



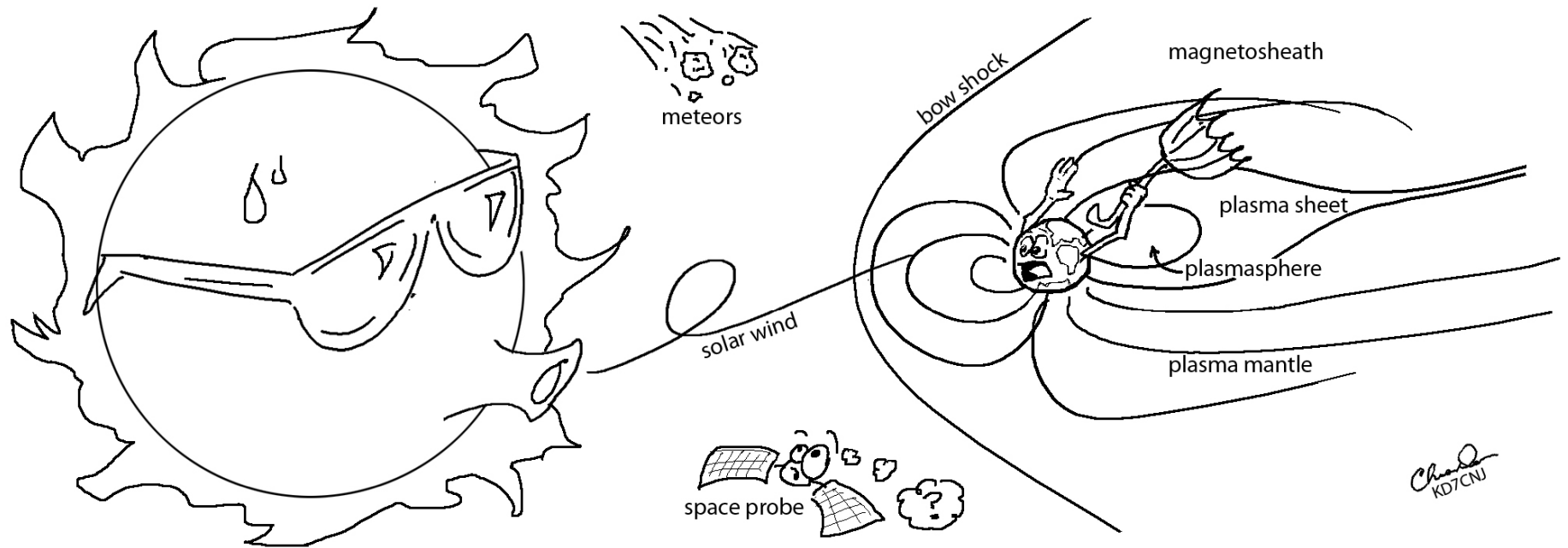
Propagation by Colors

When it comes to HF operating, some modes allow you to communicate farther than others. Free software can help predict which ones are likely to be most effective.

