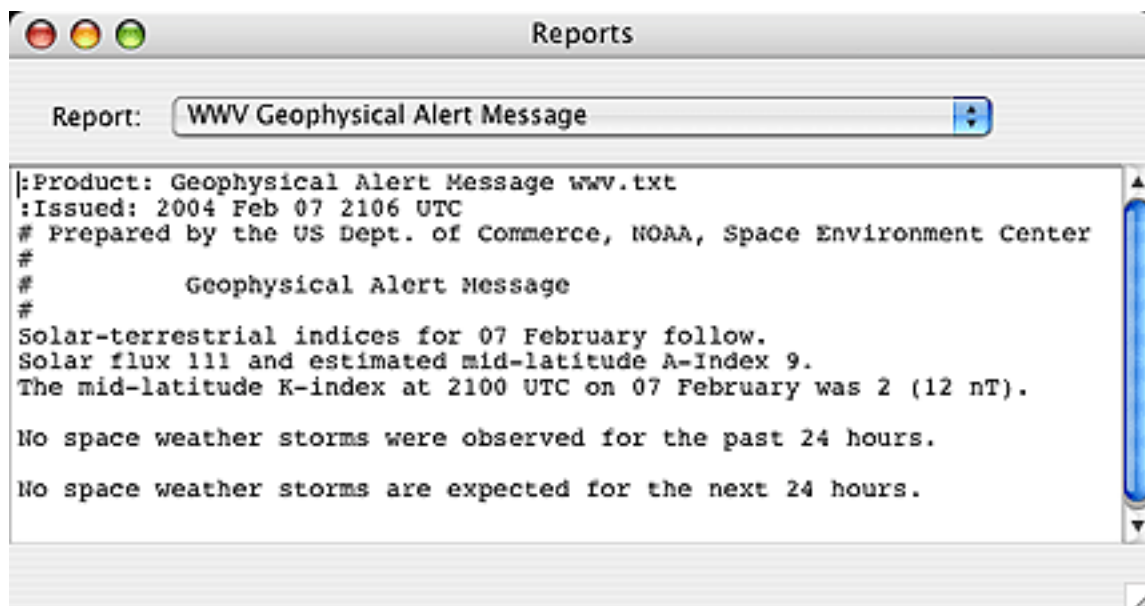
Weekly Highlights and Forecasts

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.

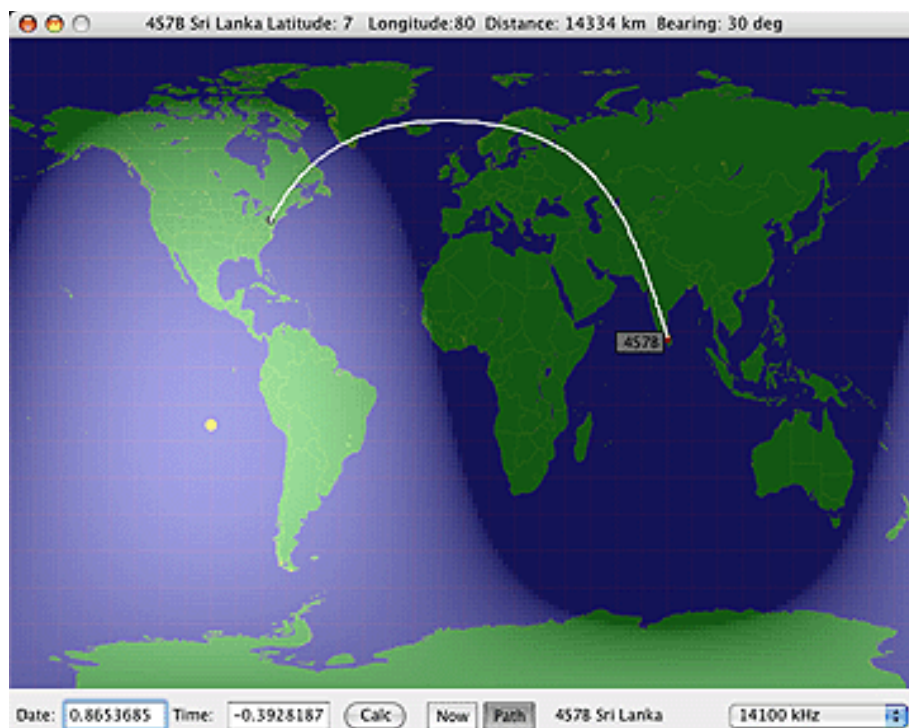
Propagation is generally enhanced between regions in the grayline. That is, if you are in the grayline, then often you will find excellent propagation conditions to/from other locations also in the grayline.

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.

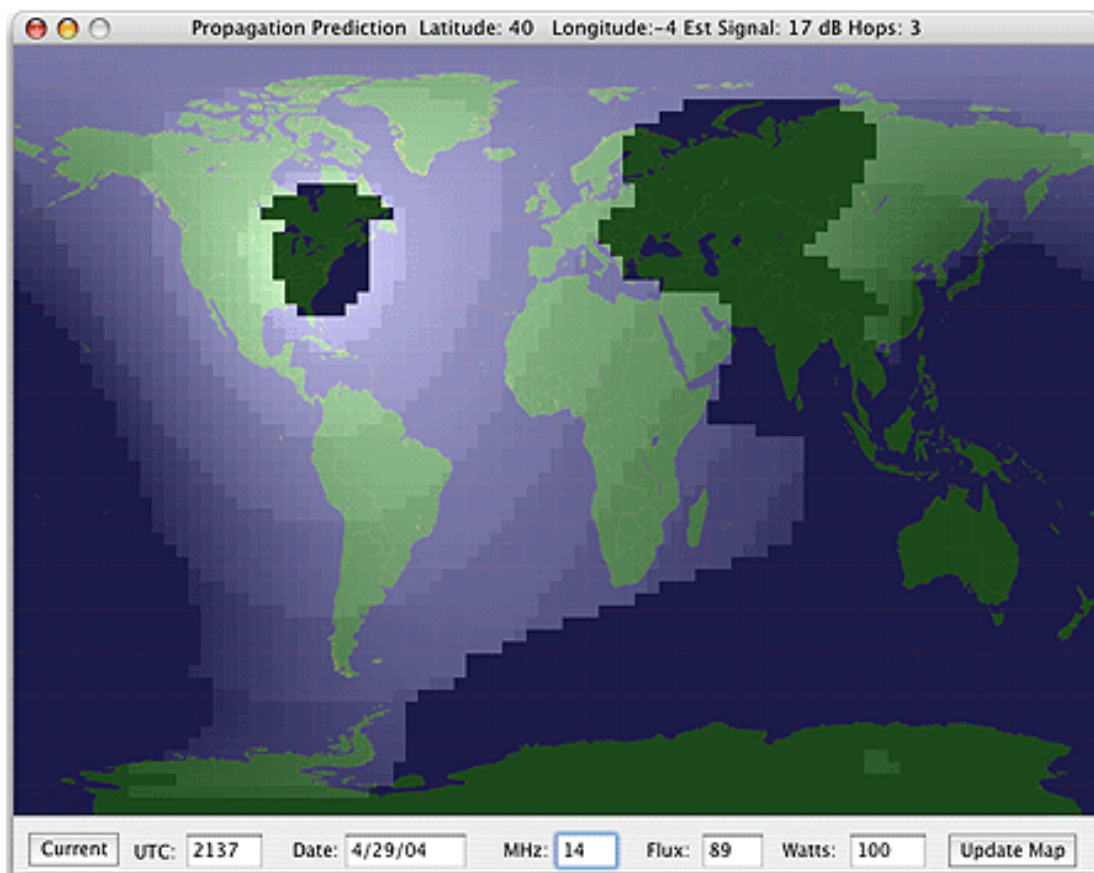
Clicking on a location with the control key held will bring up the Propagation Path for Time calculator, to help estimate the propagation conditions between your location and that location. Clicking on a location with the alt/option key held will bring up the Propagation Path for Frequency calculator, and clicking on a location with the shift key held will bring up the MUF / LUF calculator.

