

# USING PROPAGATION PREDICTION OF HF DXING VOACAP

LARA Club Meeting April 18, 2020

By Perry Abernethy – NE5ET

## WHAT IS VOACAP?

- ▶ [VOACAP Quick Guide: HF Propagation Prediction and HF Propagation Prediction and Ionospheric Communications Analysis](#)
- ▶ <https://www.voacap.com>
- ▶ **VOACAP (Voice of America Coverage Analysis** Program) is free professional high-frequency (HF) propagation prediction software from NTIA / ITS, originally developed for **Voice of America (VOA)**.
- ▶ VOACAP is an improved and corrected version of **IONCAP**, retaining all of the theory as put forth by **John Lloyd, George Haydon, Donald Lucas** and **Larry Teeters** in the 1975-1985 time-frame with modifications which were suggested/approved by **George Lane, Donald Lucas, George Haydon** and **A. D. Spaulding** (a world authority on HF radio noise predictions).

## OVERVIEW:

- ▶ VOACAP is the result of **50+ years** of U.S. HF research and development
- ▶ Considered by many as **the most professional HF system performance prediction tool** available on the market
- ▶ Used currently for HF frequency planning by **Voice of America** and a number of other international HF broadcasters and institutions all over the world.
- ▶ **Easy to use** graphical user interface and, for advanced users, powerful command line options
- ▶ Detailed Point-to-Point graphs and Area Coverage maps for **22 parameters** of circuit quality such as
  - ▶ SNR (Signal-to-Noise Ratio)
  - ▶ Reliability
  - ▶ Required Power Gain
  - ▶ Signal Power
  - ▶ MUF
  - ▶ Takeoff/Arrival Angle, and more
- ▶ **Accurate predictions** of the distribution of Worldwide Atmospheric and Man-made **radio noise** using the latest ITU-R recommendations and a unique combination methodology developed by the late A. D. Spaulding, a world authority in the modeling of noise distributions
- ▶ **Detailed hourly and 24-hour predictions** for the entire HF spectrum [2 to 30 MHz] with user assigned frequencies, such as
  - ▶ **Point-to-Point Performance vs Distance** at the given hour for the given parameter at one or all user assigned frequencies
  - ▶ **Point-to-Point Performance vs Time** for the given parameter at one or all user assigned frequencies on the 24-hour scale



### Topics

- Spectrum Management
- Broadband
- Internet Policy
- Domain Name System
- Public Safety
- Grants
- Institute for Telecommunication Sciences
- Data Central

### Our Mission

NTIA is the Executive Branch agency that is principally responsible for advising the President on telecommunications and information policy issues. NTIA's programs and policymaking focus largely on expanding broadband Internet access and adoption in America, expanding the use of spectrum by all users, and ensuring that the Internet remains an engine for continued innovation and economic growth.



### What's New at NTIA

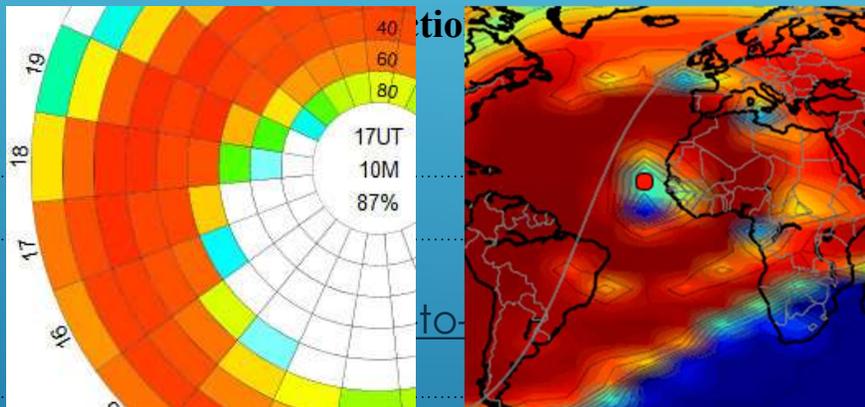
- Blog** 03/25/2020  
**Progress Report: American Broadband Initiative Turns One**  
Topics: American Broadband Initiative Broadband
- Federal Register Notice** 03/18/2020  
**Notice of 04/15/2020 Multistakeholder Process on Promoting Software Component Transparency Meeting**
- Press Release** 03/12/2020  
**NTIA Statement on FirstNet Board Naming Ed Parkinson as Executive Director**  
Topics: FirstNet Public Safety
- Other Publication** 03/03/2020  
**NTIA Software Component Transparency**  
Topics: Cybersecurity Internet Policy Task Force Internet of Things Internet Policy