Kai Siwiak, KE4PT
February 22, 2020

The Big Picture

It's all blowing in the Solar Wind



The Big Picture

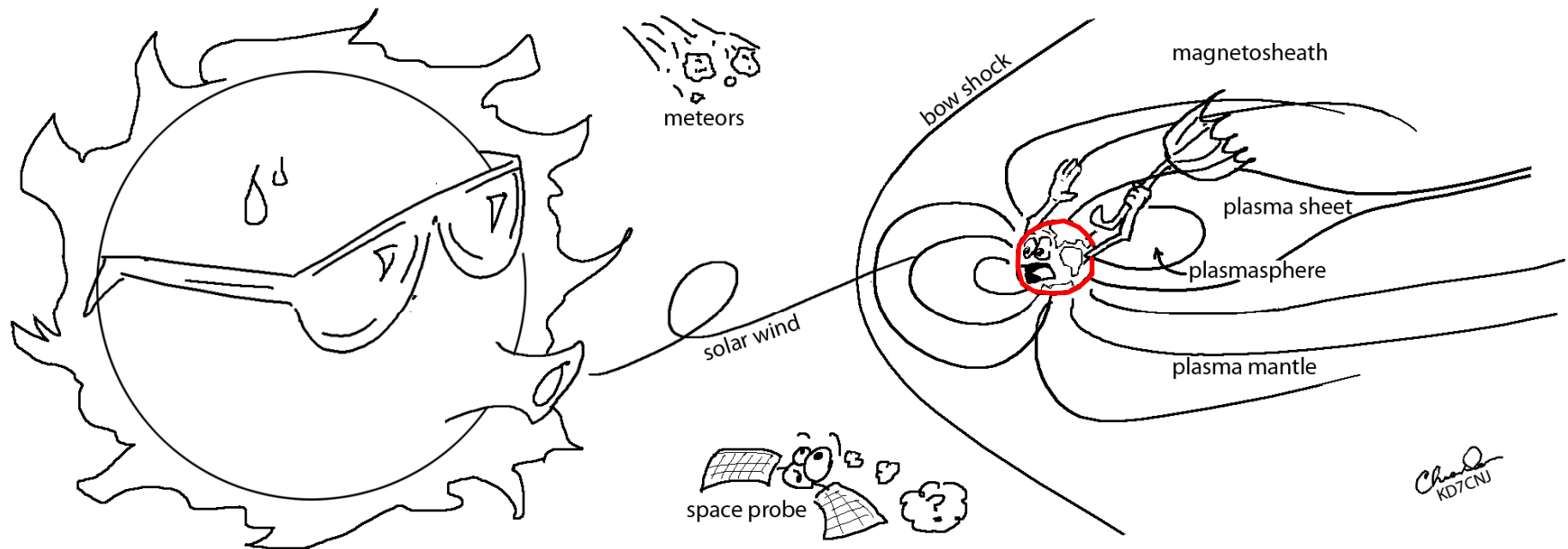
The Grand Scale Events

- What happens 150 million km away on the Sun impacts our local vicinity
- Resulting Space Weather drives the Ionosphere



