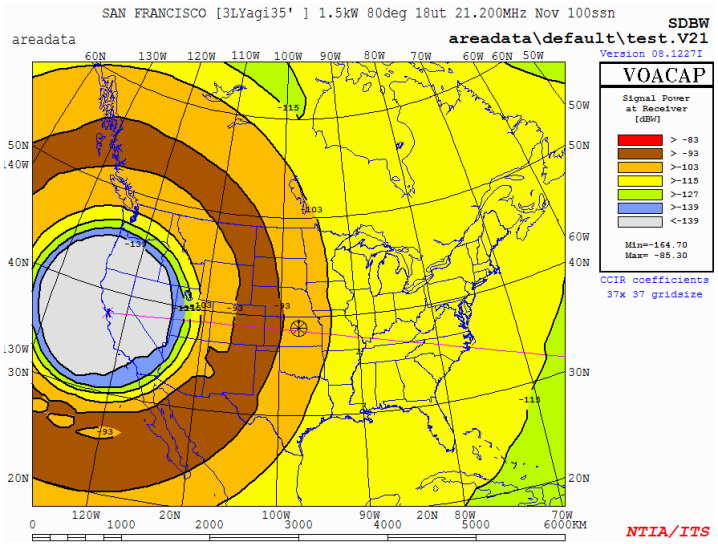
HF Propagation and Contesting

NCCC Contest Academy 2013

Visalia, CA on Friday, Apr. 19, 2013

By Dean Straw, N6BV



Seeing the HF Propagation "Big Picture"

- Today, I will present two ways to see "the big picture" of worldwide HF propagation for contest or DX planning.

  1. *VOAAREA* maps

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Seeing the HF Propagation "Big Picture"

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  1. *VOAAREA* maps

  2. N6BV Prediction Tables

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VOAAREA

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VOAAREA

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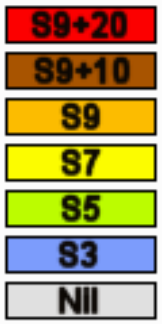

S-meter Calibration; 6 dB/S-unit

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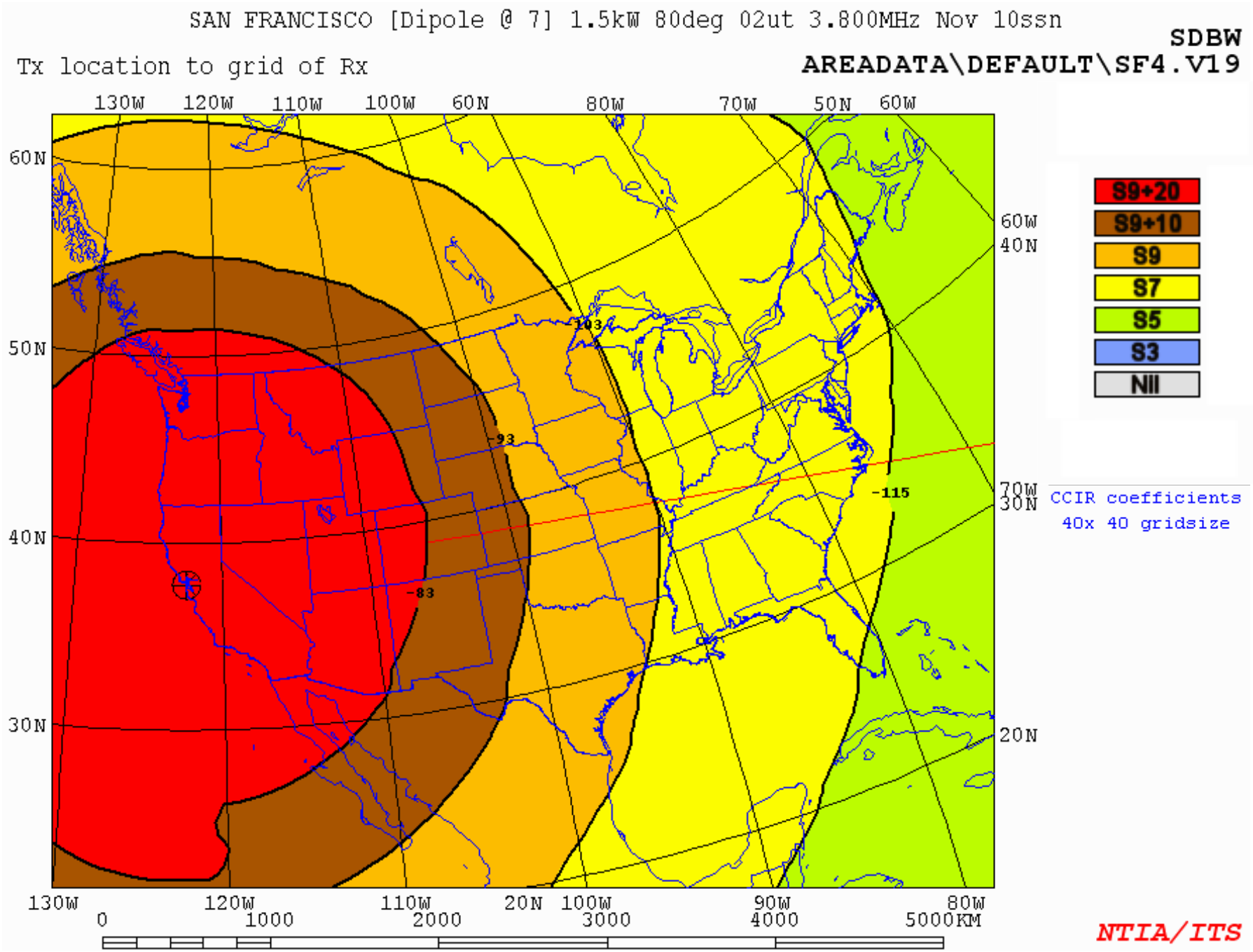
SAN FRANCISCO [Dipole @ 7] 1.5kW 80deg 02ut 3.800MHz Nov 10ssn
SDBW
AREADATA\DEFAULT\SF4.V19
Tx location to grid of Rx
130W 120W 110W 100W 60N 80W 70W 50N 60W
60N
50N
40N
30N
60W
40N
70W
30N
20N
S9+20
S9+10
S9
S7
S5
S3
Nil
-103
-93
-115
-83
CCIR coefficients
40x 40 gridsize
130W 120W 110W 20N 100W 90W 80W
0 1000 2000 3000 4000 5000KM
NTIA/ITS

VOAAREA

- *VOACAP = Voice of America Coverage Analysis Program.*
- *VOAAREA* uses the *VOACAP* engine to produce area-wide coverage from a single transmitting site for a single frequency.
- A series of these montages makes a sort of hour-by-hour *movie* to use while operating to make band-change decisions.

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VOAAREA

- Here's a movie for the ARRL Sweepstakes, calculated using the N6RO antenna systems and terrain for a Low level of solar activity.

VOAAREA

- Here's a movie for the ARRL Sweepstakes, calculated using the N6RO antenna systems and terrain for a Low level of solar activity.
- This movie helps me make decisions about when to change bands.