### Featured Initiatives

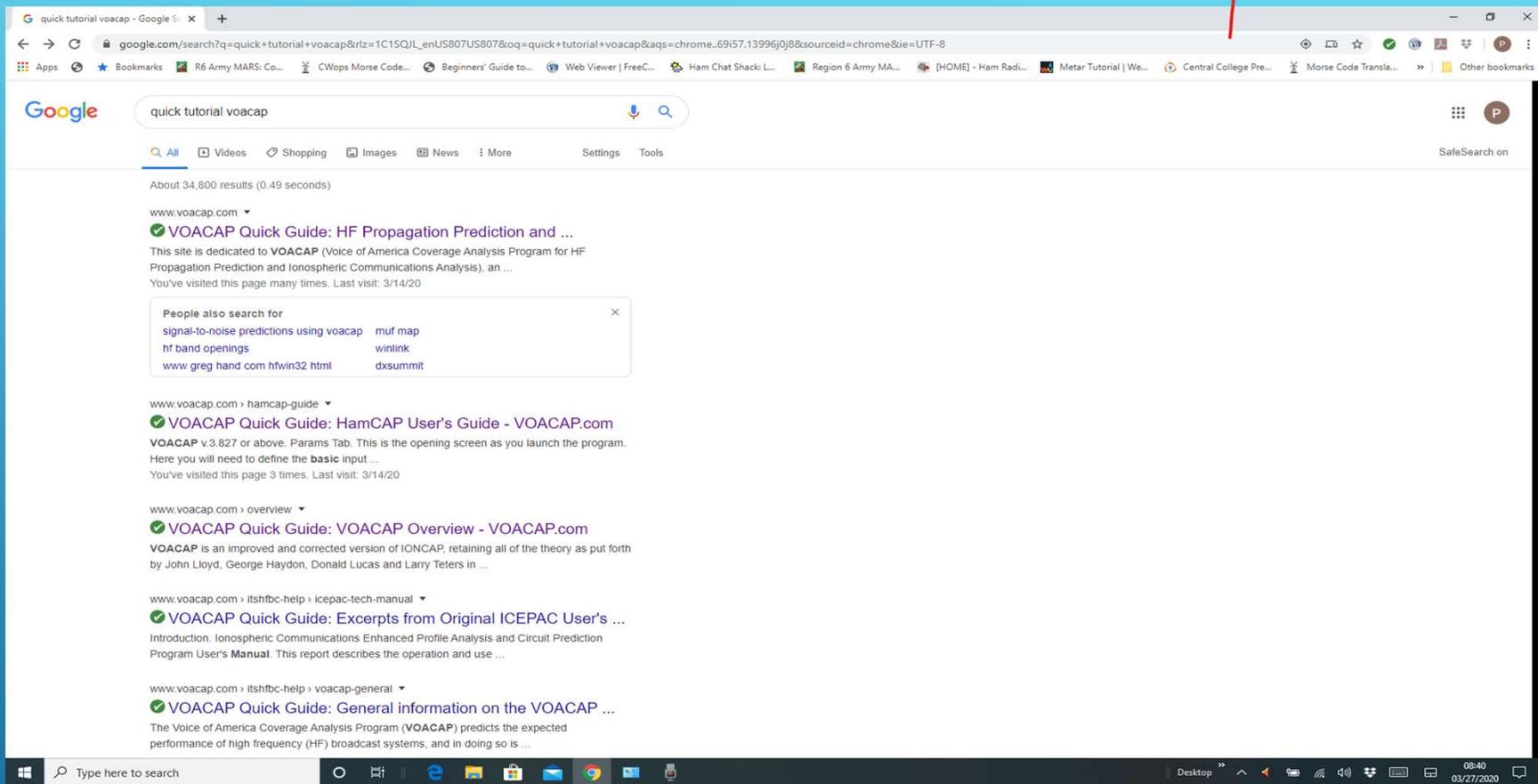
- National Spectrum Strategy
- BroadbandUSA
- Cybersecurity
- National Broadband Map



# BRIEFLY



POINT TO POINT AND  
COVERAGE AREA MAPS  
Maps



FIRST, GO TO GOOGLE: " QUICK TUTORIAL VOACAP"

VOACAP Quick Guide: HF Propa... x +

voacap.com

## VOACAP Quick Guide

HF Propagation Prediction and Ionospheric Communications Analysis

by Jari Perkiömäki, OH6BG/OG6G

### What is VOACAP?

[VOACAP \(Voice of America Coverage Analysis Program\)](#) is free professional high-frequency (HF) propagation prediction software from NTIA/ITS, originally developed for Voice of America (VOA).

This 'work-in-progress' guide should get you well started with the software. A more comprehensive discussion about the finer details of using the software can be found in George Lane's book [Signal-to-Noise Predictions Using VOACAP: A User's Guide](#). The book is now available on CD-ROM.

There is now also "[The Official VOACAP Blog](#)" - well, it's not too official.