The Detail

Happens within 500 km of Earth

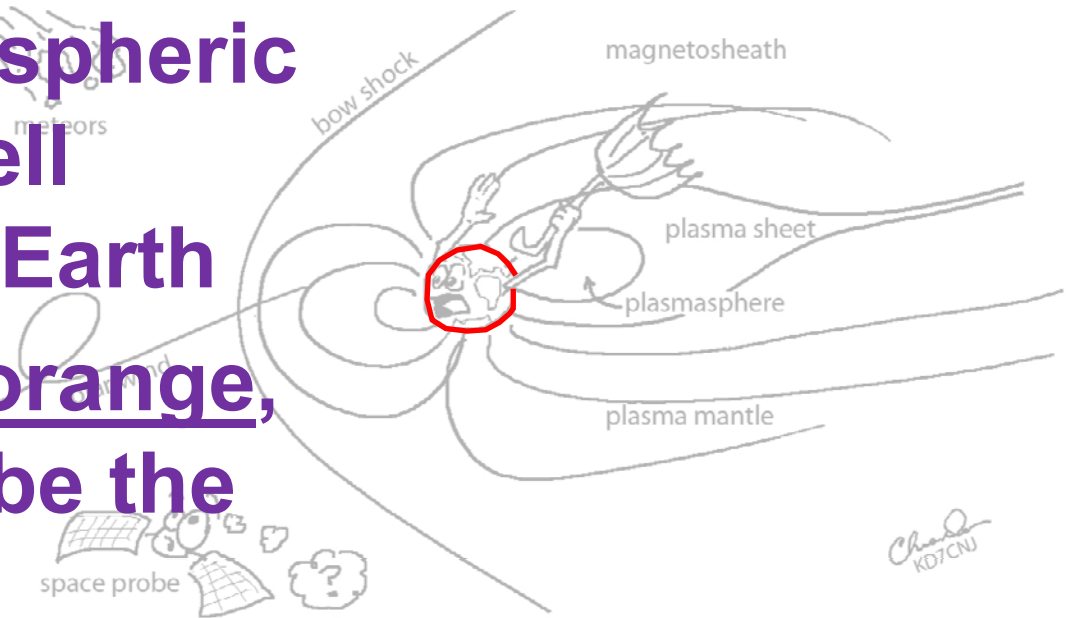


500 km is about 300 miles

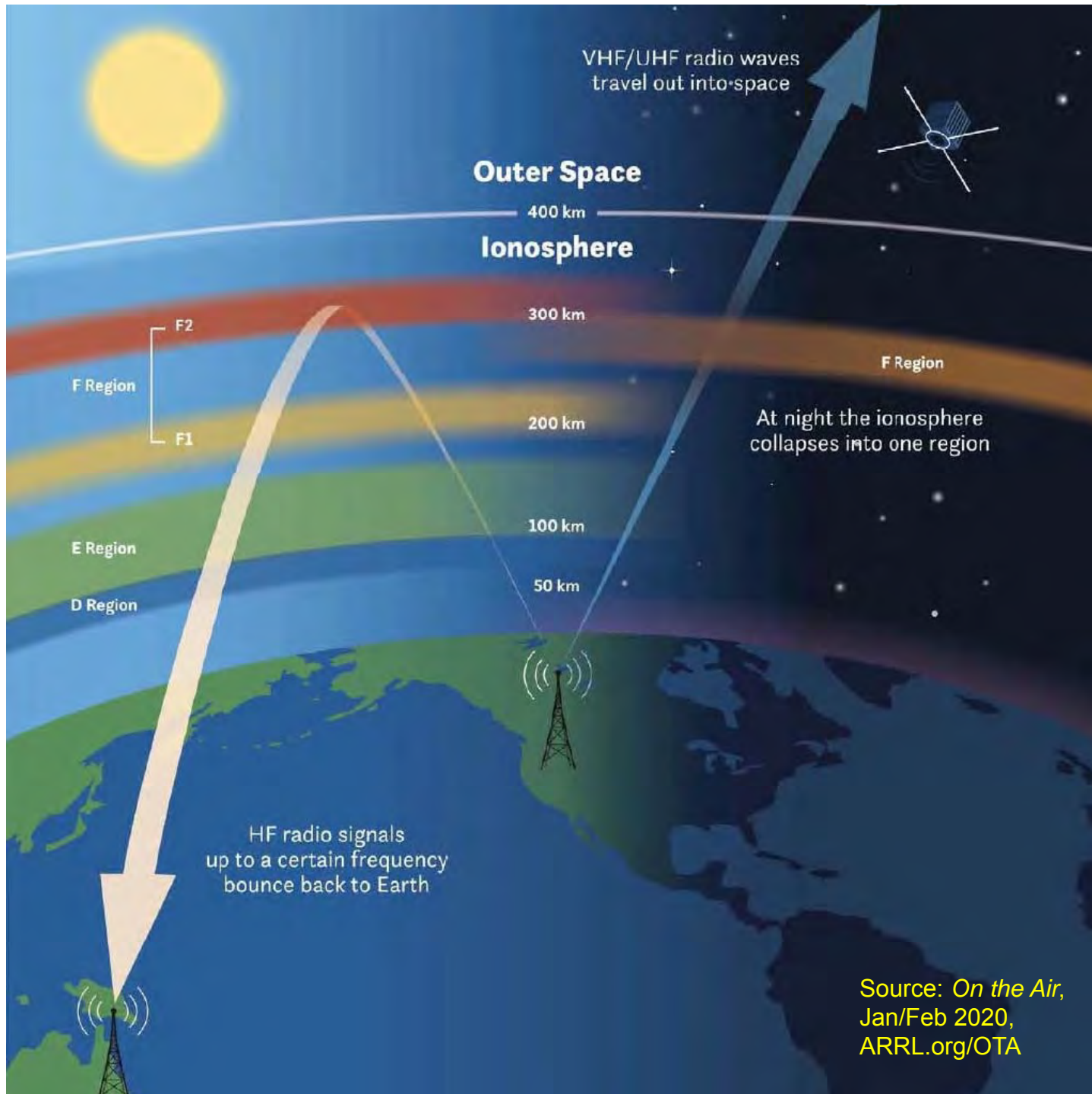
The Detail

Is In Our Immediate Vicinity

- Realm of all ionospheric phenomena is well within 500 km of Earth
- If Earth were an orange, the realm would be the orange peel



“within 500 km of Earth’s surface”



“Within the Orange Peel”

This is the realm of propagation prediction

Modest Stations

May Need to Crank up the Range Knob



What range knob???