## 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.

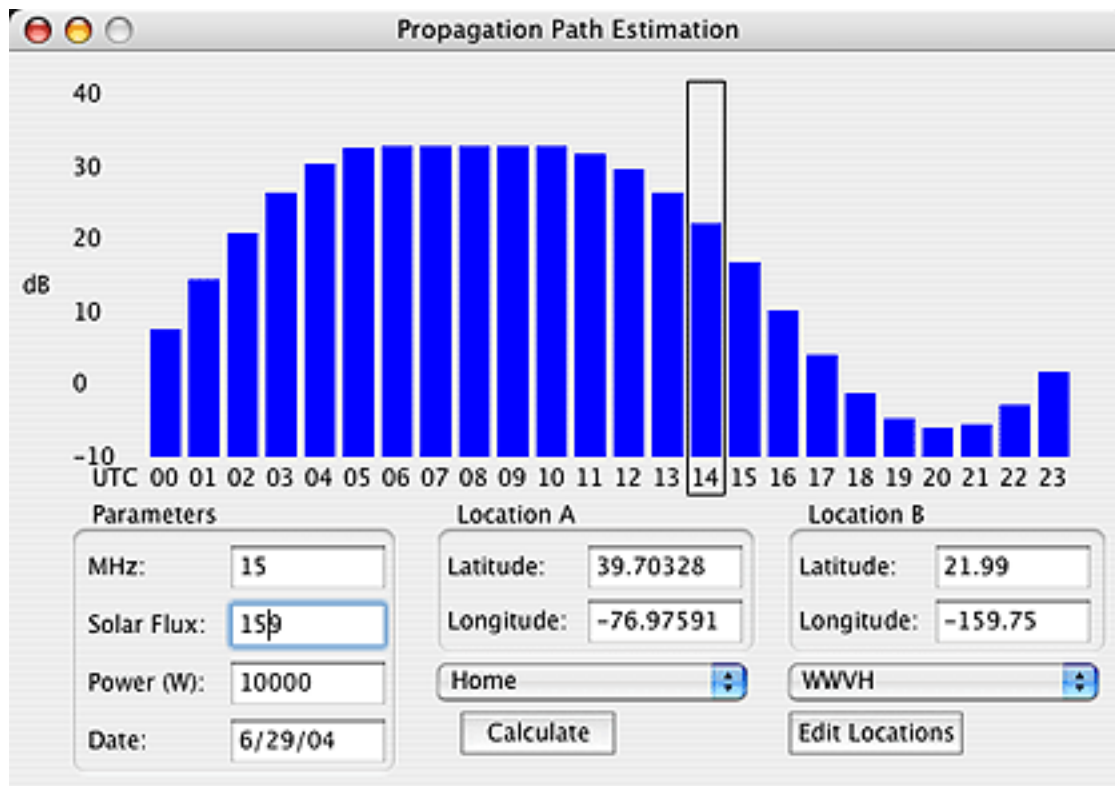


## Propagation Path Estimation

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.



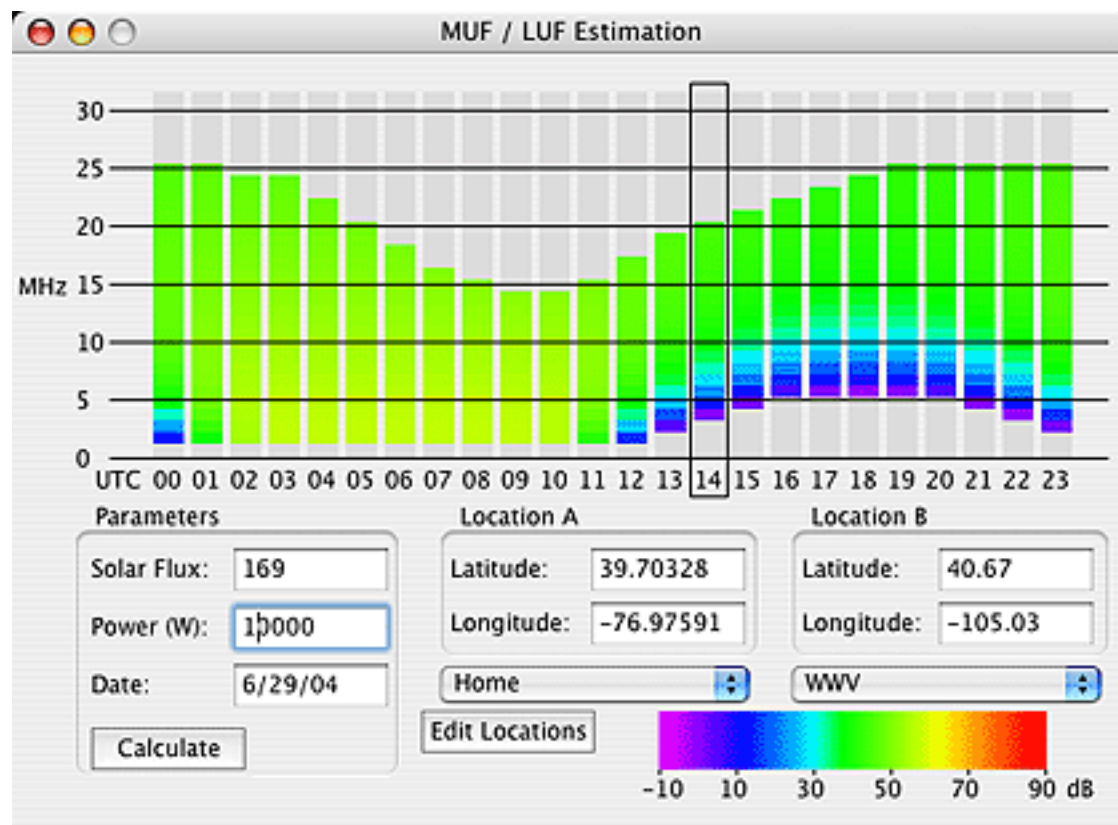
## MUF / LUF Estimation Window

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.

