

Propagation Software Review

rev 1

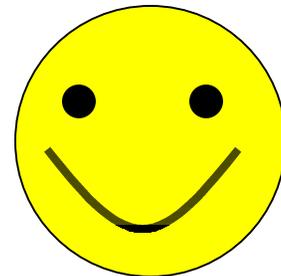
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What We're Going to Cover

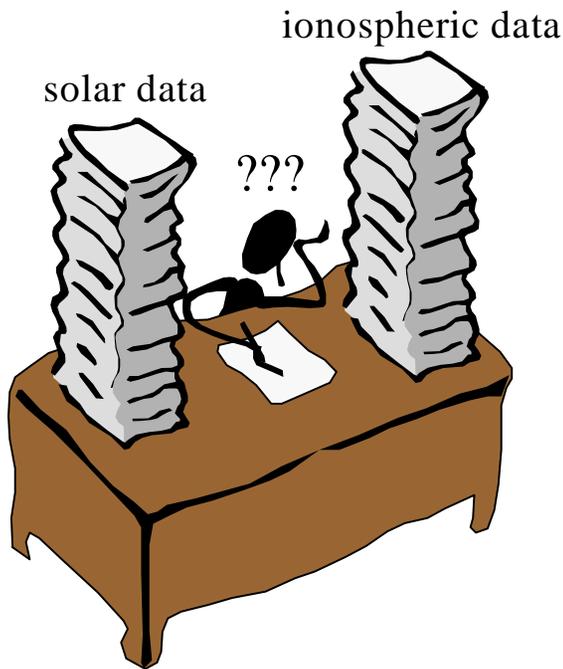
- The model of the ionosphere
- What's common among all the software
- Getting started with propagation predictions
- What's out there

all of this in 30 minutes!



The Model of the Ionosphere

Lots of data on what the sun was doing (measure solar flux and count sunspots)



Lots of data on what the ionosphere was doing (ionosonde measurements of foE, foF2, hmF2, etc)

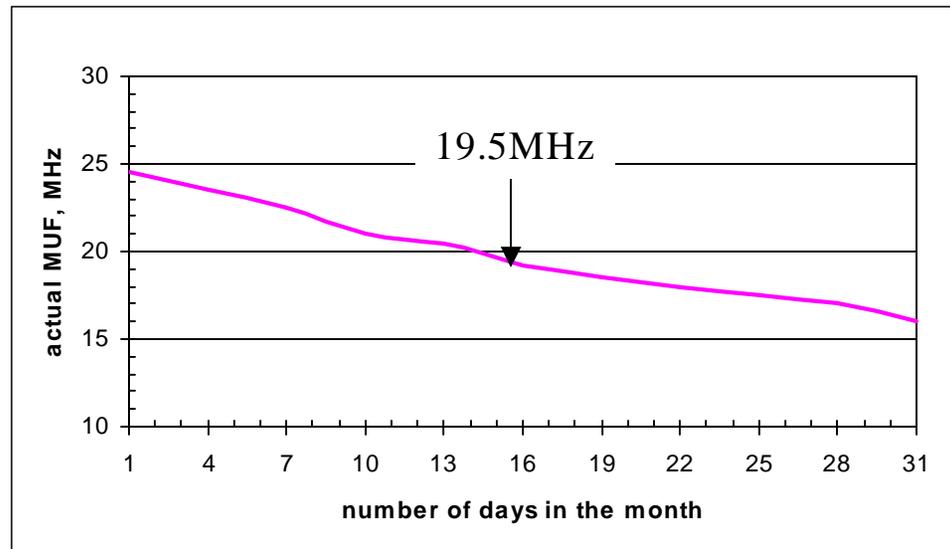
what was the best correlation?