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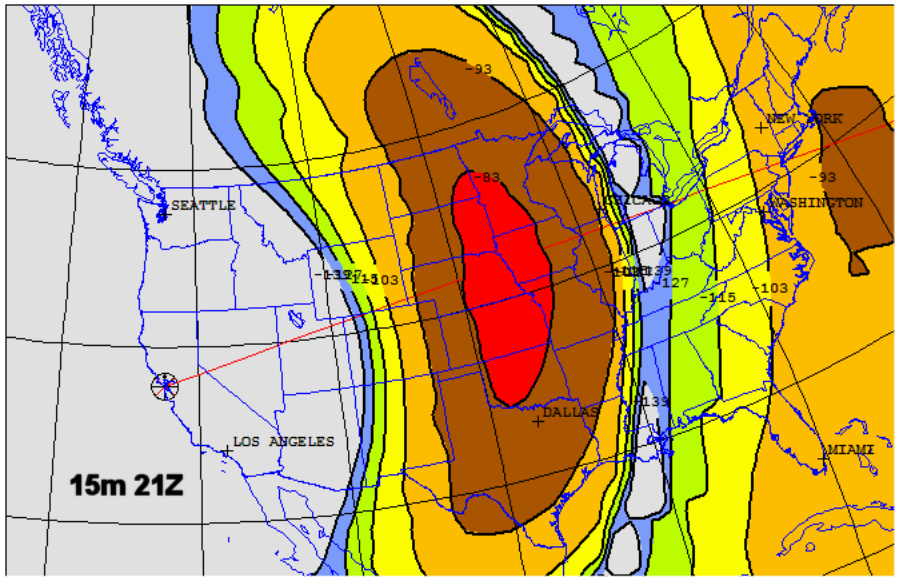
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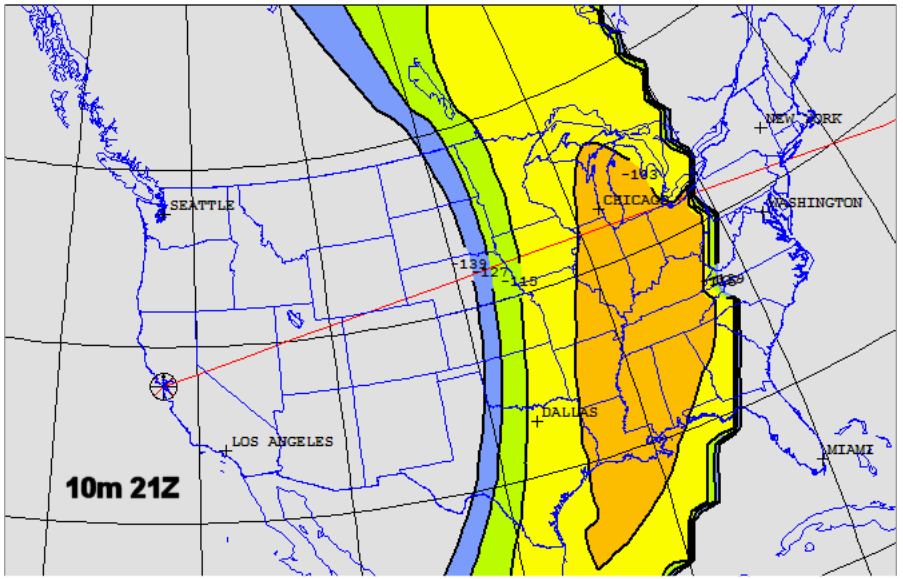
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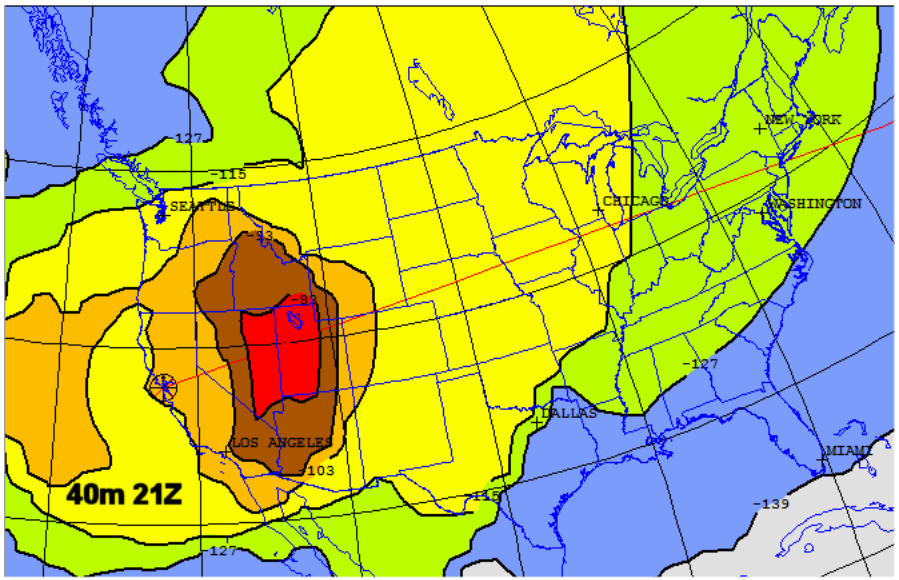
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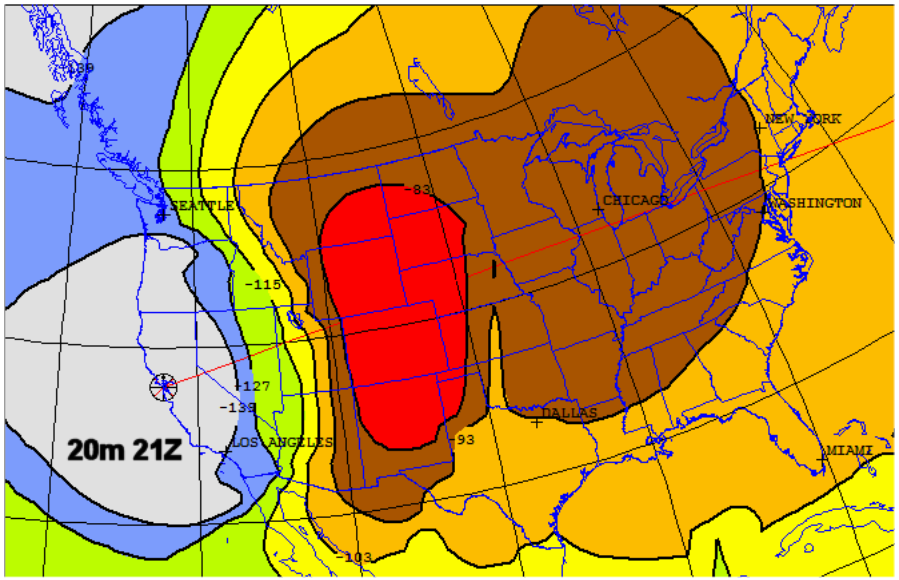
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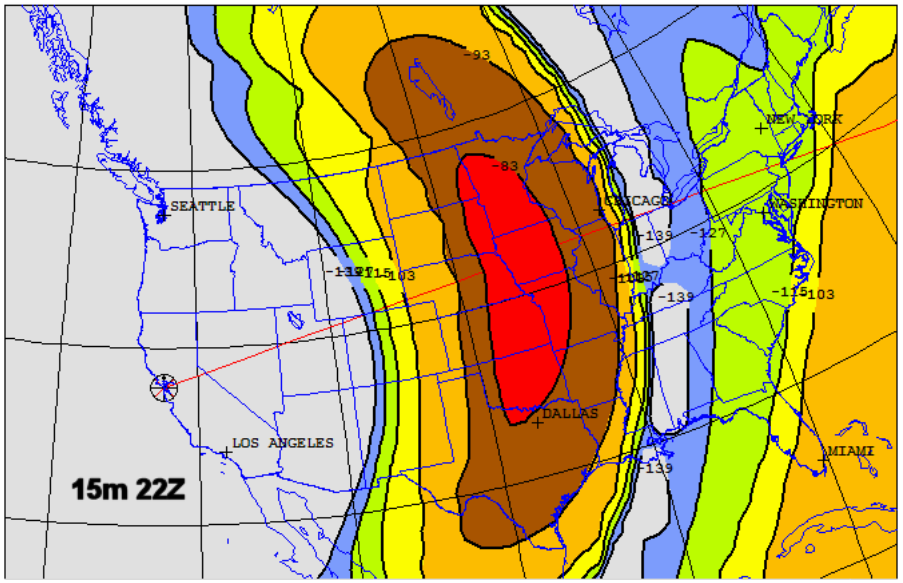