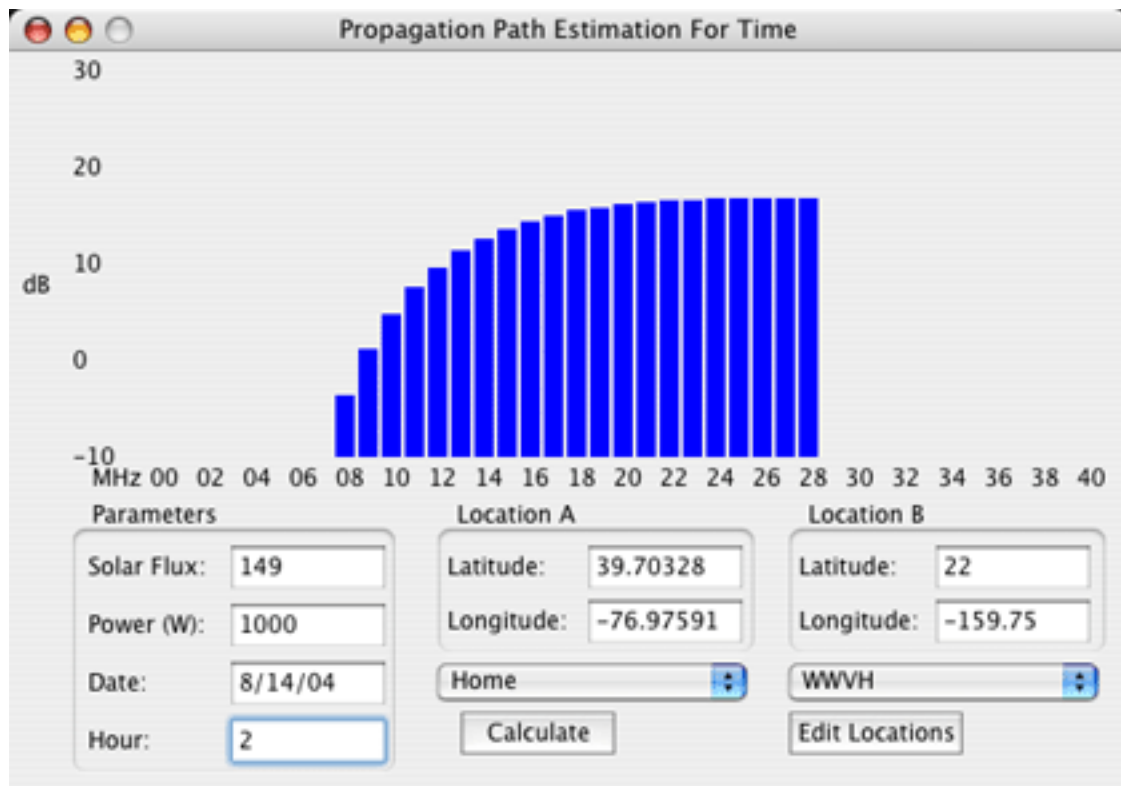


## Propagation Path Estimation For Time Window

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

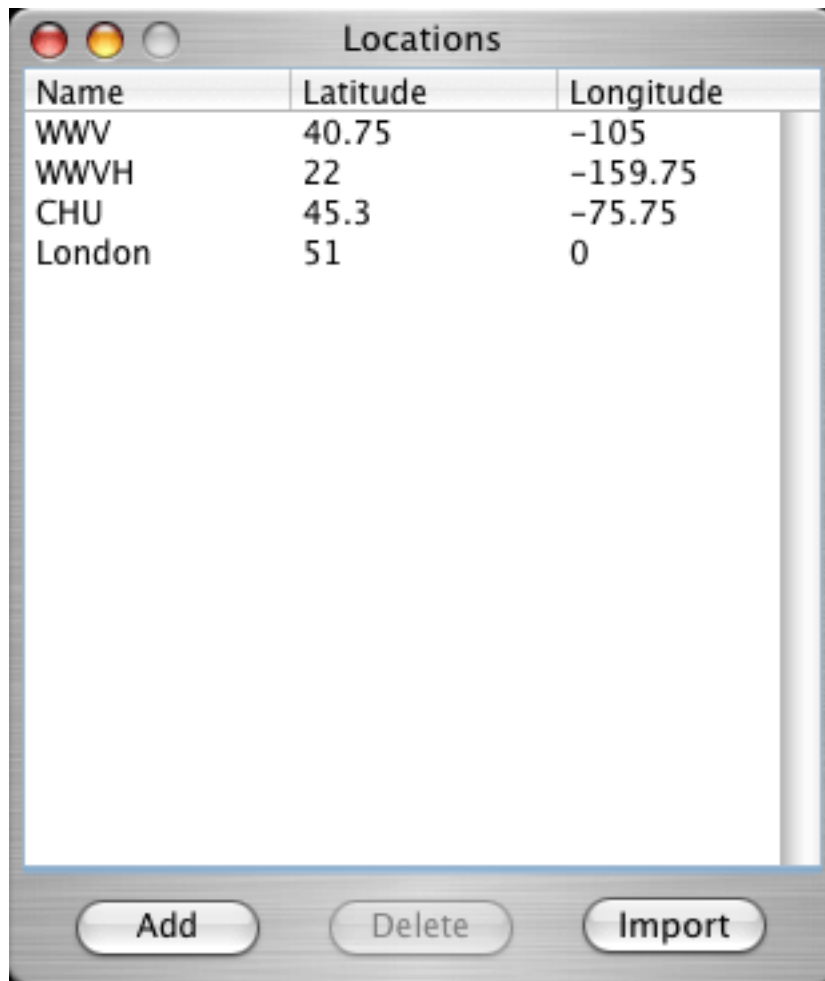
This window allows you to add, edit, and delete locations that appear in popup menus. To add a new location, click the add button, and then type in the location name, latitude (N is positive, S is negative), and longitude (E is positive, W is negative).

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 import a large number of entries at once, using the Import button, by putting them into a comma delimited text file, one on a line, like this:

location,latitude,longitude

You can have a maximum of 100 locations.



## SWBC Schedule Window

Station	Frequency	Time	Country	Target	Language	Transmitter Site
<b>China Radio Int.</b>	<b>9525</b>	<b>1900-2000</b>	<b>China</b>	<b>EEu</b>	<b>Russian</b>	<b>Beijing-Chaoyang/Gaobeidian/Shuan...</b>
<b>Voice of Indonesia</b>	<b>9525</b>	<b>1900-2000</b>	<b>Indonesia</b>	<b>Eu</b>	<b>English</b>	<b>Jakarta (Cimanggis) 06S12-106E51</b>
<b>Voice of Indonesia</b>	<b>9525</b>	<b>1900-2000</b>	<b>Indonesia</b>	<b>Eu</b>	<b>English</b>	<b>Jakarta (Cimanggis) 06S12-106E51</b>
<b>Voice of Indonesia</b>	<b>9526</b>	<b>1900-2000</b>	<b>Indonesia</b>	<b>Eu</b>	<b>English</b>	<b>Jakarta (Cimanggis) 06S12-106E51</b>
<b>Rádio Transmundial</b>	<b>9530</b>	<b>1000-1959</b>	<b>Brasil</b>	<b>SAm</b>	<b>Portuguese</b>	<b>Santa Maria, RS 29S44'18"-53W33'...</b>
<b>China Radio Int.</b>	<b>9535</b>	<b>1900-2000</b>	<b>China</b>	<b>SAf</b>	<b>Portuguese</b>	<b>Baoji-Xinjie (Shaanxi; CRI 150 kW; C...</b>
<b>BBC</b>	<b>9545</b>	<b>1930-2000</b>	<b>United Kingdom</b>	<b>Waf</b>	<b>Haussa</b>	<b>Woofferton 52N19-02W43</b>
<b>R.Boa Vontade, P.Alegre</b>	<b>9550</b>	<b>1000-0001</b>	<b>Brasil</b>	<b>B</b>	<b>Portuguese</b>	<b>Esteio (Porto Alegre), RS 29S51'59"-...</b>
<b>BSKSA 1</b>	<b>9555</b>	<b>1800-2300</b>	<b>Saudi Arabia</b>	<b>NAf</b>	<b>Arabic</b>	<b>Riyadh 24N30-46E23</b>
<b>Super Rádio Deus é Amor</b>	<b>9564</b>	<b>0000-2400</b>	<b>Brasil</b>	<b>SAm</b>	<b>Portuguese</b>	<b>Curitiba, PR 25S27'08"-49W06'50"</b>
<b>Rádio Cairo</b>	<b>9570</b>	<b>1900-2000</b>	<b>Egypt</b>	<b>Eu</b>	<b>German</b>	<b>Abis 31N10-30E05</b>
<b>Medi 1</b>	<b>9575</b>	<b>0000-2400</b>	<b>Morocco</b>	<b>NAf</b>	<b>A,F</b>	<b>Nador (RTM,Medi1) 34N58-02W55</b>
<b>BSKSA 2</b>	<b>9580</b>	<b>1700-2200</b>	<b>Saudi Arabia</b>	<b>ME</b>	<b>Arabic</b>	<b>Jeddah/Jiddah 21N15-39E10</b>
<b>All India Radio GOS</b>	<b>9620</b>	<b>1945-2030</b>	<b>India</b>	<b>Waf</b>	<b>French</b>	<b>Aligarh (4x250kW) 28N00-78E06</b>
<b>Rádio Aparecida</b>	<b>9630</b>	<b>0000-2400</b>	<b>Brasil</b>	<b>B</b>	<b>Portuguese</b>	<b>Aparecida, SP 22S50'47"-45W13'13"</b>
<b>Voice of Turkey</b>	<b>9635</b>	<b>1930-2030</b>	<b>Turkey</b>	<b>WEu</b>	<b>French</b>	<b>Emirler 39N29-32E51</b>
<b>Rádio Bandeirantes, SP</b>	<b>9645</b>	<b>0000-2400</b>	<b>Brasil</b>	<b>B</b>	<b>Portuguese</b>	<b>Sao Paulo - Radio Bandeirantes, SP 2...</b>
<b>China Radio Int.</b>	<b>9645</b>	<b>1830-2030</b>	<b>China</b>	<b>Waf</b>	<b>French</b>	<b>Kunming-Anning CRI (Yunnan) 24N5...</b>
<b>Rádio Guinée</b>	<b>9650</b>	<b>0600-0001</b>	<b>Guinea</b>	<b>Waf</b>	<b>French</b>	<b>Conakry-Sonfonia 09N41'10"-13W3...</b>
<b>China Radio Int.</b>	<b>9655</b>	<b>1800-2000</b>	<b>China</b>	<b>ME</b>	<b>Turkish</b>	<b>Kunming-Anning CRI (Yunnan) 24N5...</b>

This window displays a list of schedules for shortwave broadcast (SWBC) stations. Broadcasts currently on the air will be displayed in bold.

The band buttons can be used to immediately jump to the beginning of one of the shortwave broadcast bands.

You can toggle the On Now button to only display those broadcasts currently on the air. Pressing the All button will display all broadcasts.

The search boxes can be used to search for specific stations, by station name, time on, frequency, and country code. There are two buttons, to allow you to more specifically find the station(s) of interest.

Checking “Only Display Stations On Now” will, as the name suggests, only display stations that are currently on the air. Likewise, checking the Show Transmitter Site box will add a column on the right hand side of the window, showing the site for each station, if known.