NOTE: Running automated scripts to access VOACAP services is strictly prohibited unless agreed upon in advance with the VOACAP site owners.

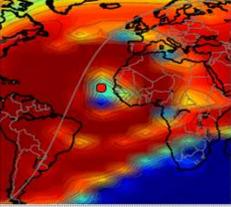
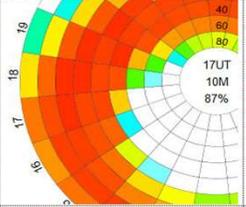
**Follow me on Twitter for the latest news**

If you wish to keep abreast of the latest developments on my site, follow me on [Twitter](#).

**Real Propagation Visualized with FT8 Data**

Explore [the 50,000+ real-life propagation charts](#) from one ITU zone to another ITU zone over the months of 2017-2019!

### VOACAP Online Prediction Services



[Point-to-Point Predictions](#)

[Coverage Area Maps](#)

[11M Point-to-Point Predictions](#)

[11M Coverage Area Maps](#)

15M SP	01	02	03	04	05	06	07	08	09	10	11
01 KL7											
no vuv											

VKOEK HEARD ISL											
KP02 SD to VKOEK HEARD (via SP, Mar 2016)											
01	02	03	04	05	06	07	08	09	10	11	12

Type here to search

08:45 03/27/2020

THEN CLICK ON "POINT TO POINT PREDICTIONS"

VOACAP Quick Guide: HF Propa... x VOACAP Online HF Predictions x +

voacap.com/hf/

**VOACAP Online HF Predictions (Amateur Radio) – 13:50:39 UTC (08:50 AM)**

Select TX QTH: << Select a location >> or set Grid: EM13kd or Latitude: 33.1362 Longitude: -97.0821  
Select RX QTH: << Select a location >> or set Grid: IN99mj or Latitude: 49.3884 Longitude: -0.9812

The map displays a world map with a grid. A red location pin is placed in the United States (TX: 33.14, -97.08) and a blue location pin is placed in Europe (RX: 49.39, -0.98). A solid green line represents the direct path between the two locations. A dashed red line shows a curved path representing HF propagation, starting from the TX location, curving over the North Pole, and ending at the RX location. The map includes a scale bar (5000 km / 3000 mi) and a time slider set to 13:50. The date is 03/27/2020. The map also shows various colored dots representing other stations or locations.

TX: 33.14, -97.08 | RX: 49.39, -0.98 | Short: 7699 km — 4784 mi | 44° — 297° | Mid: 52.4729, -56.9418 | Long: 32309 km — 20076 mi | 224° — 117° | Mid: -52.4729, 123.0582

Band-by-band Best FREQ REL & SDBW SIG PD SNR PD NumTel All-year QSO Window Season Planner P2P Grayline Distance REL Map SDBW Map DXCC Grayline EME

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Type here to search Desktop 08:50 03/27/2020

FOR COMPLETE “USERS MANUAL” INSTRUCTIONS GO  
BOTTOM OF PAGE IN SMALL PRINT

# The Official VOACAP Blog

All things - even vaguely - related to VOACAP, Voice of America Coverage Analysis Program.

Sunday, June 17, 2018

## VOACAP Online HF Predictions, User's Manual (17 June 2018)

The VOACAP Online HF Predictions service ([voacap.com/hf](http://voacap.com/hf)) is a replacement for and a consolidation of the previous VOACAP Online P2P (point-to-point) service at [voacap.com/p2p](http://voacap.com/p2p) and VOACAP Online Coverage Maps at [voacap.com/area](http://voacap.com/area). These two previous services will be closed down by mid-July.

The new service uses VOACAP (Voice of America Coverage Analysis Program) as its calculation engine, requiring the use of a reasonably new web browser. For example, the latest versions of Microsoft Edge (but not Internet Explorer), Mozilla Firefox, and Google Chrome are known to work. The earlier versions may not be supported. If you encounter problems with the service, please try first to upgrade your browser to the latest version available. If you think you have found a bug or if you wish to help translate the user interface into your language, please contact me at [jpe@voacap.com](mailto:jpe@voacap.com).

### 1. The interactive map for setting the transmitter (TX) and receiver (RX) site coordinates

Originally, a smooth and an easy coordinate entry for the Transmitter (TX) and Receiver (RX) sites was one of the single most important design features at VOACAP Online. The stand-alone PC version of VOACAP does not offer this, and, in fact, not many other similar software do, either. Choosing an interactive map for this purpose considerably lowered the threshold of using VOACAP.