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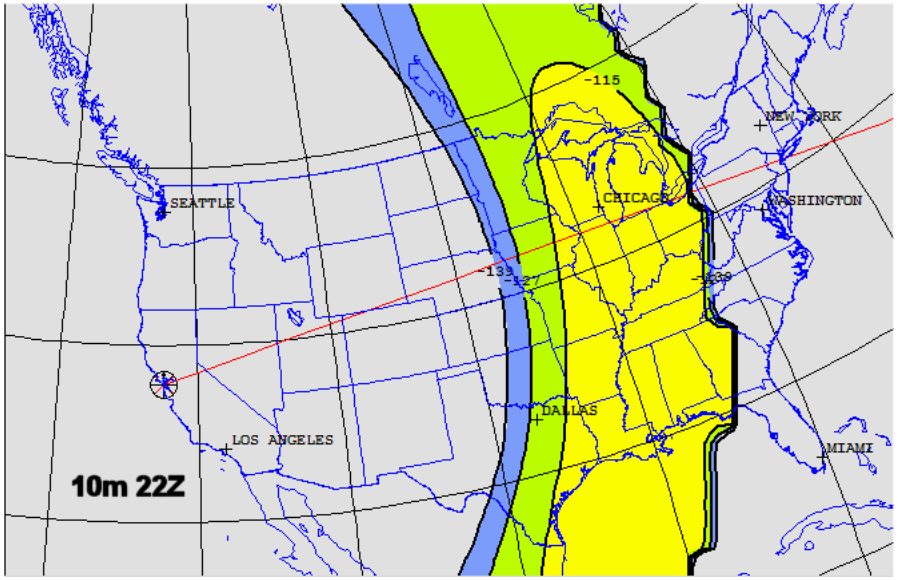
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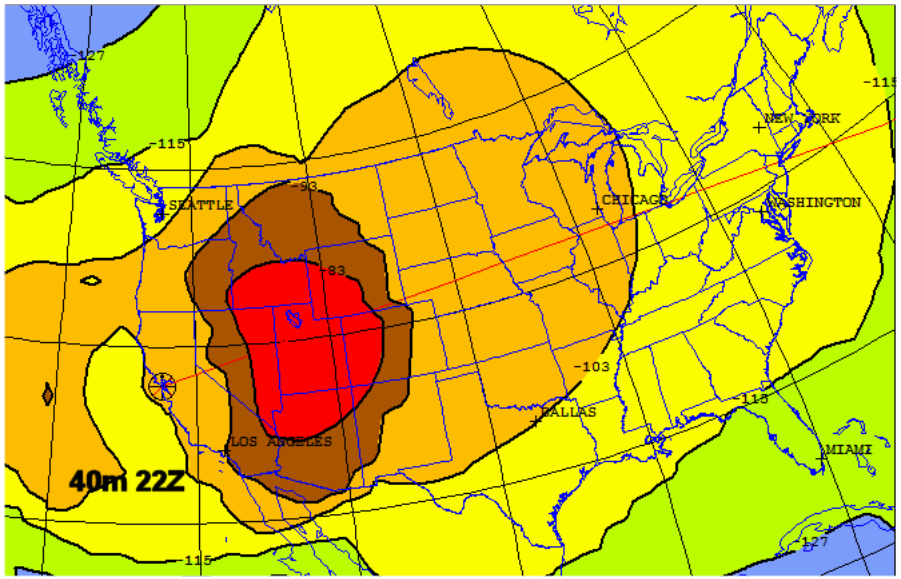
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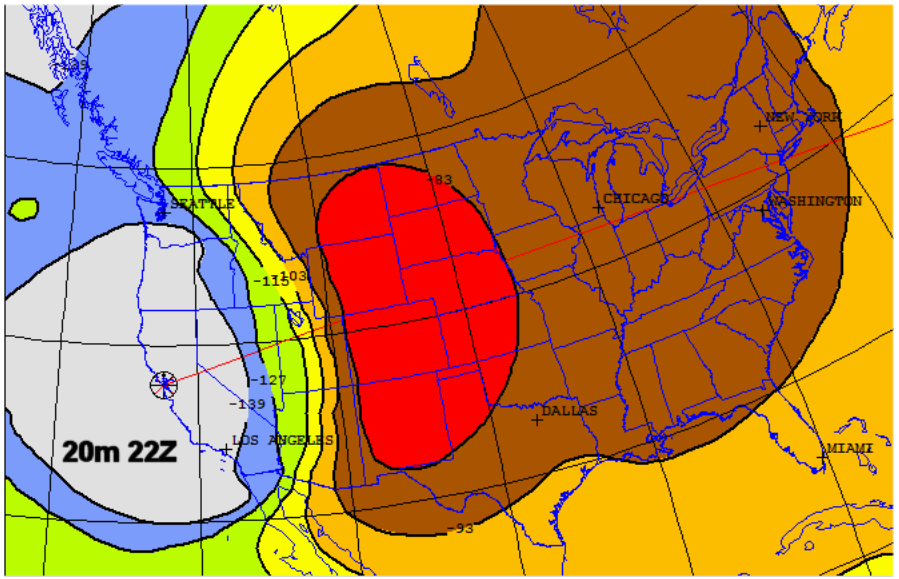
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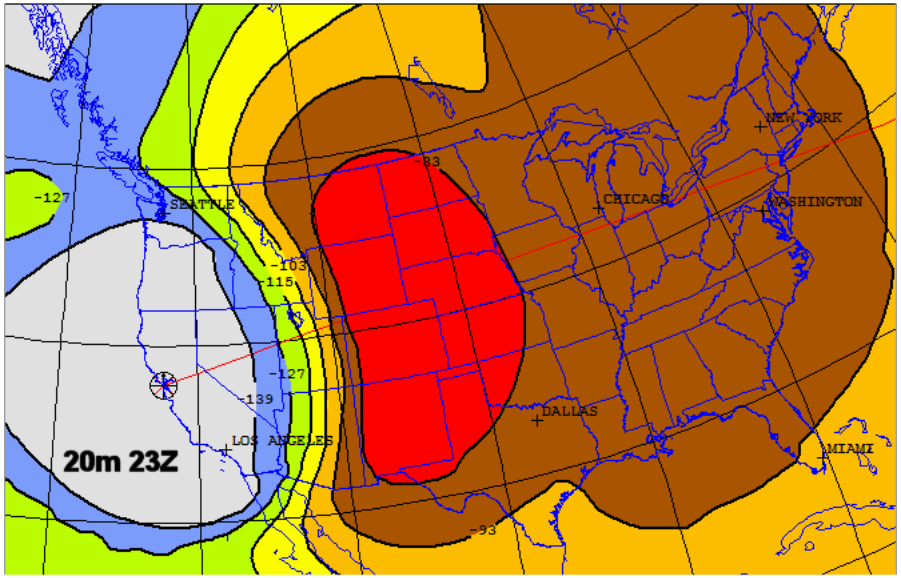
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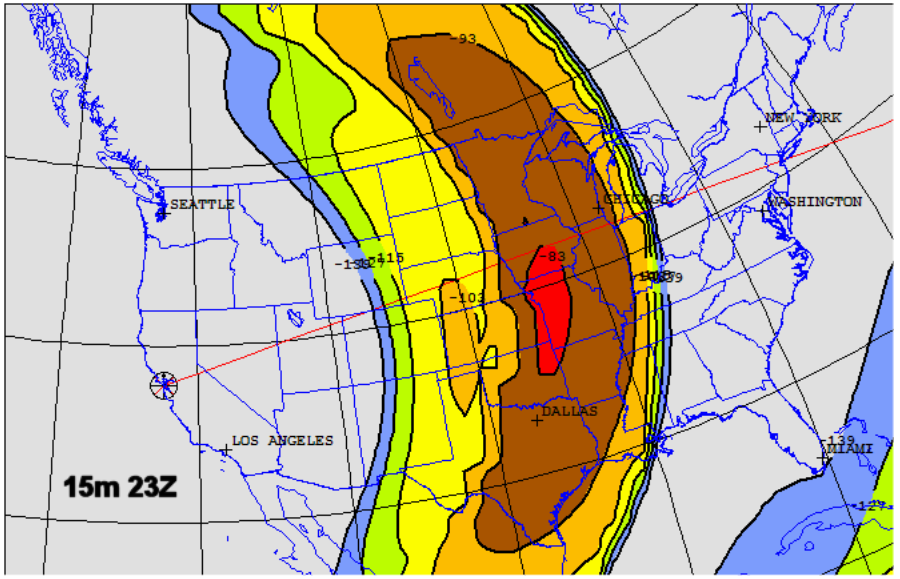