Clicking on Download Schedule will download the current schedule file. Or if you have Check For Updates checked in the app’s Preferences, it will automatically check for a new schedule file each time you open this window. If you wish to manually update the schedule file, download it from this page: <http://www.eibispace.de/> and rename it eibi-sked.csv, then place it in the same folder as the DX ToolBox application. Then run DX ToolBox.

If you are running the SdrDx app, you can control it with this window, as well as get lists of possible SWBC stations in this window. Go to the preferences for DX Toolbox, and check the SdrDx Support box. Then make sure the receive and send UDP port numbers match the settings in SdrDx (the default values should match). Then open the SWBC Schedule window.

If you double click on an entry in the window, SdxDr will be told to change to that frequency.

Right clicking an entry will give you a popup menu with options to get a window with other transmissions by the same station, on the same frequency, from the same country, in the same language, or to the same target. Note that you can right click entries in this new window as well, to get other related windows. And so on... There is also the option to log an entry, see the Logbook window section after this one.

If you change the frequency in SdrDx, DX Toolbox will be informed, and will change the contents of the window to show all stations that use that frequency. Stations currently on the air will be shown in bold.

You can add your own entries to the schedule window. You need to create a file named “extra-swbc-sked.txt” and place it either in the Documents directory for your user account, or the same directory the DX ToolBox application file is located in. This must be a plain text file (not RTF or any word processing format). It contains a series of lines of text, which define the station schedule. Each line has multiple fields, separated by a semicolon. You can leave some of these fields blank. The fields are:

Frequency in kHz

Sign on Time, a dash, sign off time, both in UTC

An empty field

The country code for the station

The name of the station

Language code

Target area code

Transmitter site code

End with a semicolon

The fields and codes are described here: <http://eibispace.de/dx/README.TXT>

An example file (with a .bak extension that needs to be removed to be used) is included with the download.

Please understand that you are on your own as far as creating a custom schedule file, I cannot assist with this task.

An example file:

```
12100;2300-0200;;USA;The Station Name;E;NA;fa;  
6320;2000-0200;;HOL;Various Dutch Pirates;E;;;;  
6925;2200-0500;;USA;Various US Pirates;E;;;;  
27700;0000-2400;;;Various Outbender SSTV;E;;;;
```

## Logbook Window

DX ToolBox has a built in logbook. Open it by selecting Logbook from the Windows menu.

A new entry can be added by selecting New Logging from the Edit menu. Enter in the pertinent information:

- Date as MM/DD/YY such as 10/3/17
- UTC time, both start and end, four digits.
- Frequency should of course be entered in kHz.
- The SIO field is actually a text field, so you can enter in SINPO or another signal strength format if you wish.
- Mode can be AM, USB, CW, etc.
- Station is the station name.
- Country is the country.
- Type can be SWBC, Ham, Pirate, Utility, etc.
- Report Sent and QSL received are the dates you sent a reception report and received a QSL, if applicable.
- Program details and notes are free form, for your own use.

Click OK when you are done entering the information.

You can edit an existing logbook entry by double clicking on it. This also gives you the opportunity to delete it, if you wish.

Right clicking an entry will give you a popup menu with options to get a window with other transmissions by the same station, on the same frequency, or from the same country. Note that you can right click entries in this new window as well, to get other related windows. And so on...

Your logbook can be searched, select Search Logbook from the Edit menu while the Logbook window is frontmost. Enter the text you wish to search for in the fields. All of the fields are ANDed together, that is if you enter 9675 into the Frequency search field and AM into the Mode field, then only logs that satisfy both of those will be returned.

The text search fields (Station, Country, Mode, Type, Details, and Notes) perform partial text matches. For example if you search for "Radio" in the Station field, then any logging with "Radio" as part of the text will be returned.

For the Time field, enter in one four digit UTC time, and any logging where the Start and End/Until UTC times contain that time will be entered.

For Date and Frequency, you can enter in one value, or a span using the dash - between them. For example if you enter 9400-9800 for the Frequency, any log with a frequency in that range will be returned.

If the Report sent, no QSL received box is ticked, then logs where a report has been sent, but no QSL received will be displayed. Likewise the QSL received box lets you see logs where a QSL was received. Don't tick both of these boxes, or nothing will be displayed.

The All button can be checked to go back to displaying all logbook entries.

## SWBC Reminders Window

Never forget about an upcoming shortwave broadcast again! Open this window by selecting it from the Windows menu. There's two ways of entering a transmission to be reminded of:

First, select New Reminder from the Edit menu. You'll get a window that allows you to enter in the pertinent information. Be sure to enter time in UTC. You don't need to enter information in all of the fields, such as country, target, language and transmitter location. Then click OK.

Second, shift click an entry in the Shortwave Schedule window. The details will automatically be added to the reminders window.

The reminders window shows a list of upcoming transmissions you want to hear, sorted by time, with those to air next at the top of the list. Broadcasts currently on the air are displayed in bold.

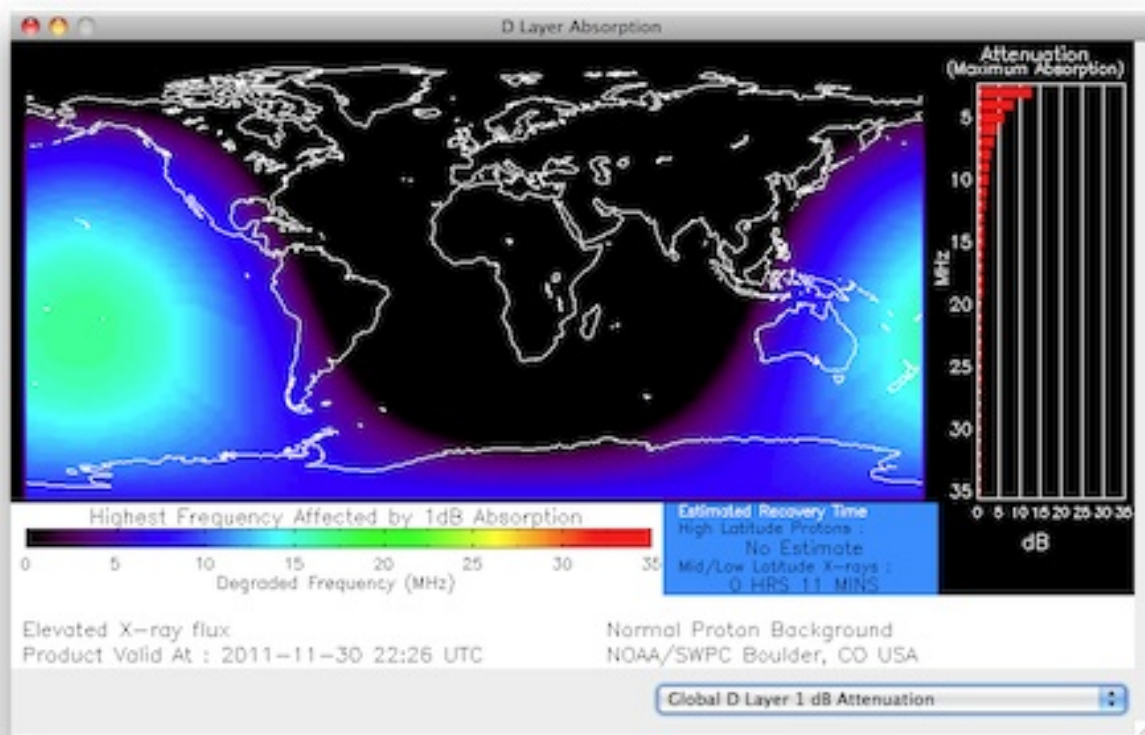
There is an option in the DX ToolBox preferences to alert you via a system notification when any reminded stations go on the air.

Right clicking an entry will give you a popup menu with options to open a logging entry window with many of the fields pre-filled out for you, delete the reminder, or get a window with other transmissions by the same station, on the same frequency, from the same country, in the same language, or to the same target. Note that you can right click entries in this new window as well, to get other related windows. And so on...

## D Layer Absorption Window

This window displays various maps of the Earth, showing the level of D layer absorption at various frequencies. Excessive D layer absorption is caused by elevated x-ray flux levels, often due to a solar flare. It first affects lower frequencies, and then moves up to higher frequencies as the D layer starts to more strongly attenuate radio waves.

One of 21 different maps can be displayed, or “Cycle through images” can be selected to automatically cycle through the maps. Note that these maps will be blank if no absorption events are taking place.