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▼ 2018 (5)

▼ June (2)

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Sunrise/Sunset  
Info and  
Propagation  
Predi...](#)

[VOACAP Online HF  
Predictions,  
User's Manual  
\(17 Ju...](#)

► April (1)

► February (1)

► January (1)

► 2017 (6)

► 2016 (3)

VOACAP Quick Guide: HF Props... x VOACAP Online HF Predictions x

voacap.com/hf/

VOACAP Online HF Predictions (Amateur Radio) – 13:54:56 UTC (08:54 AM)

Select TX QTH: << Select a location >> or set Grid: EM13ld or Latitude: 33.1362 Longitude: -97.0821  
Select RX QTH: << Select a location >> or set Grid: EM60th or Latitude: 30.3130 Longitude: -87.5410

13:50

03/27/2020

TX: 33.14, -97.08 | RX: 30.31, -87.54 | Short: 956 km — 594 mi | 107° — 292° | Mid: 31.8142, -92.2391 | Long: 39052 km — 24266 mi | 287° — 112° | Mid: -31.8142, 87.7609

Band-by-band Best FREQ REL & SDBW SIG PD SNR PD NumTot All-year QSO Window Season Planner P2P Grayline Distance REL Map SDBW Map DXCC Grayline EME

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Type here to search Desktop 08:54 03/27/2020

RED BUTTON IS TRANSMIT LOCATION

**South Orkney 2020**  
**VP8PJ**

Perseverance DX Group

HOME DONATE VP8ドネーション2 RADIO TEAM PILOT TEAM SPONSORS ISLAND OPERATIONS SOUTH ORKNEYS

K6TU PROPAGATION TOOLS NEWS QSL LOG SEARCH CONTACT US PRESS RELEASES FOLLOW BRAVEHEART

Home

**Call Sign Changed to VP8PJ See Press Release #9**

2020 South Orkney Islands DXpedition

Feb. 21, 2020 - Mar. 6, 2020  
CQ Zone: 13  
IOTA: AN-008  
Locator: GC-79eh

BLUE BUTTON IS RECEIVE LOCATION

VOACAP Quick Guide: HF Propa... VOACAP Online HF Predictions

voacap.com/hf/

VOACAP Online HF Predictions (Amateur Radio) – 14:10:55 UTC (09:10 AM)

Select TX QTH: << Select a location >> or set Grid: EM13kd or Latitude: 33.1362 Longitude: -97.0821  
 Select RX QTH: << Select a location >> or set Grid: EM60fh or Latitude: 30.3095 Longitude: -87.5183

TX: 33.14, -97.08 | RX: 30.31, -87.52 | Short: 959 km — 596 mi | 107° — 292° | Mid: 31.8128, -92.2275 | Long: 39049 km — 24264 mi | 287° — 112° | Mid: -31.8128, 87.7725

Band-by-band Best FREQ REL & SDBW SIG PD SNR PD NumTot All-year QSO Window Season Planner F2P Grayline Distance REL Map SDBW Map DXCC Grayline EME

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Windows taskbar: Type here to search, Desktop, 09:10, 03/27/2020

I HAVE CHOSEN "K4EES" AND ENTERED GRID SQUARE.

# AFTER MODE AND POWER SET ANTENNAS

VOACAP Quick Guide: HF Propa... VOACAP Online HF Predictions

voacap.com/hf/

### VOACAP Online HF Predictions (Amateur Radio) – 14:14:52 UTC (09:14 AM)

Select TX QTH: <<< Select a location >> or set Grid: EM13jd or Latitude: 33.1386 Longitude: -97.0824  
Select RX QTH: <<< Select a location >> or set Grid: EM60th or Latitude: 30.3095 Longitude: -87.5183

**Transmitter Site**

TX antennas: 10M: 1/4 wl Vert Gd Gnd  
12M: 1/4 wl Vert Gd Gnd  
15M: 1/4 wl Vert Gd Gnd  
17M: 1/4 wl Vert Gd Gnd  
20M: 1/4 wl Vert Gd Gnd  
30M: 1/4 wl Vert Gd Gnd  
40M: 1/4 wl Vert Gd Gnd  
60M: 1/4 wl Vert Gd Gnd  
80M: 1/4 wl Vert Gd Gnd

**Receiver Site**

RX antennas: 10M: Dipole @ 10M (33R)  
12M: Dipole @ 10M (33R)  
15M: Dipole @ 10M (33R)  
17M: Dipole @ 10M (33R)  
20M: Dipole @ 10M (33R)  
30M: Dipole @ 10M (33R)  
40M: Dipole @ 10M (33R)  
60M: Dipole @ 10M (33R)  
80M: Dipole @ 10M (33R)

Swap TX/RX antennas

TX: 33.14, -97.08 | RX: 30.31, -87.52 | Short: 959 km — 596 mi | 107° — 292° | Mid: 31.8141, -92.2275 | Long: 39049 km — 24264 mi | 287° — 112° | Mid: -31.8141, 87.7725