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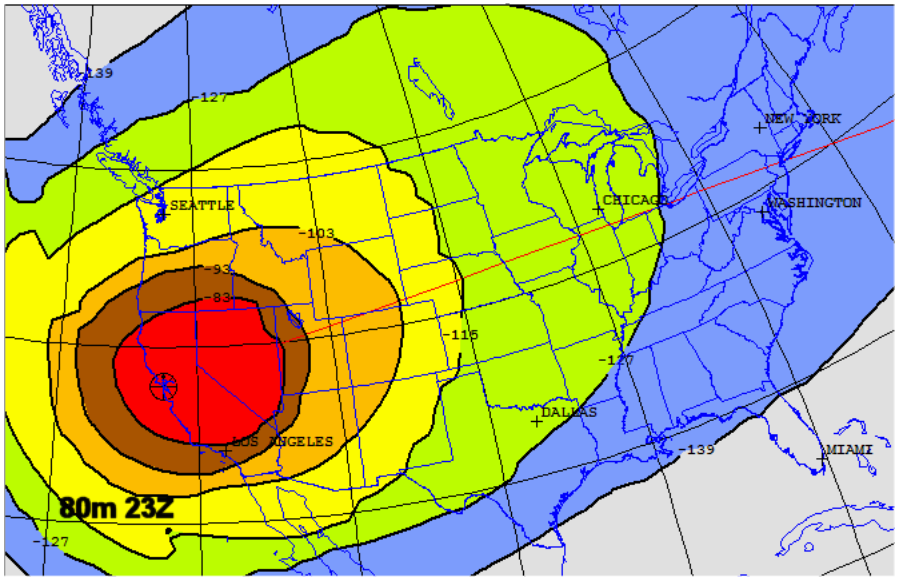
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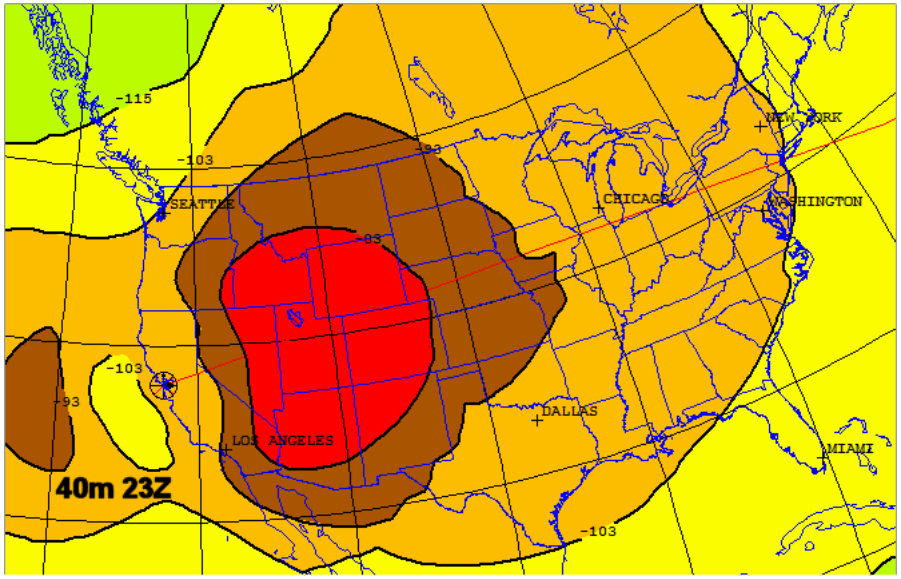
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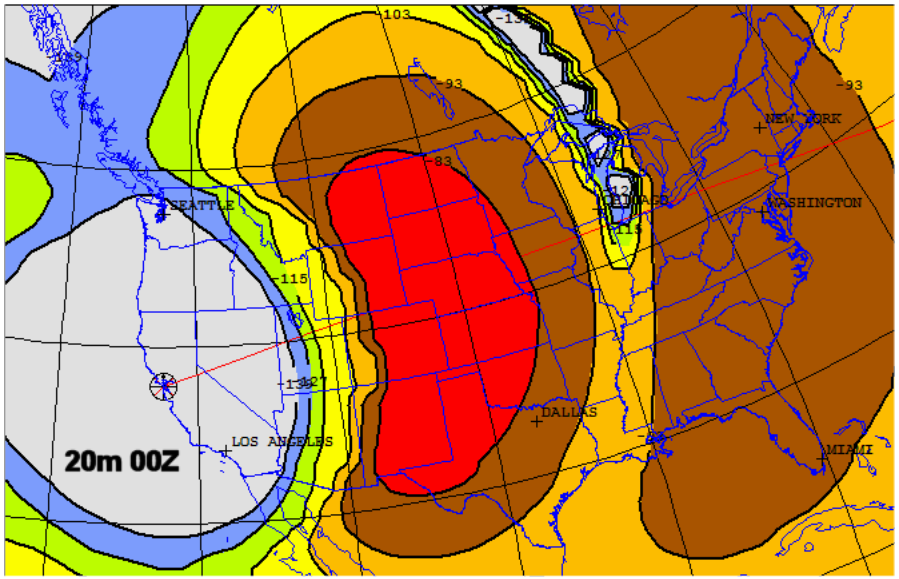
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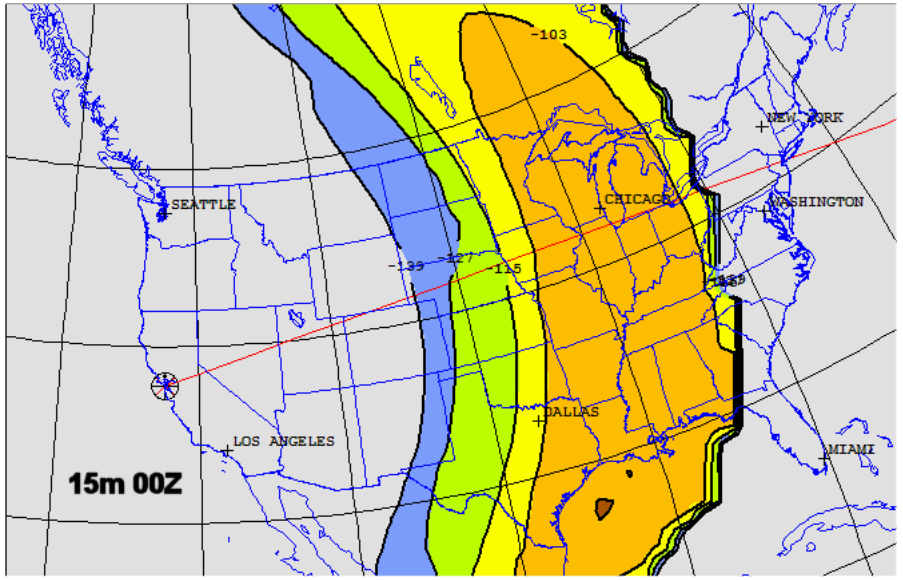
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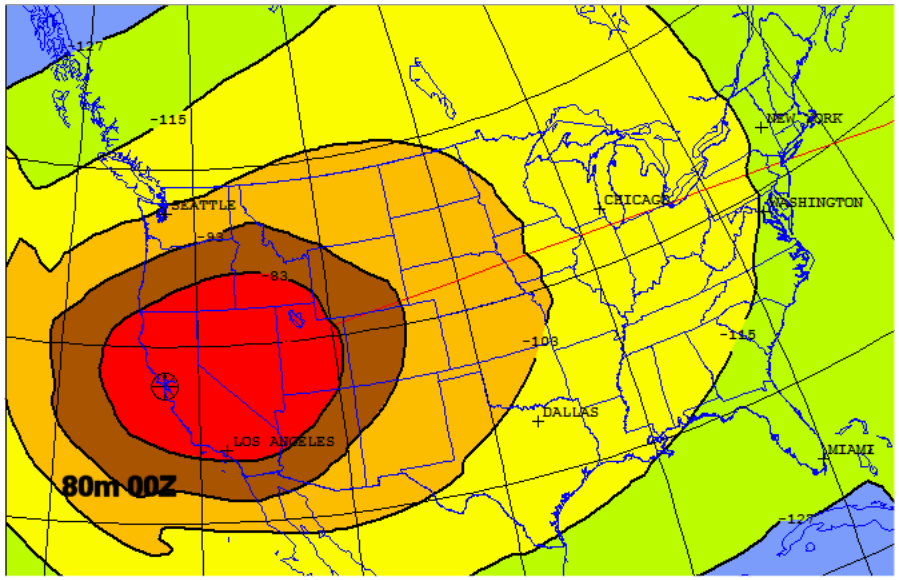
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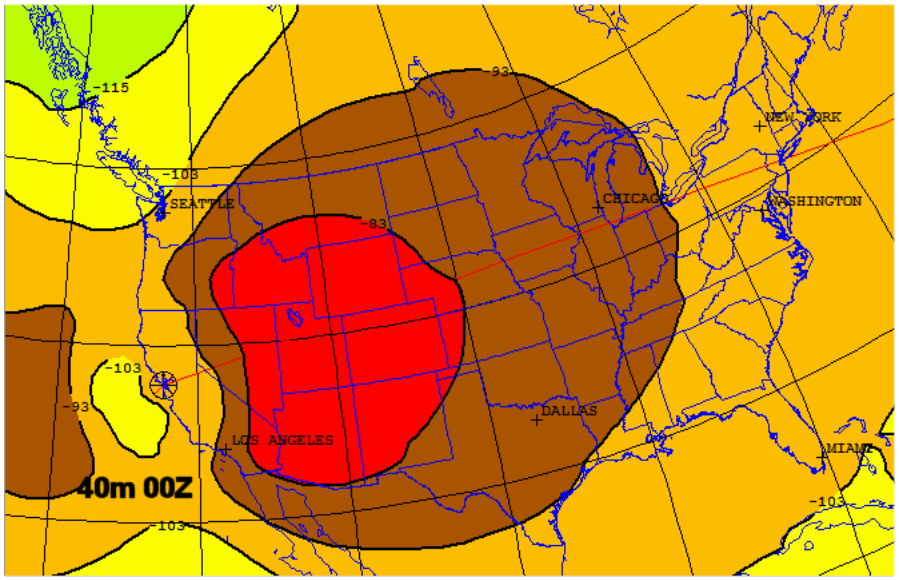