## MUF Calc Window

This window allows you to calculate the estimated MUF based on the current foF2 (maximum vertical incidence reflected frequency for the F2 layer), hmF2 (height of the F2 layer) and the distance between the two locations. In addition, the takeoff angle will be computed.

By selecting the foF2 and hmF2 tabs, maps of their current values around the world will be displayed (assuming you have a working internet connection).

The screenshot shows a macOS-style window titled "MUF Calc Window". It has three tabs: "Calc" (which is selected and highlighted in blue), "foF2", and "hmF2". The main area contains input fields for "foF2:", "hmF2:", and "Distance:", each followed by a text box and a unit label. Below these, the calculated results for "Calc MUF:" and "Takeoff Angle:" are displayed with their respective values and units.

Input	Value	Unit
foF2:	9	MHz
hmF2:	250	km
Distance:	700	km
Calc MUF:	15.5	MHz
Takeoff Angle:	35.5	degrees

## Ionosonde Plot

This window lets you see graphs of ionosonde data from a number of sites around the world. Note that sometimes sites will not have data. Select the site from the first popup menu, then select the type of graph from the second. There are three types:

### foF2:

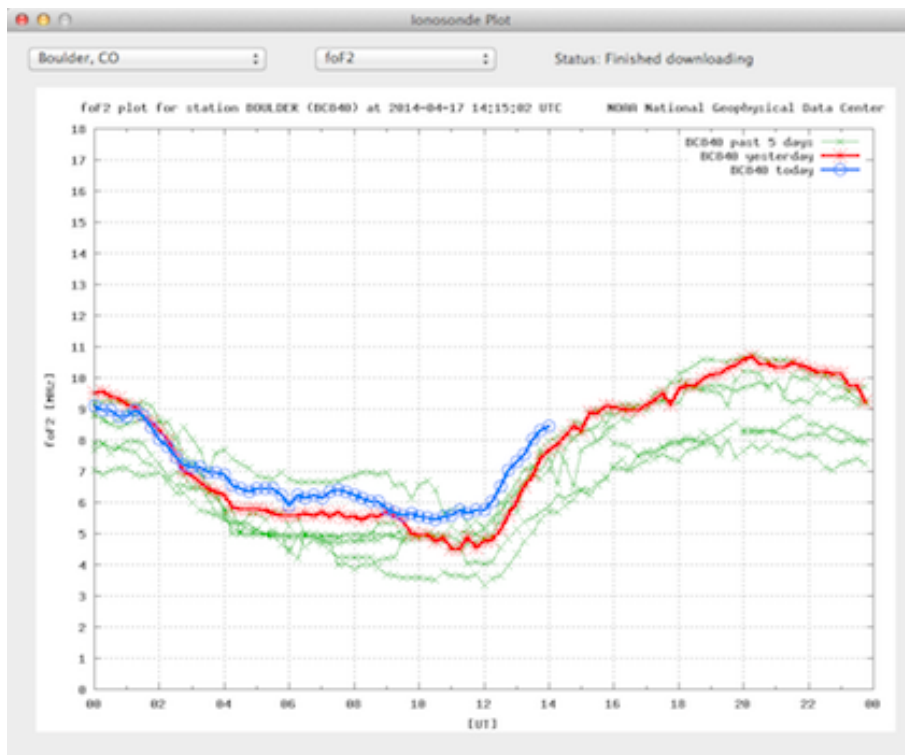
This is a plot of the highest frequency that will be reflected from the F2 layer of ionosphere when transmitted straight up. As the incident angle is decreased, higher frequencies will be reflected, that is, more distant stations can be heard, or alternatively, more distant locations can receive the signal. This effect explains the “skip zone” around a transmitter site.

### f0Es:

This is a plot of the highest frequency that will be reflected from the E layer of the ionosphere.

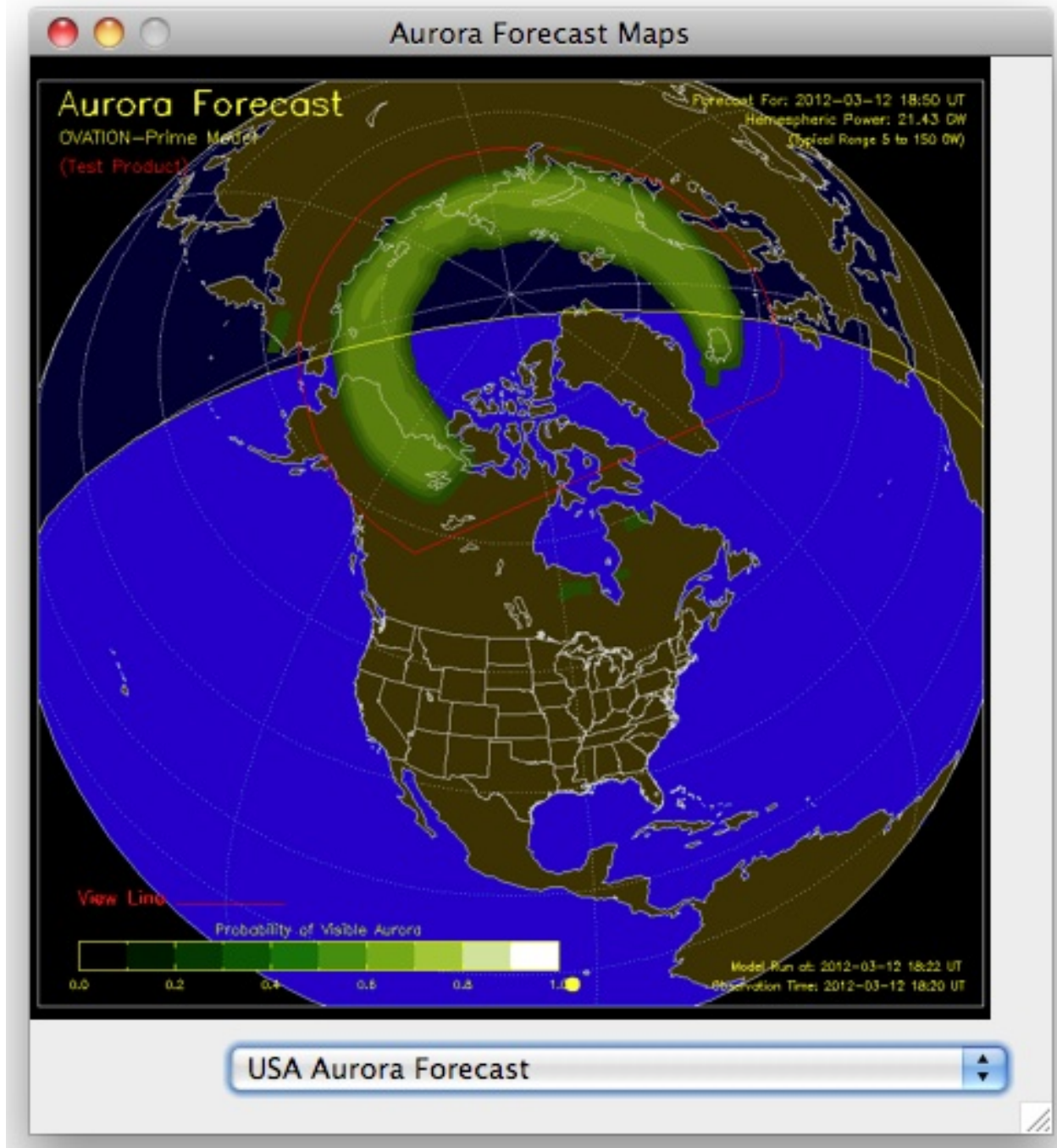
### hmF2:

This is a plot of the height of the F2 layer of the ionosphere. Along with the foF2 value, it can be used to calculate the MUF for a given path. See the MUF Calc Window above.



## Aurora Forecast Maps Window

This window allows you to view aurora forecast maps for various parts of the world. You can select one map to view, or have DX ToolBox cycle through the various maps.