Band-by-band Best FREQ REL & SDBW SIG PD SNR PD NumTot All-year QSO Window Season Planner P2P Grayline Distance REL Map SDBW Map DXCC Grayline EME

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Type here to search Desktop 09:14 03/27/2020

### VOACAP Online HF Predictions (Amateur Radio) – 14:17:48 UTC (09:17 AM)

Select TX QTH: << Select a location >> or set Grid:  or Latitude:  Longitude:

Select RX QTH: << Select a location >> or set Grid:  or Latitude:  Longitude:

**General Propagation Settings**

Noise:  ▾

SSN:

Method:  ▾

Min.TOA:  °

---

**Coverage Area Map Settings**

Band:  ▾

UTC:  ▾

Range:  hrs

---

**Propagation Planner Settings**

DX sites:  CQ Zones  DXCC All Continents

ITU Zones  DXCC Africa

DXCC Antarctica

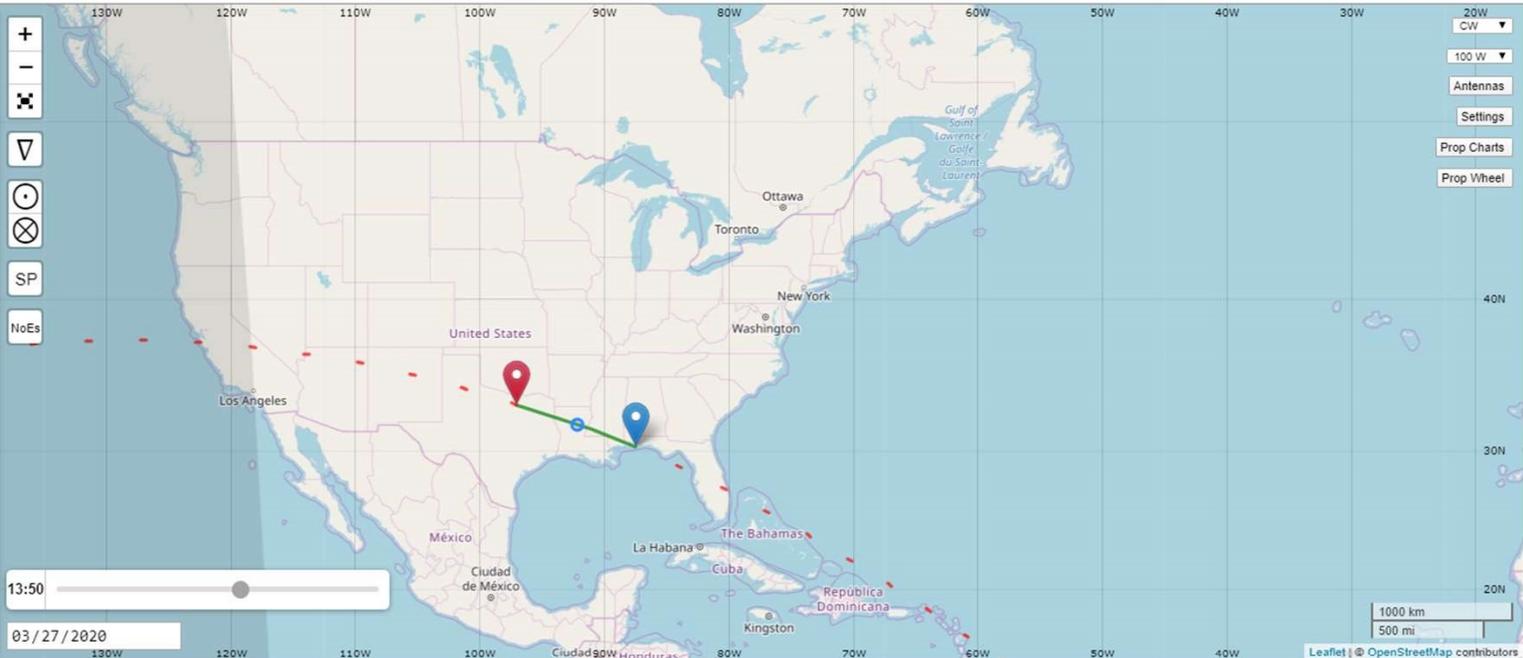
DXCC Asia

DXCC Europe

DXCC North America

DXCC Oceania

DXCC South America



TX: 33.14, -97.08 | RX: 30.31, -87.52 | Short: 959 km — 596 mi | 107° — 292° | Mid: 31.8141, -92.2275 | Long: 39049 km — 24264 mi | 287° — 112° | Mid: -31.8141, 87.7725

- Band-by-band
- Best FREQ
- REL & SDBW
- SIG PD
- SNR PD
- NumTot
- All-year
- QSO Window
- Season
- Planner
- P2P Grayline
- Distance
- REL Map
- SDBW Map
- DXCC Grayline
- EME