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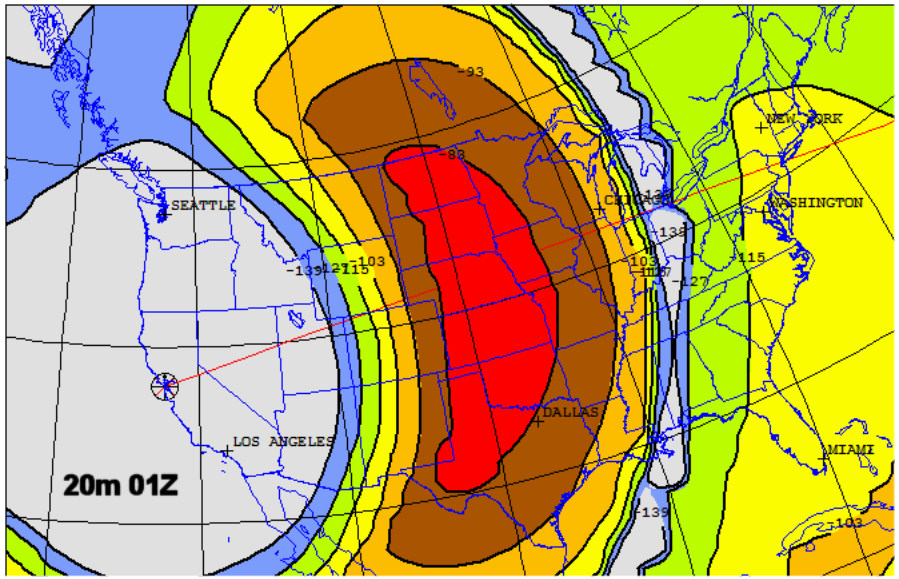
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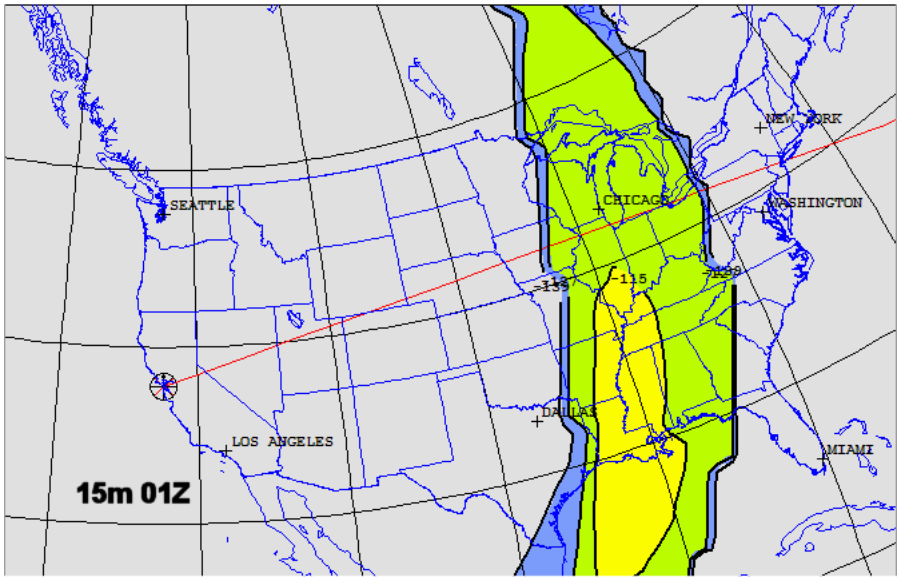
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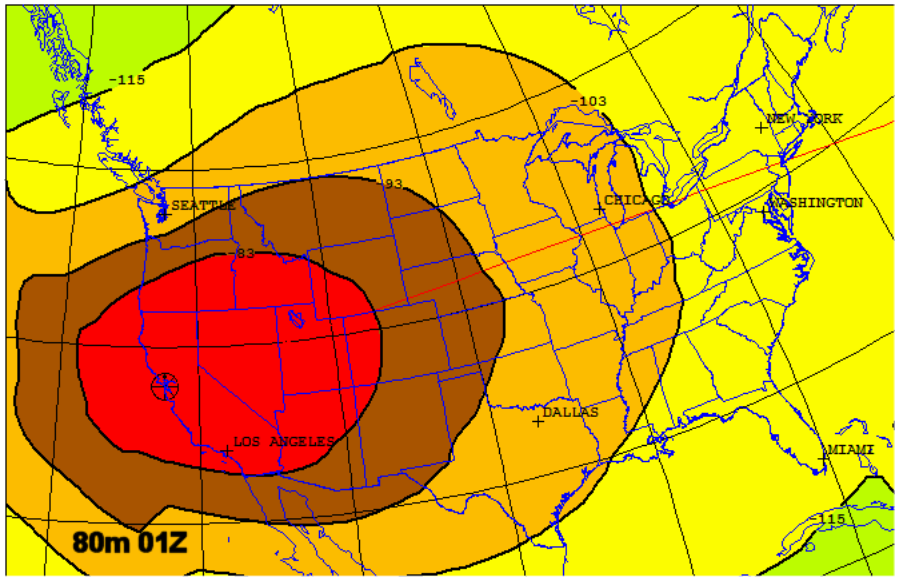
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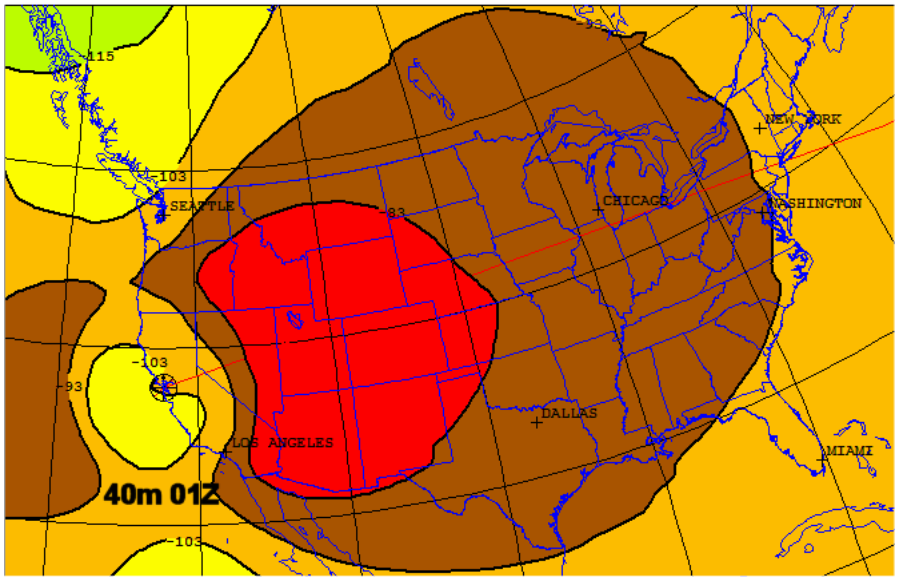
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K6TU Has Created a Custom Website