## Grid Calculations

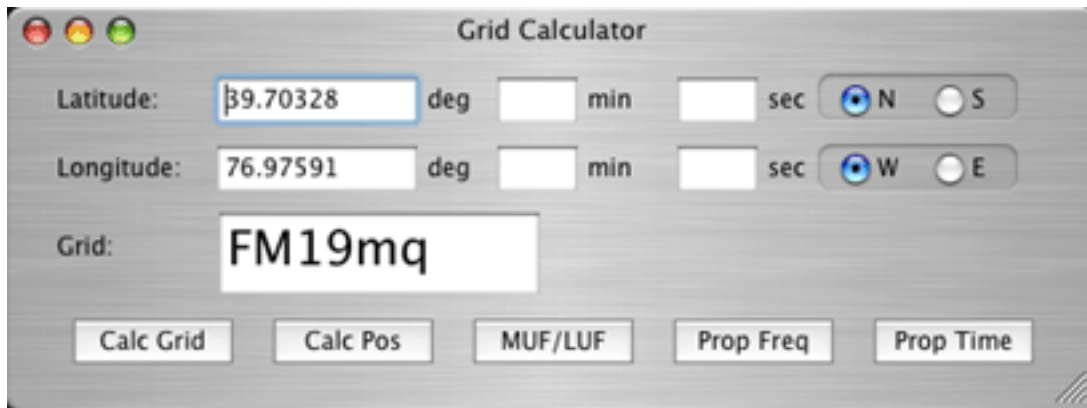
The Grid Calculator lets you determine the grid square from the longitude and latitude. You can enter them as decimal numbers as shown in the above example, or enter integer values for the degrees, minutes, and seconds. Then click on the Calc Grid button.

You can also enter in the grid location, and calculate the latitude and longitude for that grid by clicking on the Calc Pos button.

Each of the other three buttons will display one of the propagation tool windows, with the propagation conditions forecast for the path from your location to the one specified in the Grid Calculator.

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.

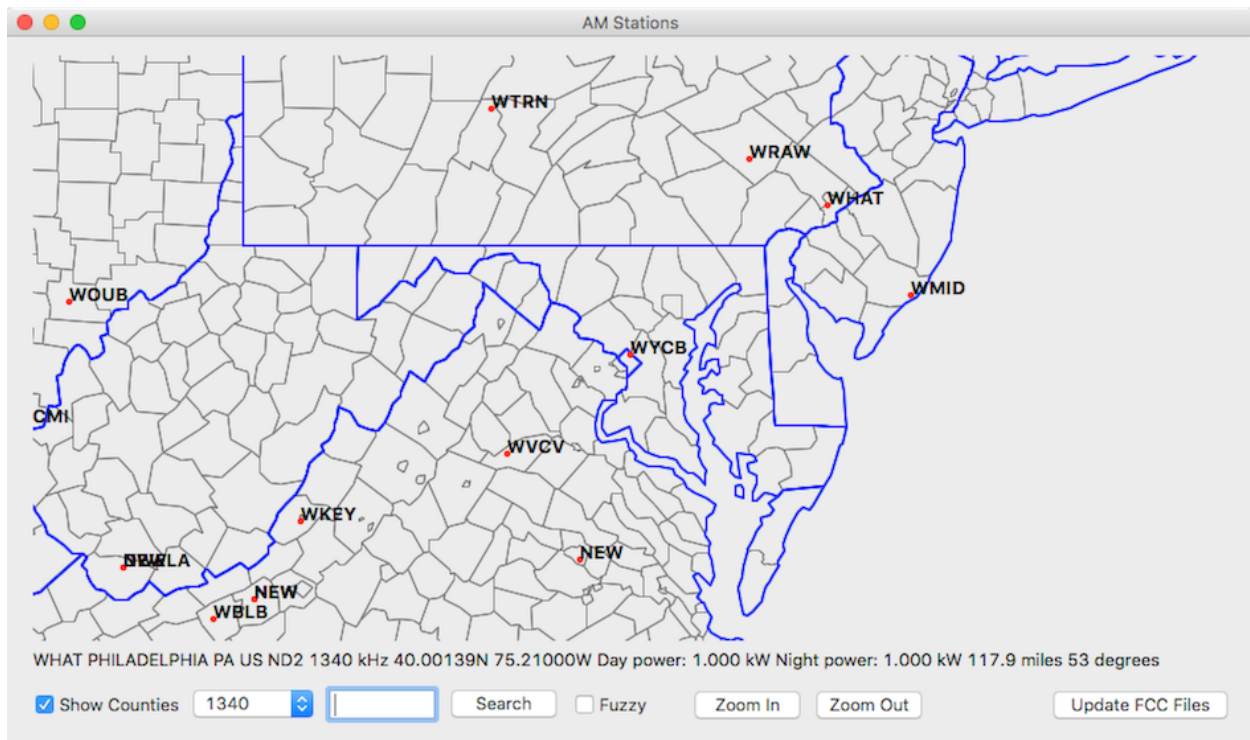
You can type a 4 digit grid square into the text box and click the **Jump To** button, and the map will be re-centered (roughly) at that grid square location.



The screenshot shows a window titled "Grid Calculator" with a light gray background. At the top left are three standard macOS window control buttons (red, yellow, green). The interface includes the following elements:

- Latitude:** A text box containing "39.70328", followed by "deg", an empty "min" box, an empty "sec" box, and radio buttons for "N" (selected) and "S".
- Longitude:** A text box containing "76.97591", followed by "deg", an empty "min" box, an empty "sec" box, and radio buttons for "W" (selected) and "E".
- Grid:** A large text box containing "FM19mq".
- Buttons:** A row of five buttons at the bottom: "Calc Grid", "Calc Pos", "MUF/LUF", "Prop Freq", and "Prop Time".

## AM Stations Map



This uses the FCC database to display AM (MW) stations on a map, as well some information about them. The app has a built in feature to download the zipped file from the FCC (it's pretty large, about 150 MB) and unzip and parse it into a file. This file will be used until the next time you decide to update and download the FCC file. The first time you use this window, you will need to click on the Update FCC Files button to download the FCC database. You can re-download the database again whenever you wish to refresh it, they often update it daily.

Double clicking on a station on the map will bring up a line of text with information about that station. You can also search for stations. Type in the callsign, click search, and if the station can be found, the map will jump to it.

You can also do a "fuzzy" search. Say you heard a callsign, but there's the chance you misheard one of the letters. C sounds a lot like E, for example. With the fuzzy search option enabled, similar letters will be checked as well. A list of all possible matching stations for the specified frequency will be displayed. You can then click on each station to locate it on a map. Note that you must have the correct frequency selected from the popup menu when doing a fuzzy search, only that frequency will be checked.

The FCC database includes foreign stations (although I am not sure how accurate the data is). I've spotted a few obvious errors in their data even for US stations, but it seems to be mostly OK. If you see errors in the station information, please direct your complaints to the FCC, not me, I can't edit their files.

Be sure to set your location in the DX ToolBox preferences before opening this window, so it centers on your location, and uses that when computing distance and bearing to the station.

If you have SdrDx interfacing enabled, you can select a frequency in this window, and SdrDx will be retuned to that frequency. Likewise, if you tune a frequency in SdrDx, the selected frequency in this window will update.

## Beacons

kHz	ID	LSB	USB	Sec	Format	QTH	State	ITU	GridSq	Watts	Last heard	Num	km	Deg
315	AT	1023	1022	8.6		'Bruny' Dayton	OH	USA	EM79tu		2016-09-18	47	636	273
315	D5AJ7		1020	8.07		Noble Bob Douglas		XUN	EL47ob		2015-10-19	2	1902	226
315	HO			20.1		Wallis		WAL	AH16vs		2016-09-28	285	11730	265
315	UBR	1017	1078	8.751		Cayo Las Brujas		CUB	FL02ko		2016-02-17	32	1915	186
314.5	SAC	400	400	5.4		UnKnown		XUN			2014-09-25	6		
315	BL	1006	1050	6.9		Salinopolis (PA)		BRA	GI69hj	500	2009-04-27	9	5396	138
315	M		400		DA3ID	Sisters Islets Light Station	BC	CAN	CN79sl	100	1990-11-01	2	3847	302
315	UDR	651	473	3.8	UNID	XUN		XUN			2008-01-25	3		
315	UPI					Barranca De Upia (Boya...		CLM	FJ34mn	1000	1997-01-20	1	3930	173
315	USR							CUB	FL01or		1999-03-24	3	2008	185

Heard in: TX

Notes: Drill rig

DX Toolbox can display lists of beacons from the online NDB WebLog. These beacons include NDBs, as well as ham beacons, and other beacons. Open this window by selecting Beacons from the Windows menu. In order to use this window, you first need to download the appropriate file from that website. Go to one of these URLs:

[http://www.classaxe.com/dx/ndb/rna/signal\\_list](http://www.classaxe.com/dx/ndb/rna/signal_list) - for beacons heard in North America.