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# PROPAGATION CHARTS

VOACAP Quick Guide: HF Propag... x VOACAP Online HF Predictions x +

voacap.com/hf/

Apps | Bookmarks | R6 Army MARS: Co... | CWops Morse Code... | Beginners' Guide to... | Web Viewer | FreeC... | Ham Chat Shack: L... | Region 6 Army MA... | [HOME] - Ham Radi... | Metar Tutorial | We... | Central College Pre... | Morse Code Transla... | Other bookmarks

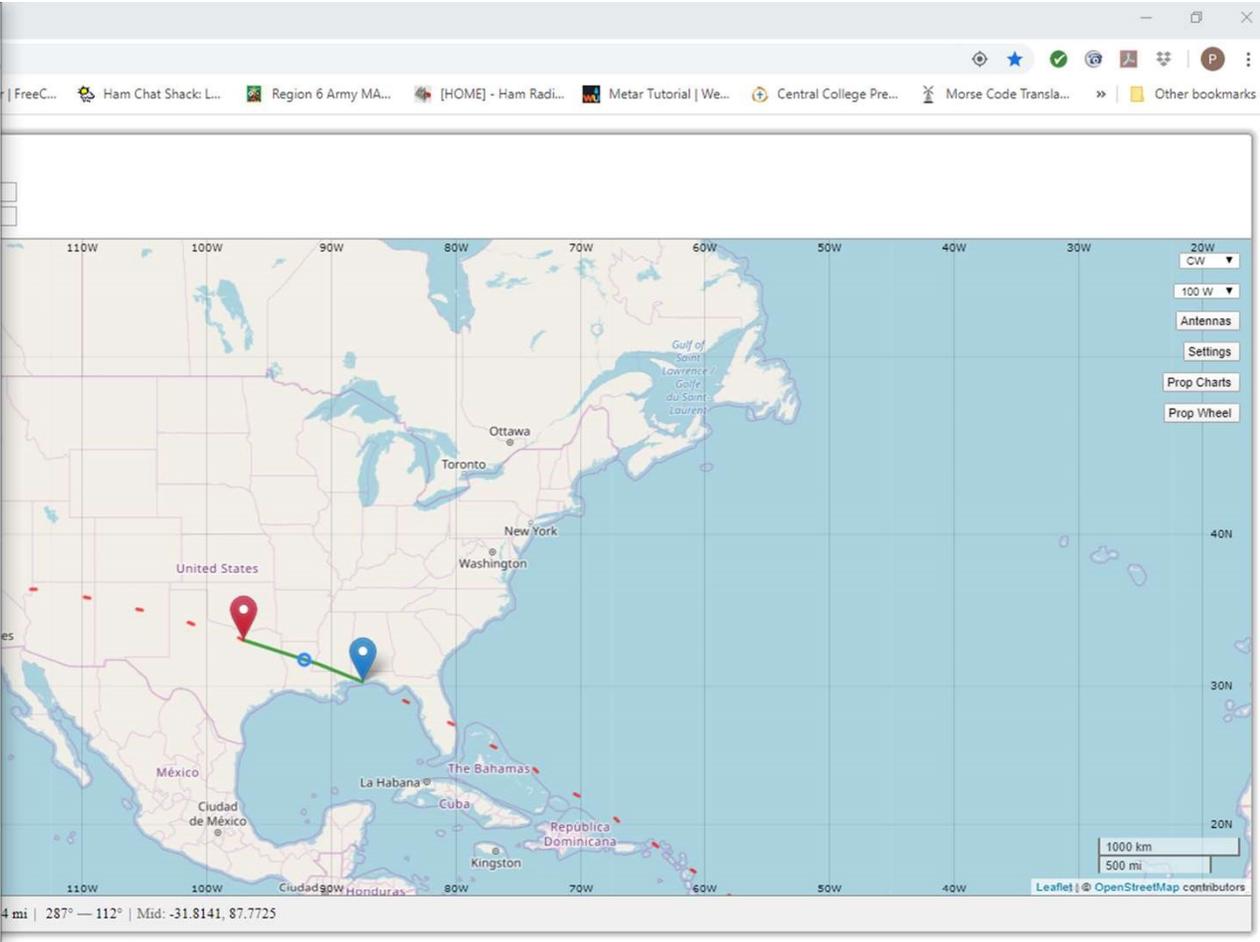
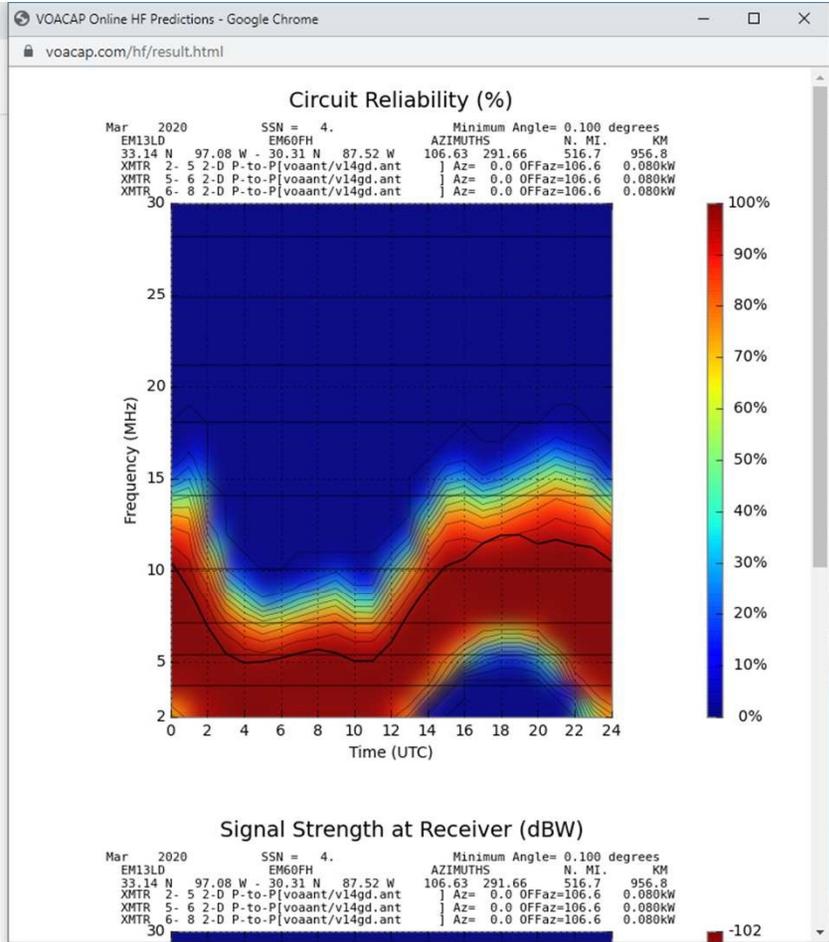
### VOACAP Online HF Predictions (Amateur Radio) – 14:21:00 UTC (09:21 AM)