Range Knob Tool Kit

- **Range Knob lets you choose the best mode for your HF operation**
- **Tool #1: Afreet Software *HamCAP***
 - Uses *VOACAP* propagation engine
 - Select 'MAP' to compute propagation
 - Hover mouse over Map to read *SNR/Hz*
- **Tool #2: Apply the KE4PT Color and Mode Correspondence Chart**



Afreet Software, Inc.

Software created by Alex Shovkopyas, VE3NEA

Products

new!



[GRITTY](#)



[RTTY Skimmer
Server](#)



[HamVNA](#)



[DX Atlas](#)

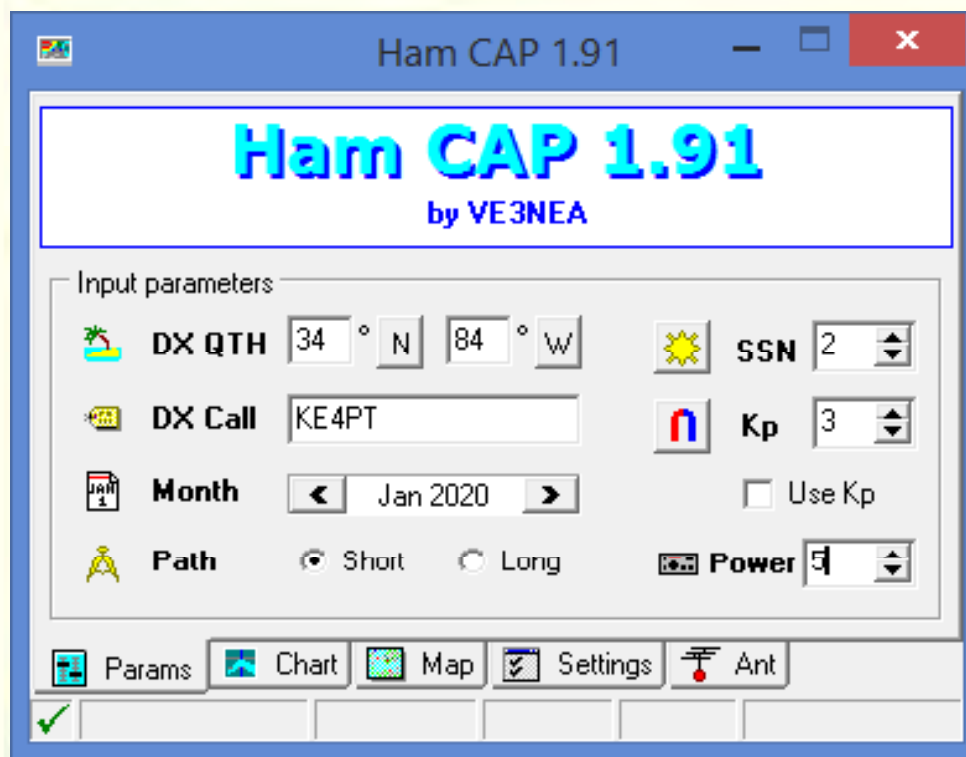


<http://www.dxatlas.com>

Ham CAP 1.91

HF propagation prediction tool for Amateur Radio

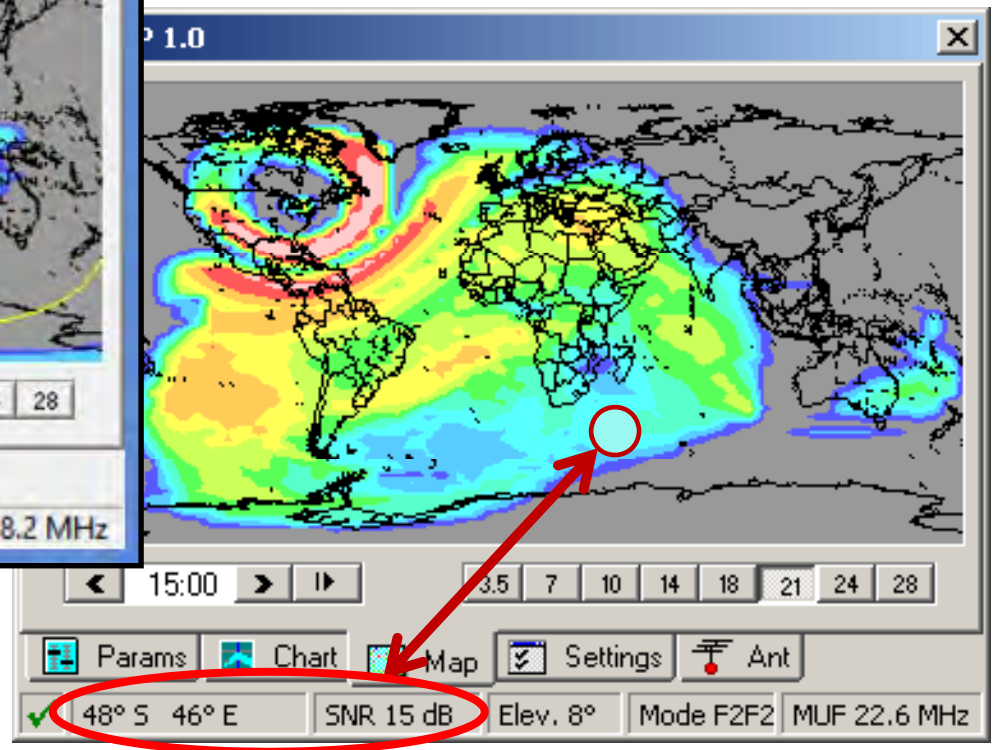
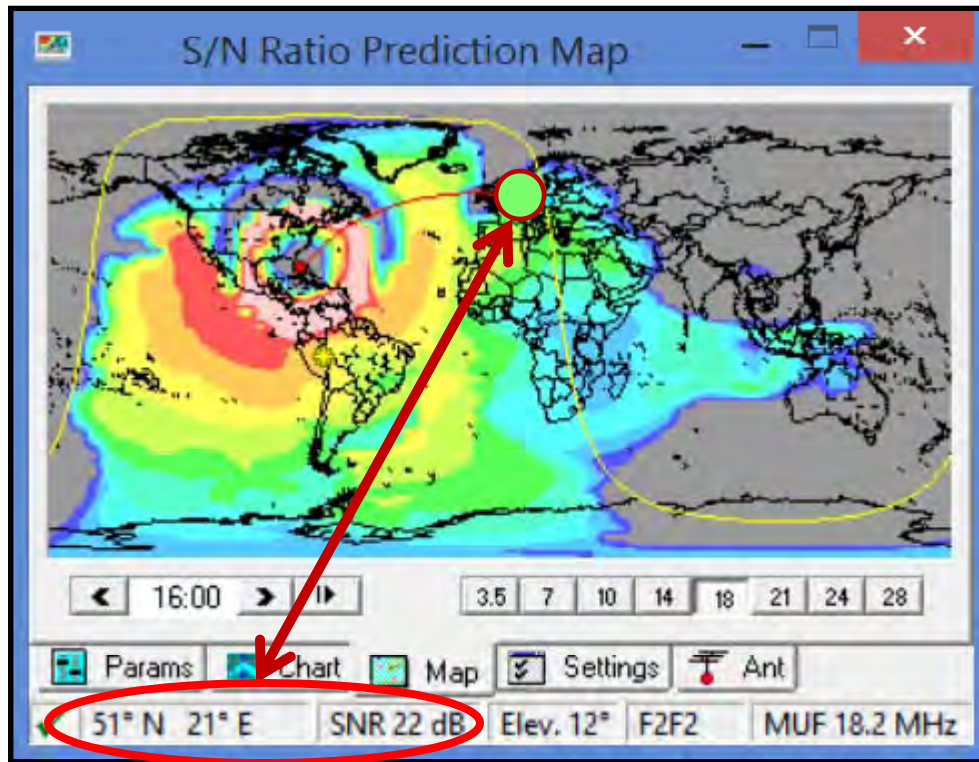
FREEWARE



HamCAP

- Uses *VOACAP* propagation engine
- You input the SSN, power, date
- Choose your antennas
- Select frequency band
- Select 'MAP' to compute propagation
- **Hover mouse over Map to read *SNR/Hz***