[http://www.classaxe.com/dx/ndb/reu/signal\\_list](http://www.classaxe.com/dx/ndb/reu/signal_list) - for beacons heard in Europe.

[http://www.classaxe.com/dx/ndb/rww/signal\\_list](http://www.classaxe.com/dx/ndb/rww/signal_list) - for beacons heard anywhere in the World.

Use the Customized RNA Report section near the top to configure what you want to see. Usually the defaults work well, except you may want to check additional boxes besides NDB, such as Ham and perhaps Other? You need to experiment.

Then go to the bottom of the page and click the button that says “All RNA > Excel” (or “All REU > Excel” or “All RWW > Excel” depending on which page you used). A file will download. While this file has an .xls extension, it is not a spreadsheet file, it is just html.

DX ToolBox will look for this file in three locations, place it in one of them:

- The same directory as DX ToolBox (the EXE or .app file itself)
- \Users\UserName\AppData\Roaming\ (Windows) or /Users/UserName/Library/Application Support (Mac)
- The Documents directory for your user account

It should open the file you have placed in one of these locations, or complain if it could not find the file.

There's a few ways to use the Beacon window. You can type a frequency into the box in the upper left corner, and press enter or click the Set button, or use the - and + buttons, and see a list of all beacons on that frequency. You can click on a beacon, and any additional information about that beacon will be displayed at the bottom of the window.

Or you can put a frequency in the second box, and type part of a callsign, and any beacon that matches that partial callsign, and is on the specified frequency (either with its carrier or either sideband) will appear in the list.

Right click a beacon from the list, and you can log it. Either at the current UTC time, or with a date and time you specify (handy if you are going through previous recordings).

Most of the fields are self explanatory, the LSB and USB fields are the actual audio frequencies of the LSB and USB tones for NDB beacons that transmit in MCW mode. Sec is the repetition period in seconds. Num is the number of loggings for that beacon. Note that you need to have your location correctly set in DX ToolBox for the distance (km) and azimuth (Deg) fields to be valid.

If you are running SdrDx, and have configured the UDP communications settings in that app as well as DX ToolBox, they will interact, so if you tune a frequency in SdrDx, the window in DX ToolBox will update to the new frequency, likewise you can change it in the window, and control SdrDx.



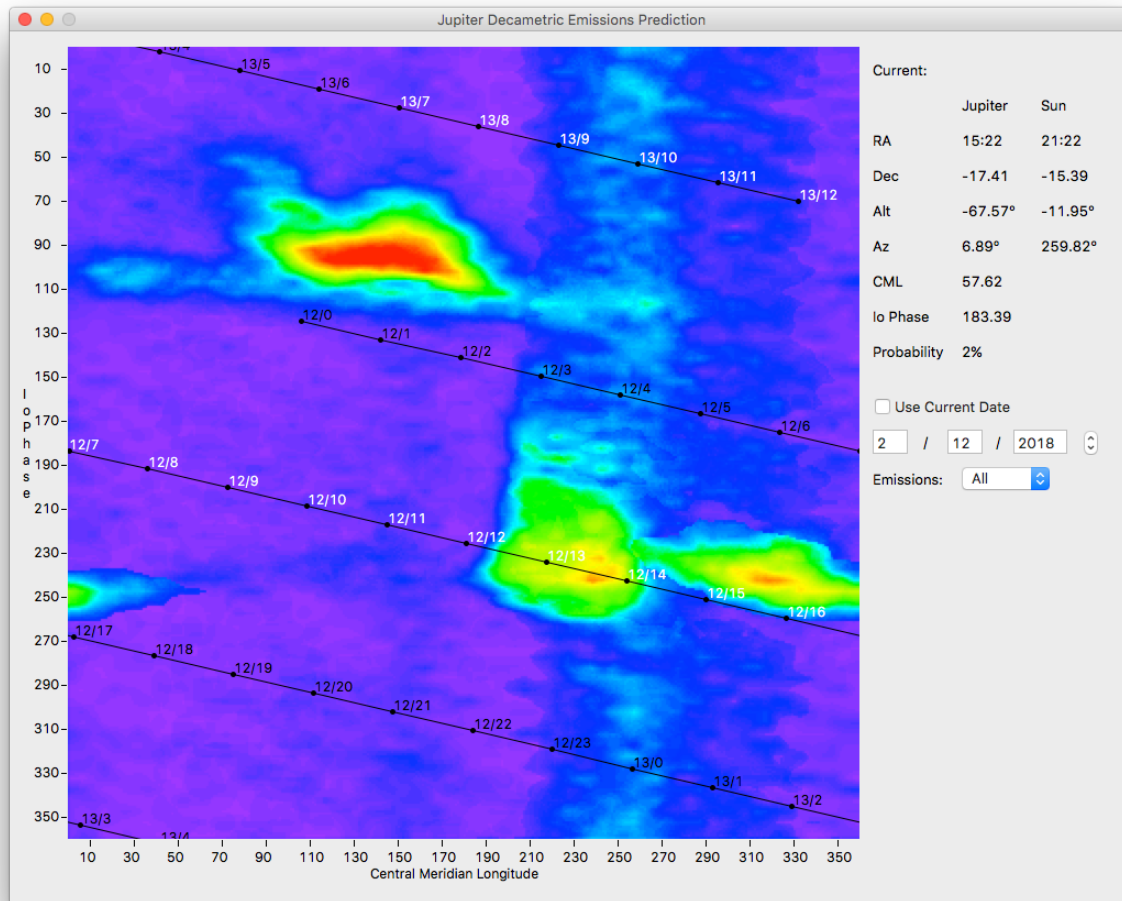
## **NDB Beacon Logs and Map**

Under the Windows menu are two items for viewing your logs of NDBs.

NDB Beacon Logs brings up the logs of beacons. You enter logs via the NDB Beacons window (described in the previous section). You can delete a log by right clicking on it, and selecting delete.

NDB Beacon Logs Map brings up a map showing all your logged NDBs. Each NDB is only displayed once on the map. You can scroll and zoom. You can also specify a single date to display, or a range of dates. Use a dash between the two dates, such as: 12/3/2017-12/10/2017

## Jupiter Decametric Emissions (Radio Bursts) Prediction



Jupiter can be a prolific source of radio signals, which can be received right here on Earth, even with modest equipment. These radio bursts are more likely when a certain longitude of Jupiter is facing the Earth, as well as the location of Jupiter's moon Io in orbit around the planet. This window in DX ToolBox tells you when radio bursts are more likely. These bursts are heard between 4 and 40 MHz. They peak at around 8 MHz, most observations are done in the 15 to 25 MHz range, as the same ionosphere which reflects shortwave radio signal here on Earth can also block lower frequency signals from Jupiter.

The right side of the window has a table of numbers, giving the position of Jupiter and the Sun, both as Right Ascension and Declination, as well as the altitude and azimuth angles for your location. (Note that these values are quickly calculated to accuracies suitable for casual radio observation, not exact values for astronomical purposes) Below that, the Central Meridian Longitude of Jupiter is displayed, as well as the phase of Io in orbit around Jupiter, and the current probability of a radio storm.

To the left, an X-Y scatter plot is displayed, with the CML as the X axis, the phase of Io as the Y axis, and the probability of a radio burst as the color. Superimposed on this plot are lines showing what these values will be for various dates and times. The color of the plot tells you what the probability will be, it is coded much like an SDR waterfall, purple and blue are small values, green higher, yellow and orange higher still, and red the highest of all. The two numbers next to each dot on the line are the day of the month and hour of the day (UTC) for that point. The day is shown because more than one day's worth of values may be plotted. When the numbers are white, Jupiter is above your horizon. When they are black, it is below your horizon and not visible (nor will you hear radio bursts).

Looking at the sample graph above, data is plotted for February 12 and 13. Examine the period on the 12th from around 1200 to 1400 UTC, that is, markers 12/12 to 12/14. This period is one with some level of radio activity possible. If you move your mouse cursor over the plot, the CML, phase, and probability will be displayed on the right side of the window.

If the Use Current Date checkbox is ticked, the plot will show the current information. Otherwise, you can change the date to look ahead to see when radio bursts may be likely.

Normally, leave the Emissions popup menu set to All, so that all types of bursts will be shown. If you are interested in seeing probabilities for only some types of bursts, you can select that type.