Select TX QTH: << Select a location >> or set Grid: EM13ld or Latitude: 33.1386 Longitude: -97.0824  
 Select RX QTH: << Select a location >> or set Grid: EM60h or Latitude: 30.3095 Longitude: -87.5183

TX: 33.14, -97.08 | RX: 30.31, -87.52 | Short: 959 km — 596 mi | 107° — 292° | Mid: 31.8141, -92.2275 | Long: 39049 km — 24264 mi | 287° — 112° | Mid: -31.8141, 87.7725

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Windows taskbar: Type here to search | Desktop | 09:21 03/27/2020

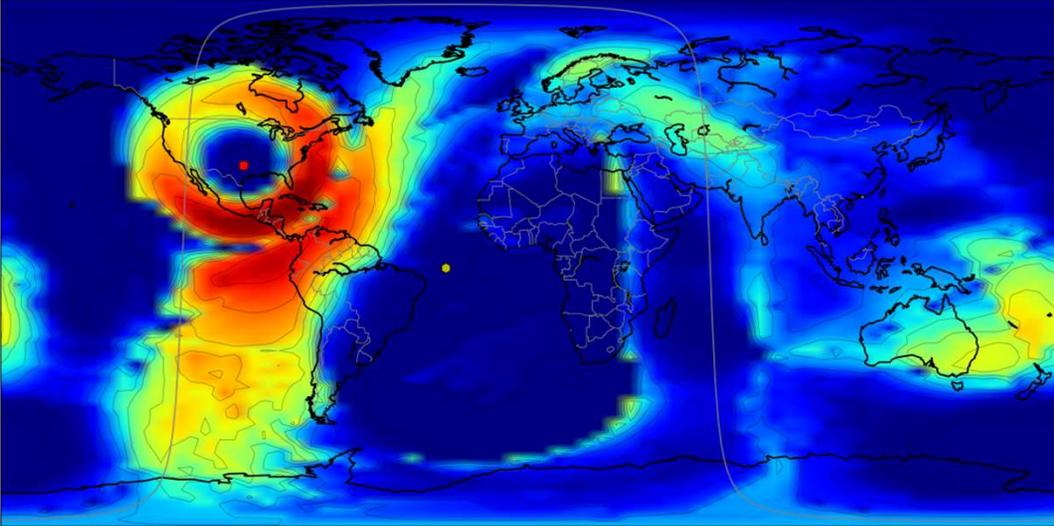


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VOACAP Online HF Predictions - Google Chrome  
voacap.com/hf/area.html