The Model of the Ionosphere

- Best correlation was between smoothed sunspot number (or smoothed solar flux) and monthly median ionospheric parameters
 - *the word 'median' says propagation predictions are statistical in nature - they are not absolutes*
- What the Sun was doing on a given day did NOT correlate well with what the ionosphere was doing on that given day
- Thus we have a monthly median model of the ionosphere

The 'Monthly Median' Concept

- If your software says the MUF = 19.5MHz
 - the actual MUF will be at least 19.5MHz on half the days of the month
 - on a couple days of the month the MUF will be almost 25MHz
 - on all the days of the month the MUF will be at least 16MHz



we really don't know which specific days give the high MUFs and which specific days give the low MUFs

- Same concept applies to signal strength prediction

Why Don't We Have a Daily Model?

3 general categories that cause day-to-day variability

• Solar Ionizing Radiation

- Flares
- 27-day rotation
- Seasonal
- Solar cycle



10.7cm solar flux and sunspot number
surrogate parameters for ionizing radiation

• Solar Wind / Geomagnetic Activity

- Storms
- Energetic particle precipitation
- Plasma convection



K and A indices
ionospheric current at ~100km

• Neutral Atmosphere

- Tides
- AGWs
- Coupling from lower atmosphere



???????

What's Common Among All the Software

- They all use a monthly median ionosphere model
- They all answer two basic questions
 - Is there enough ionization to get from A to B?
 - How strong will the resulting signal be?
- All but one of them ignores the role of the Earth's magnetic field with respect to propagation paths
 - Most important on the low bands – especially 160m
 - Refraction, absorption, polarization
- The basic differences are
 - How the output data are presented
 - Bells and whistles

Getting Started

- Free downloads
 - VOACAP: Voice of America version of IONCAP
 - Also get ICEPAC – “improved” high latitude model
 - W6ELProp: Windows version of the old MiniProp DOS series
- Introductory tutorials for VOACAP and W6ELProp
 - how to download, set up, a sample prediction, discussion of output
 - www.arrl.org/tis/info/pdf/Voacap.pdf
 - www.arrl.org/tis/info/pdf/W6elprop.pdf
- More in-depth VOACAP articles on the ARRL TIS Propagation website
 - *What is VOACAP Trying to Tell Me?* by N6BV
 - *VOACAP Quick Guide* by OH6BG

What's Out There

I apologize if I left any out!

VOACAP/ICEPAC elbert.its.bldrdoc.gov	PropView www.qsl.net/propview/	SKYCOM 2.0 e-mail: w4het@aol.com
Ham CAP (and DX Atlas) www.dxatlas.com	ARRL (N6BV) Antenna Book CD	ASAPS www.ips.gov.au/
ACE-HF home.att.net/~acehf	DXAID e-mail: p.oldfield@telus.net	HFProp www.qsl.net/g4ilo/hfprop.html
WinCAP Wizard 3 www.taborsoft.com/wwizard3/	W6ELProp www.qsl.net/w6elprop	HFx ???? www.psrv.com/hfx, but goes to www.crescentbaysoftware.com
PropMan 2000www.rockwellcollins.com/products/ gov/page2034.htm	SNAPmax www.geocities.com/tyndar_press/index.html	GWPROP www.computing.edu.au/~geoff/ftp.html
MultiProp www.qsl.net/ac6la/multiprop.html	Ionsound members.aol.com/skywavetec/	PropLab Pro www.spacew.com/www.proplab.html

those highlighted in green use VOACAP

Antenna Forum Dayton 2004 K9LA

Which One Is the Best?

- IMHO, that depends on your needs and your personal preference
 - I routinely use 5 different programs
 - W6ELProp for DXpedition predictions
 - VOACAP raw data for most technical work
 - Proplab Pro for all in-depth 160m work
 - DXAID and DX Atlas for their graphics
- Accuracy
 - The model of the ionosphere
 - How it uses the model
 - Should be evaluated over a month's time frame
 - Ray tracing with Proplab Pro
 - Includes the Earth's magnetic field and electron-neutral collisions
 - Shows ducting, chordal hops, non great circle paths, etc
 - More an analysis tool than a prediction tool

Summary

- Understand statistical nature of predictions
- Start with free software to gain familiarity
- Visit websites
- Read product reviews
 - QST, NCJ, CQ, The DX Magazine, etc
- Select based on what best suits your needs and your personal preference