Mouse-over HamCAP Map to see SNR in 1 Hz Bandwidth



Now You Need the “Big Box” of Crayons



The KE4PT Color and Mode Correspondence Chart

Table 1
How HamCAP Map Colors Correspond to Mode SNRs

SNR span (dB in 1 Hz)	Color	Mode	Threshold SNR in 1 Hz
48+	Pink	AM	+56 dB
42 – 47	Red	SSB	+42 dB
38 – 41	Orange	FM	+40 dB
33 – 37	Yellow	RTTY	+33 dB
28 – 32	Light Green	CW	+28 dB
22 – 27	Green	PSK31	+22 dB
13 – 21	Light Blue	FT8/FT4	+14/+16 dB
7 – 12	Medium Blue	JT9/JT65	+7/+9 dB
1 – 6	Blue	WSPR	+6 dB

Threshold SNR
in 2500 Hz BW

+22 dB

+8 dB

+6 dB

-1 dB

-6 dB

-12 dB

-20/-18 dB

-27/-25 dB

-28 dB

The 'range knob' extends over more than 50 dB!!

Source: QST, April 2020,
ARRL.org/QST

Mode

Sensitivity in 2500 Hz

Mouse-over HamCAP Map and apply the Color Code

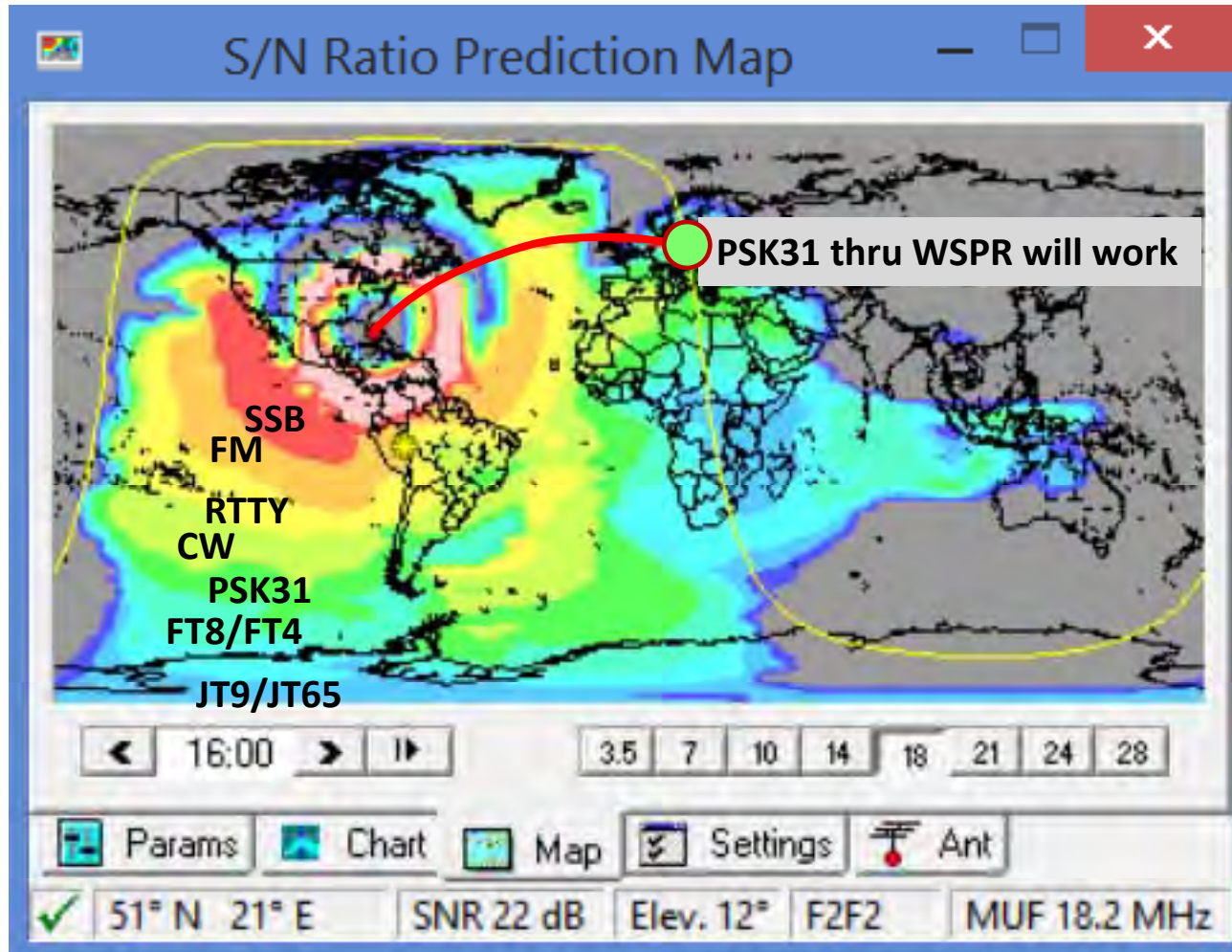
KE4PT Color Code










AM [56 dB]
SSB
FM
RTTY
CW
PSK31
FT8 / FT4
JT9 / JT65
WSPR

PSK31 thru WSPR will work

FT8 thru WSPR will work

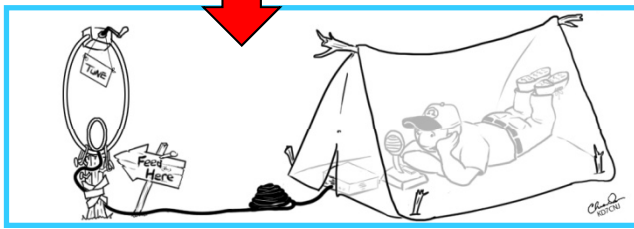