The combination of ingredients necessary for reception of radio bursts from Jupiter are:

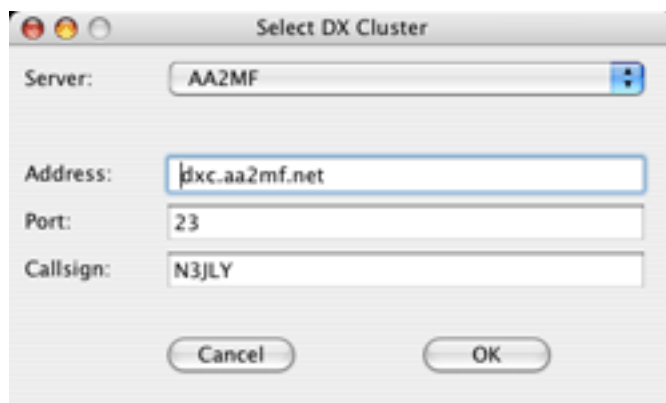
1. The CML of Jupiter and phase of Io must be in one of the combinations that makes bursts likely.
2. Jupiter must be visible at your location, and ideally high in the sky.
3. Ideally it is night, or the Sun is low in the sky.
4. Luck!

## DX Cluster

DX Toolbox can let you log into DX Clusters. Select DX Cluster from the Windows menu. Pick one of the cluster servers from the popup menu, which will populate the Address and Port fields, or enter this information in yourself if the server is not in the list. Make sure your Callsign is entered in that field, it is automatically set if you have set your Callsign in the DX Toolbox Preferences.

Click OK and you will get a window showing the connection to the Cluster.

Normally you will be automatically logged into the cluster, otherwise you will need to type in your Callsign. Type into the box at the bottom of the window, and hit enter to have what you've typed sent to the cluster server.



If you would like to add a new cluster to the list, enter in the address and port number, then click the Add button.

```
AC0X Cluster
QRX ... # 1 in line
*** Connected to: AC0X at 127.0.0.1
Welcome to the AC0X AR-Cluster node Telnet port!
Please enter your call:

Hello Christopher (N3JLY)
Welcome to the W0TDX AR-Cluster Node, serving the
Twin Cities of Minneapolis/St. Paul and the
surrounding area at 1200 baud on 144.930 MHz
via N0AT in Plymouth on 144.970 and 223.440 MHz
and the rest of the world via Telnet to w0tdx.no-ip.com.
Support this node through a membership in TCDXA.
Information at http://www.tcdxa.org.
* AR User client software by Lee Sawkins, VE7CC.
* Free download at http://www.bcdxc.org/ve7cc/default.htm
128 nodes, 10 local / 648 total users Uptime 2 08:34
N3JLY de AC0X 10-Oct 2124Z arc >
DX de PE1IWT: 2365000.0 ON5KTO datv <> palmb 170km!!! ON 2124Z PA
```

## 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.

Black Cat Systems  
4708 Trail Court Westminster, MD 21158

email: [info@blackcatsystems.com](mailto:info@blackcatsystems.com)

Web: <http://www.blackcatsystems.com/software/dxtoolbox.html>

## 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 PayPal. They handle our credit card payment processing.

Please make sure you provide a valid 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.

## 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

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

Maryland Residents please add 6% sales tax.

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

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

City: \_\_\_\_\_ State: \_\_\_\_\_ Zip or Postal

Code: \_\_\_\_\_ Country: \_\_\_\_\_

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

Please send my registration code to:

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. Maryland residents add 6% sales tax.

**Mail this form, along with payment, to:**

**Black Cat Systems**

**4708 Trail Court Westminster, MD 21158 USA**



## Revision History

February 9, 2018 - 5.1.0:

Added prediction of Jupiter radio bursts.

Now checks for active internet connection at launch.

Several bug fixes.

January 3, 2018 - 5.0.0:

Added NDB log, and log map windows.

Added search window for logbook.

Added SWBC logbook.

Added SWBC reminders window.

Added other transmissions with the same frequency/station/language/country/target window.

September 26, 2017 - 4.8.1:

Improvements to the SWBC Schedules window.

September 1, 2017 - 4.8.0:

Updates for changes to several data sources.

December 5, 2016 - 4.7.1:

Updates for changes to some NOAA SWPC data.

October 10, 2016 - 4.7.0:

Updates for macOS 10.12 Sierra.

Added preferences option to check for updates.

Added Beacons window.

Added a checkbox to the SWBC Schedule window to only display stations currently on the air.

The language name is now displayed in the SWBC Schedule window.

The transmitter site is now displayed in the SWBC Schedule window.

You can add your own entries to the SWBC Schedule window.

Added interfacing support for SdrDx in the AM Stations window.

Added option for using a TCP connection to SdrDx, in addition to UDP.

June 28, 2016 - 4.6.3:

Fixed a bug that could cause a crash when adding a new DX cluster server.

Added additional stations to Ionosonde Plot window

February 22, 2016 - 4.6.0:

Added AM Station Map window.

Added additional stations to Ionosonde Plot window

April 17, 2014 - 4.3.0:

Added Ionosonde Plot window

July 12, 2012 - 4.1.1: Packet map removed

July 12, 2012 - 4.1.1:

The SWBC schedule window updates periodically when in On Now mode.

Fixed a bug in the DX Cluster window, the enter button got lost when the window was resized.

June 15, 2012 - 4.1.0:

Added SdrDx support to the SWBC Schedules window.

March 12, 2012 - 4.0.0:

Added Aurora Forecast Map window.

January 13, 2012 - 3.9.0:

Added D Layer Absorption window.

December 1, 2011 - 3.8.0:

Added D Layer Absorption window.

October 27, 2011 - 3.7.0:

Added SWBC Schedule window.

September 22, 2011 - 3.6.4:

Additional changes to where temporary files are created. Sorting of user-entered locations.

August 5, 2010 - 3.6.2:

Changes to where temporary files are created.

March 4, 2010 - 3.6.1:

Corrected display of GOES X-Ray data.

DX Cluster - Fixed a bug under Windows, sometimes the return key could not be used.

September 8, 2009 - 3.6.0:

Can add servers to the DX Cluster window.

Propagation map updates in real time as the frequency slider is moved. Corrected several URLs in the Images Window.

June 11, 2009 - 3.5.0:

Added the VHF Propagation Map.

Changed X-Ray Flux display to reflect only one operational satellite.

March 20, 2008 - 3.3.0:

Added HTTP Proxy support.

Added a graph of the Planetary Kp Index.

Can now copy the Grayline map to the clipboard.

Updated for the new Space Environment Center URL which affects data for the Proton and Electron Flux graphs.

January 31, 2008 - 3.2.0:

Moving the cursor over the map in the grayline or propagation map window will automatically update the three propagation forecast windows.

Window positions automatically saved and restored.

Dock updates now working again (Mac OS X).

Longitude and Latitude in MUF Map title text abbreviated to fit.

Checks to see if running on a write-only volume, like a disk image; if so, alerts you to move the program to your hard drive.

December 6, 2007 - 3.1.4:

Update for new solar wind and mag field graph URLs.

Added estimated S unit values to propagation forecasting tools.

Corrected a bug with the three propagation forecasting windows, the initial values for some fields were not being used.

October 6, 2007 - 3.1.2:

Updated for the new Space Environment Center URL which affects data for the X-Ray Flux and Reports.

September 27, 2007 - 3.1.1:

Fixed a bug with country longitude values being negative.

September 27, 2007 - 3.1.0:

Country/Prefix locations added to propagation forecasting windows. Updated location of the VE8AT beacon.

Deletes any remaining temporary files when quitting the program.

May 24, 2007 - 3.0.0:

Universal Binary release for Intel Mac OS X systems.

Better parsing of x-ray flux data.

Fixed a bug that could cause a crash if no location was chosen in one of the three propagation path forecasting windows.

December 7, 2006 - 2.7.3:

Update to correctly display GOES satellite Solar Flux data due to a change in how the data is made available by the Space Environment Center.

May 15, 2006 - 2.7.2:

Fixed a bug which caused some images to look distorted when running under Windows. Fixed a bug which caused the DX Cluster window to not show the list of servers when running under Windows.

May 6, 2006 - 2.7.1:

Minor bugfix with registration message.

May 2, 2006 - 2.7.0:

Grid Calculator tool can calculate propagation conditions between your location and the specified grid location.

Added feature to import a list of locations from a text file.

Default frequency and transmitter power values are now saved and shared between the various propagation forecasting tools.

Fixed a bug with garbled text in the Report Window.

February 16, 2006 - 2.6.0:

Added DX Cluster Window.

Added Proton and Electron Flux graphs

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 display 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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