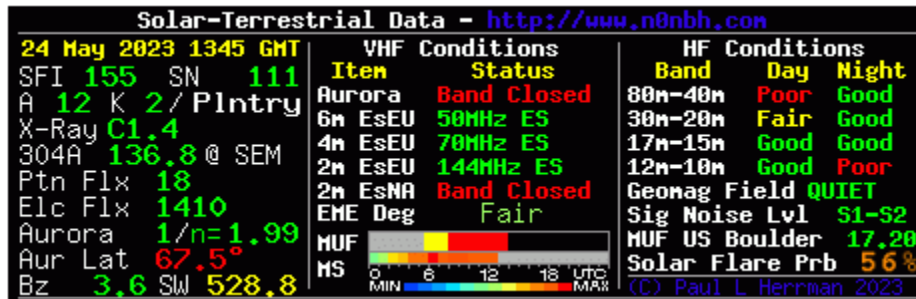


VOACAP: On-line Propagation Prediction Tool

Jim Edmondson, N5JGE

Most hams are probably familiar with the space weather propagation widgets (see below) and may consult them when getting on the air. Many hams embed them on their QRZ or other webpages. These tools are useful in a general sense to see which bands might be open and whether solar emissions are adversely affecting propagation. They are based on measured ionospheric and space weather data and may provide predictions for a few hours ahead of the current time.



VOACAP is an acronym for Voice of America Coverage Analysis Program. It is used by the VOA to determine broadcast schedules, antenna choices, power levels, etc. to target programming to various regions of the world. Nowadays, VOA over-the-air programming is quite limited, so I am not sure how much they actually use it now.

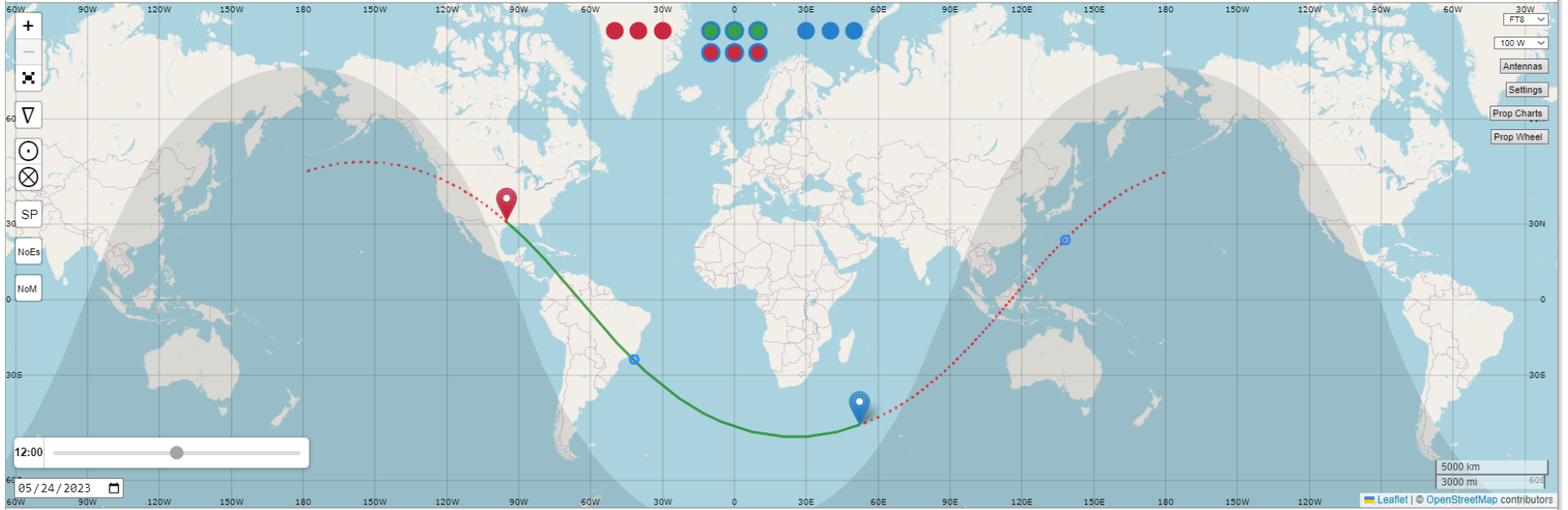
VOACAP is a propagation prediction on steroids! It provides point-to-point prediction for specific bands, times / dates, modes, power levels, antennas and many other factors! On the next page is a full screenshot of the VOACAP webpage ([VOACAP-HF](#)). The screenshot gives you some idea of the options and capabilities of this tool. The details are probably hard to read in print, so I encourage you to click the link above and follow along on-line.

At the upper left of the page, you select the transmit and receive locations. I have set my 6-digit grid square and selected Crozet Island from the DXCC dropdown list, respectively. The red map pin indicates the transmitter and the blue map pin indicates the receiver. The red, blue and green dots allow you to easily select sunrise, sunset, and midnight at the transmitter (red dots), receiver (blue dots) or midpoint (dots with blue borders). The top row of dots (green / blue) for the midpoint is for the short path and the bottom row (red / blue) is for the long path.