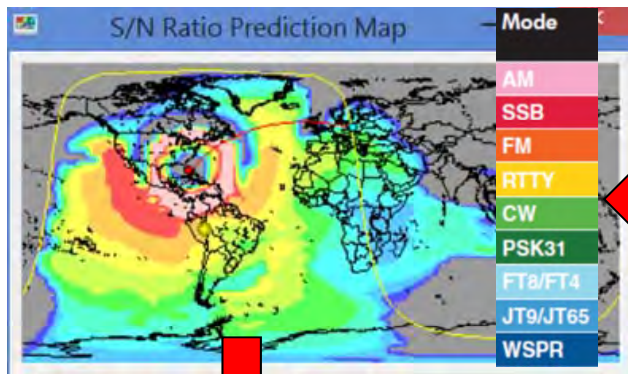
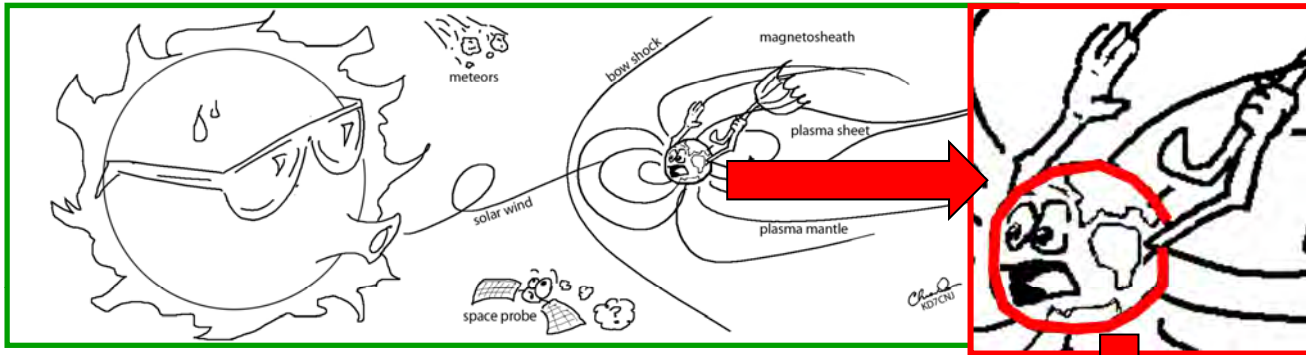
Range Limits of Various Modes



KE4PT Color Code	
	AM [56 dB]
	SSB
	FM
	RTTY
	CW
	PSK31
	FT8 / FT4
	JT9 / JT65
	WSPR

Each mode includes all the colors above its limit color in the Color Code Chart

Summary: From the Sun to Earth



Summary: Range Knob Tool Kit

- [HamCAP Freeware](#) is the propagation tool for predicting **signal level** at a given range and coverage area
- [The KE4PT Color Correspondence Chart](#) is tool for choosing the **best mode** for your HF operation over the given range

“When it rains it pours”



- Take all this with a grain of salt
- This is all VERY approximate
- It is for your amusement only
- Maybe even:
take it all with a pound of salt!

Thanks for your Attention

?? questions ??



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Thanks for your Attention



?? how about answers ??

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