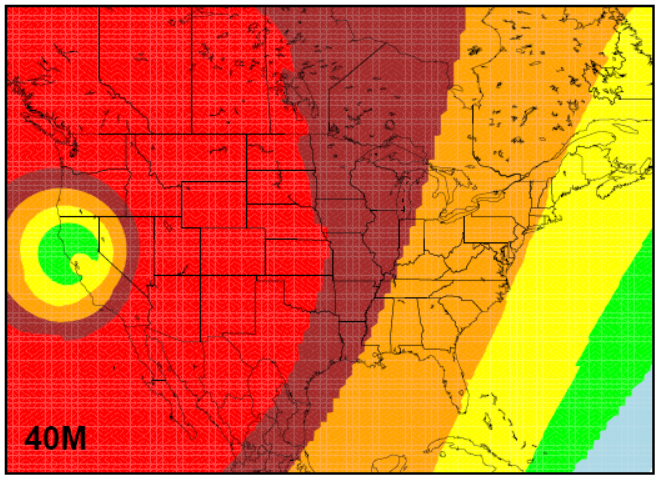
- K6TU.NET generates custom *VOAAREA* charts similar to the ones I generate by hand.

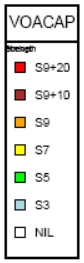
K6TU Has Created a Custom Website

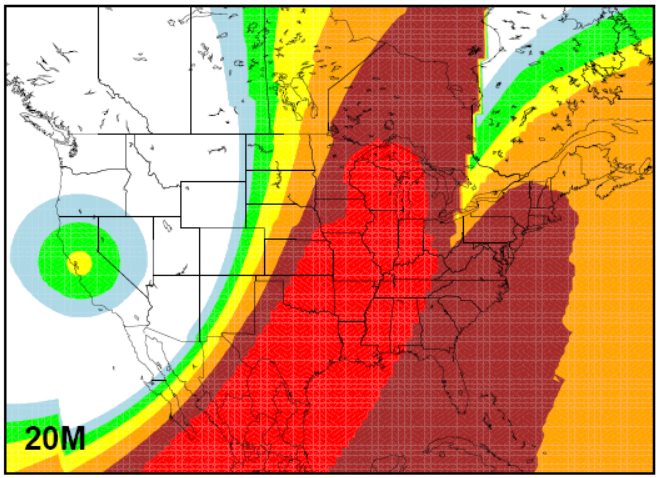
- K6TU.NET generates custom *VOAAREA* charts similar to the ones I generate by hand.
- You can specify antenna types and transmitter power levels.