EM13LD (33.14N, 97.08W), Mar, 14 UTC, 14.100 MHz, 80 W, SSN 4, Mode: 19  
TX Ant: [voaant/v14gd.ant ], RX Ants: [voaant/d10m.ant ]



100%  
90%  
80%  
70%  
60%  
50%  
40%  
30%  
20%  
10%  
0%

EM13LD (33.14N, 97.08W), Mar, 15 UTC, 14.100 MHz, 80 W, SSN 4, Mode: 19  
TX Ant: [voaant/v14gd.ant ], RX Ants: [voaant/d10m.ant ]

Band-by-band Best FREQ REL & SDBW SIG PD SNR PD NumTot All-year QSO Window Season Planner P2P Grayline Distance REL Map SDBW Map DXCC Grayline EME

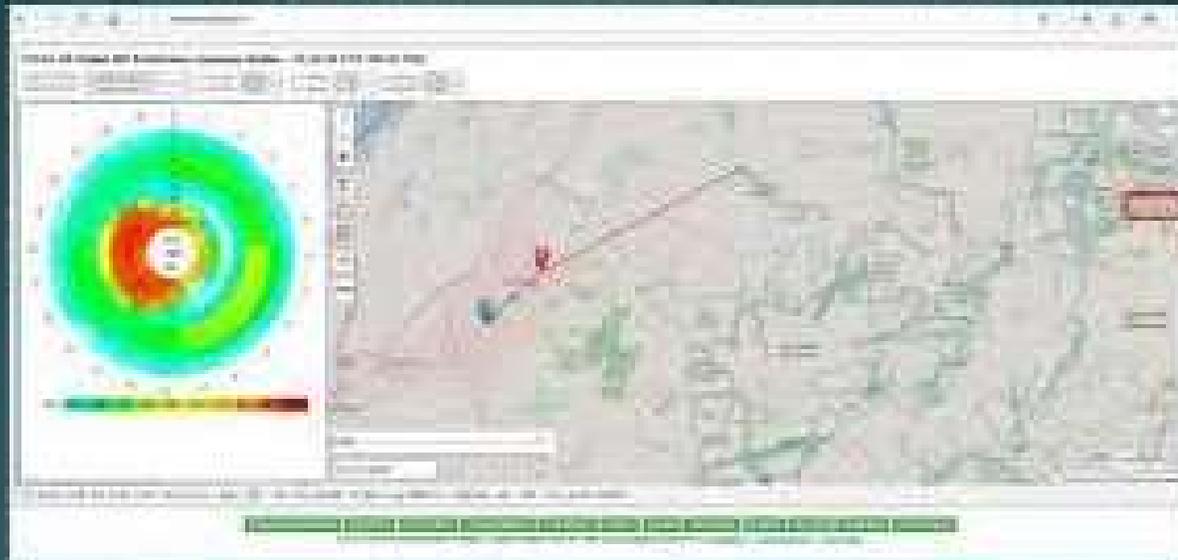
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09:28  
03/27/2020

IN SETTINGS 8 HOURS, NOW HERE EIGHT CHARTS TO SCROLL THROUGH

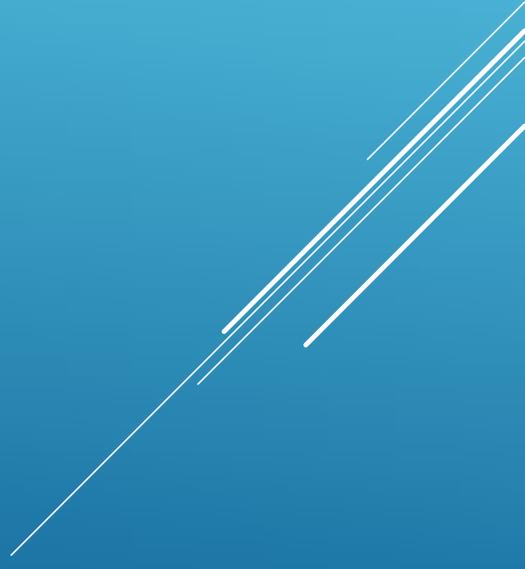
# VOACAP PROP ANALYSIS

Prop Wheel displays a window that displays the about reliability by band in a wheel representation. Generally bands that are above 75% will allow you to establish communications.



Click on Prop Wheel (remember to click on Prop Wheel again to close window after you are done) If Prop Wheel window does not appear, it may be hidden behind another window still open.

**ANY QUESTIONS**

The image features a solid blue background with a gradient from light blue at the top to a darker blue at the bottom. In the center, the text "ANY QUESTIONS" is written in a bold, dark blue, sans-serif font. In the bottom right corner, there are several white, parallel diagonal lines that create a sense of motion or a modern design element.