At the center left are several buttons mainly to adjust how the map is displayed, to store locations, choose short / long path, etc. At the bottom left corner of the graph frame, you can select time of day on the slider and date via the calendar popup. In the upper right, you can set "Mode" and "Power" via simple dropdowns. The "Antennas", "Settings", "Prop Charts" and "Prop Wheel" buttons open a slide out to the left of the map frame. For Antennas, you can set the type of antenna per band by selecting from dropdown lists. Verticals, dipoles and Yagi's at various heights are listed. For Settings, I'll refer you to the excellent on-line user manual ([VOACAP-HF User Manual](#)) as these are too involved to explain in a short article.

VOACAP Online for Ham Radio – 14:46:09 UTC (09:46 AM)

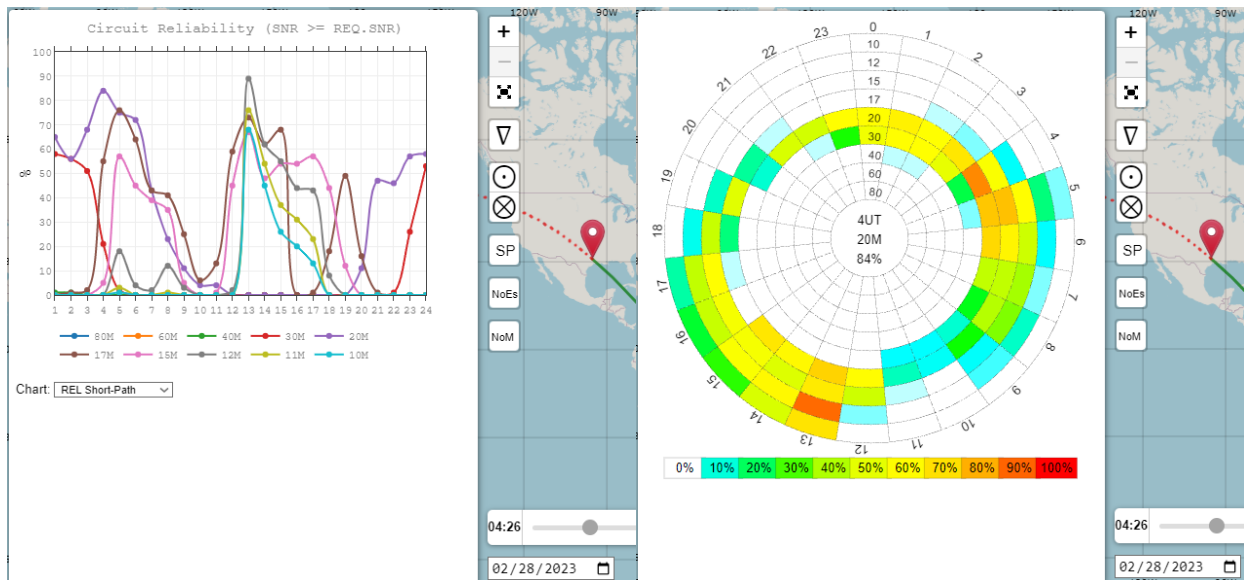
Select TX QTH: << Select a location >> or set Grid: EM21hd or Latitude: 31.1460 Longitude: -95.3750
Select RX QTH: FT5W Crozet or set Grid: LE53wn or Latitude: -46.4300 Longitude: 51.8600



TX: 31.15, -95.38 | RX: -46.43, 51.86 | Short: 16739 km — 10401 mi | 131° — 250° | Mid: -24.3487, -41.9871 | Long: 23269 km — 14459 mi | 311° — 70° | Mid: 24.3487, 138.0129

- Band-by-band
- Best FREQ
- REL | SDBW | SNR
- SIG PD
- SNR PD
- Total
- Year
- QSO Window
- Season
- Antenna
- TO Angle
- Planner
- Planner DIY
- Distance
- P2P Grayline
- Sun M
- Sun Y
- MUF Map
- REL Map
- SDBW Map
- DXCC Grayline
- Space WX
- EME

The Prop Charts and Prop Wheel present the main outputs that a casual user would want to see and are shown below for February 28, 2023 at 0426UTC. Why did I choose this date and time? Because that is when I made a good contact with FT8WW on Crozet Island. The chart and wheel show the same information but in different formats. The probability of making a contact in the early morning UTC between these locations was best on 20M. At 0400UTC probability was 84% and at 0500UTC it was 75%. My contact was made on 20M and I recall watching FT8WW's S/N ratio increase from midnight onwards (as VOACAP predicts) until we made the contact. I also made a contact on February 17, 2023 at 0317UTC when the probability was between 68% (0300UTC) and 84% (0400UTC).



The row of green buttons below the map frame opens new windows with a tremendous amount of data. For example, the “Year” button provides tables of average propagation probabilities by band and time of day for each month of the current year (via short or long path as selected). The data can be downloaded as a csv file for further analysis in a spreadsheet tool. The “Best Frequencies” button provides a table of the 3 best frequencies by time of day for a given month and year (via short or long path as selected).

I have used this tool several times and it appears to be quite helpful in deciding when to chase specific DX stations. It can also be useful for many operating situations like DXCC, grid chasing, county hunting, and any kind of HF award chasing. There are a lot of options to select and see how propagation is affected, so it can be a great learning tool as well – check it out!