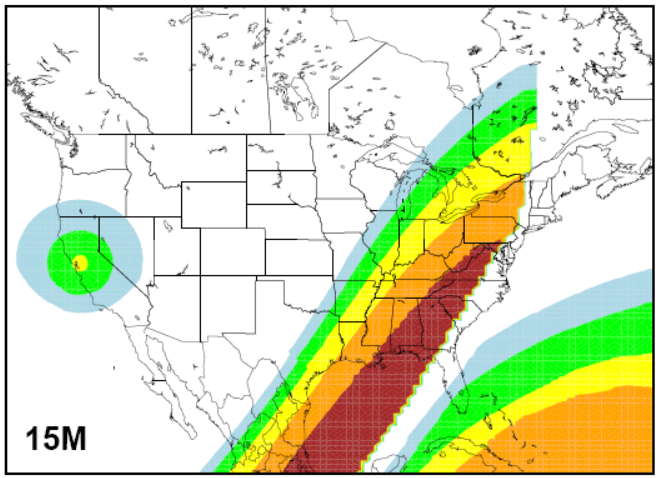
Prepared for: N6BV

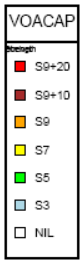
N6BV 14 UTC Nov 75ssn

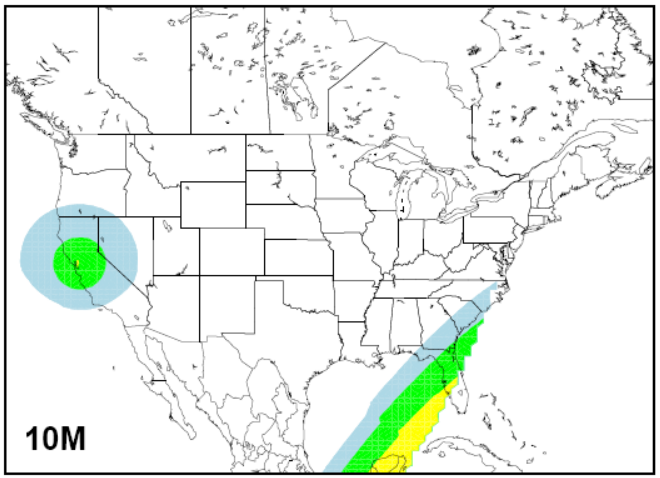












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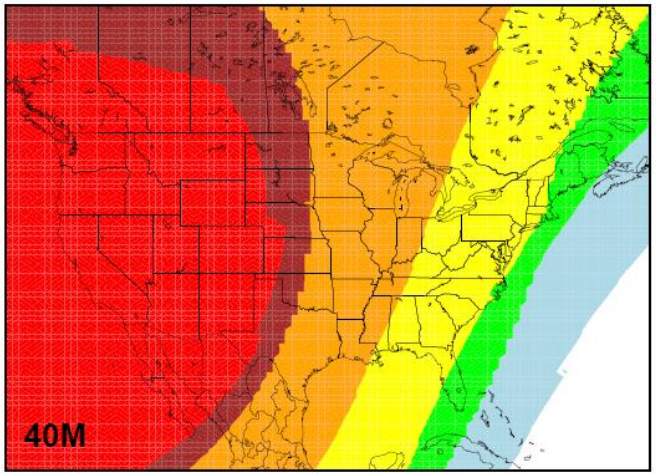
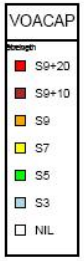
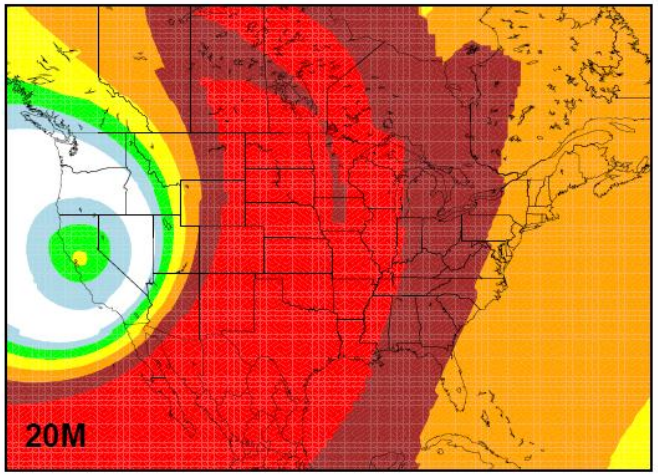
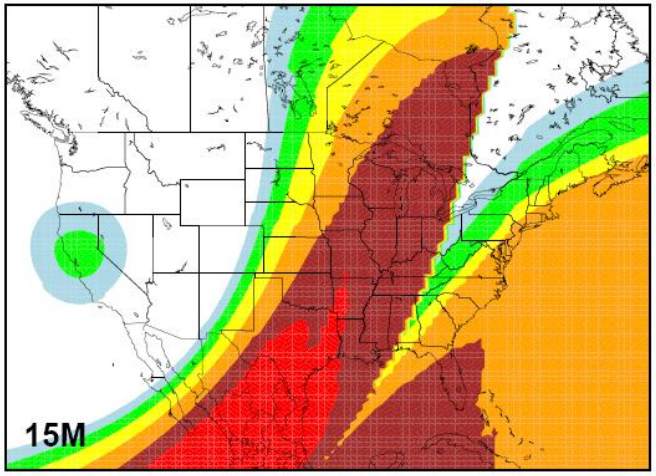
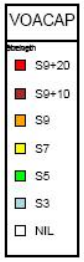
N6BV 15 UTC Nov 75ssn

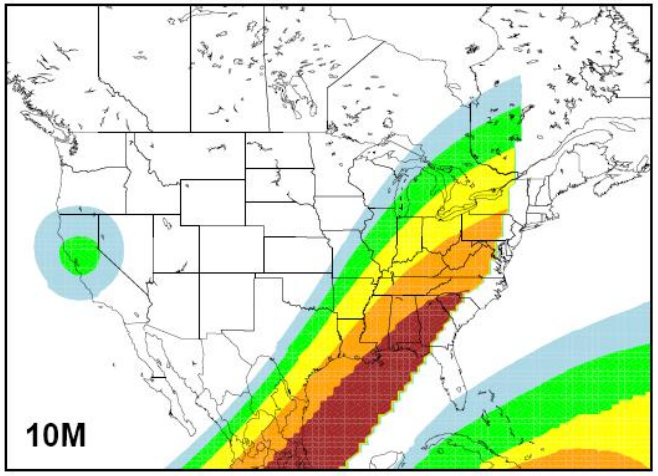












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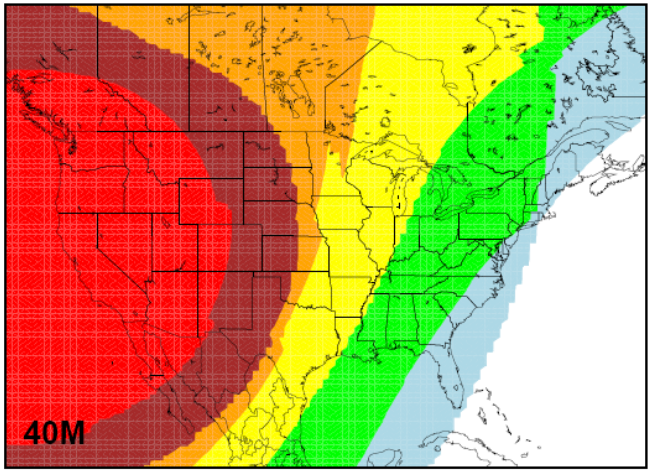
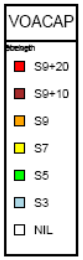
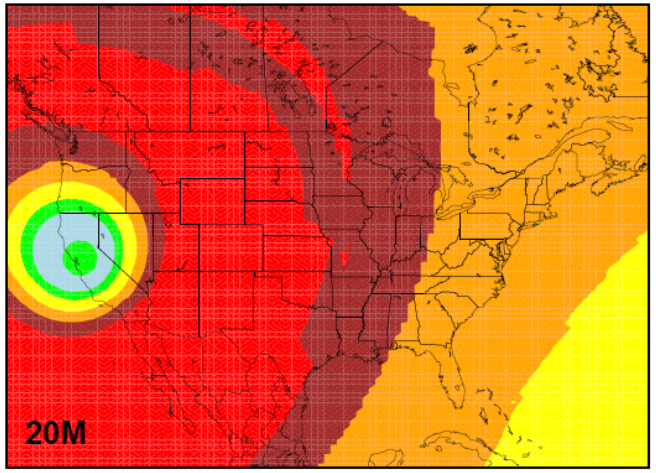
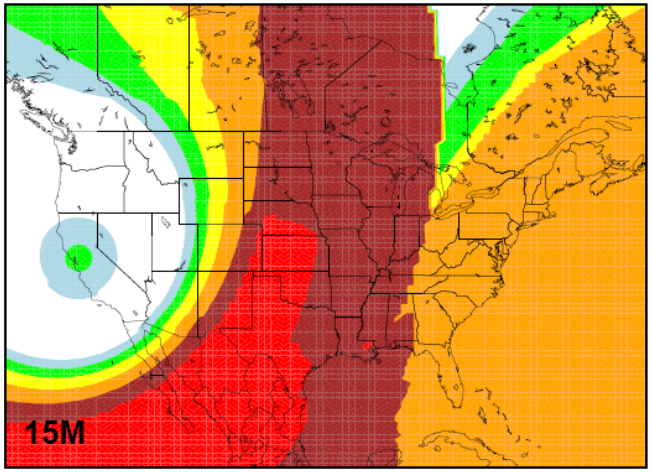
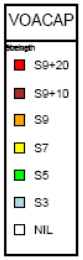
N6BV 16 UTC Nov 75ssn

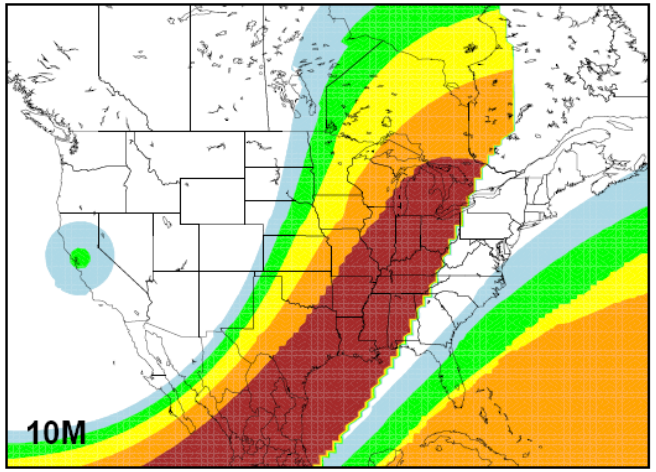












- And one of the many advantages to belonging to the Northern California Contest Club is that you get all 24 hours of K6TU's propagation predictions for free!

So How Did the Predictions Do in the 2010 Phone Sweepstakes?

CONTEST: ARRL-SS-SSB
CALLSIGN: N6BV
CATEGORY: SINGLE-OP ALL HIGH

QSO Rate Summary

Hour	160	80	40	20	15	10	Rate	Total	Pct
2100	0	0	0	0	119	0	119	119	7.1
2200	0	0	0	0	96	0	96	215	5.7
2300	0	0	0	82	22	0	104	319	6.2
0000	0	0	7	76	0	0	83	402	4.9
0100	0	0	88	0	0	0	88	490	5.2
0200	0	4	41	0	0	0	45	535	2.7
0300	0	11	18	0	0	0	29	564	1.7
0400	0	8	72	0	0	0	80	644	4.7
0500	0	7	74	0	0	0	81	725	4.8
0600	0	81	0	0	0	0	81	806	4.8
0700	0	59	9	0	0	0	68	874	4.0
0800	0	27	18	0	0	0	45	919	2.7
0900	0	0	0	0	0	0	0	919	0.0
1000	0	0	0	0	0	0	0	919	0.0
1100	0	0	0	0	0	0	0	919	0.0
1200	0	0	0	0	0	0	0	919	0.0
1300	0	0	0	0	0	0	0	919	0.0
1400	0	0	0	40	0	0	40	959	2.4
1500	0	0	0	8	71	0	79	1038	4.7
1600	0	0	0	57	7	0	64	1102	3.8
1700	0	0	0	74	2	0	76	1178	4.5
1800	0	0	0	21	1	44	66	1244	3.9
1900	0	0	0	62	0	10	72	1316	4.3
2000	0	0	0	8	50	0	58	1374	3.4
2100	0	0	3	70	0	0	73	1447	4.3
2200	0	0	0	60	0	0	60	1507	3.6
2300	0	0	12	23	0	0	35	1542	2.1
0000	0	0	56	0	0	0	56	1598	3.3
0100	0	0	24	0	0	0	24	1622	1.4
0200	0	0	62	0	0	0	62	1684	3.7
Total	0	197	484	581	368	54	1684		

Normally, my 1st hour rate is 140+. Precipitation static was murder on Saturday. Peak rates did follow the predictions however…

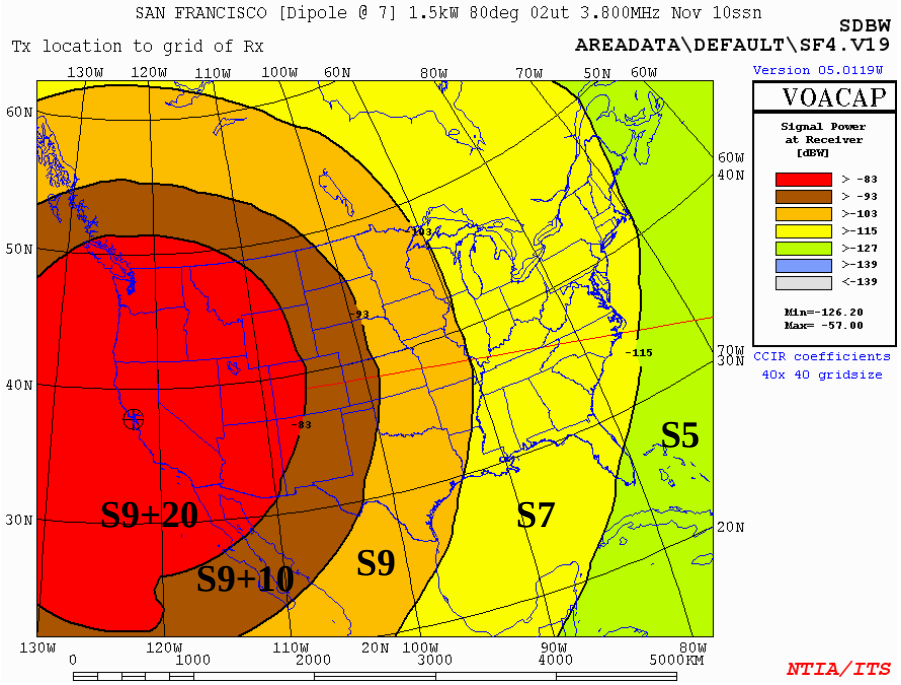
VOAAREA

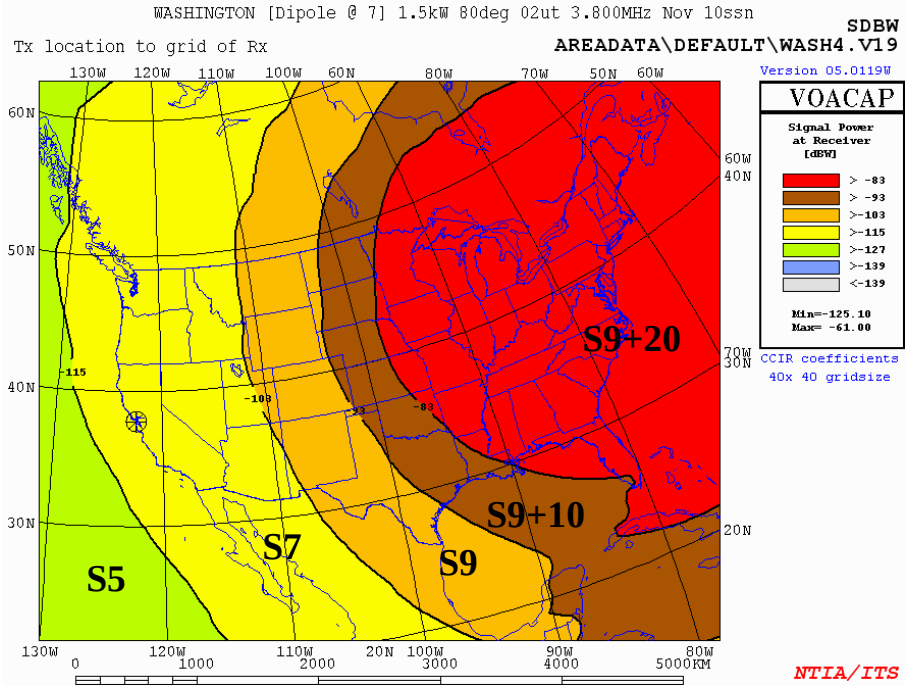
- Creating a *VOAAREA* movie manually is very labor intensive.

VOAAREA

- Creating a *VOAAREA* movie manually is very labor intensive.
- Moreover, *VOAAREA* movies don't show what the *competition* is doing… How strong is an East Coast station in the Sweepstakes on 75 meters compared to a W6, for example?

VOAAREA





Comparing 75-meter coverage for W3 in Washington, DC, to W6 in San Francisco. (Who's going to win in a pileup on a W1?)

Another Way of Looking at Area Coverage: N6BV Prediction Tables

- The N6BV Prediction Tables give detailed signal-strength predictions to aid in planning for a contest or DXpedition.

Detailed Prediction Table for 20 Meters

20 Meters: Jul., Eu. Russia (Moscow), for SSN = Low, Sigs in S-Units. (c) 2010 Dean Straw, N6BV

		UTC -->																						
	Zone	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
	KL7 = 01	4	4	8	8	7	8	8	9	8	5	6	6	7	8	8	8	6	5	4	8	6	5	5	4
	VO2 = 02	2	1*	1*	1*	-	-	-	-	2	8	8	8	8	8	8	8	9	9	9	9	9	9	8	5
USA	W6 = 03	5	5	6	6	7	8	8	7	5	4	2	2	1	2	7	8	8	8	8	7	6	6	6	6
USA	W9 = 04	8	7	7	7	6	2	-	-	-	-	1	6	6	8	8	8	8	7	7	7	7	7	8	8
USA	W3 = 05	8	7	6	7	2	4	1	1	2	5	8	7	8	8	8	8	8	7	7	8	8	8	8	8
	XE1 = 06	6	6	6	6	7	8	5	-	-	-	-	1	6	6	7	6	7	5	4	4	5	6	7	7
	TI = 07	8	6	6	6	7	8	6	4	1	1	3	7	6	6	6	5	5	3	4	4	5	7	8	8
	VP2 = 08	8	5	2	2	4	6	3	2	1	7	6	8	8	7	7	6	7	7	8	8	8	8	9	8
	P4 = 09	8	7	4	5	6	8	7	5	4	6	8	8	8	8	6	7	7	6	5	7	8	8	8	9
	HC = 10	8	8	6	6	7	8	9	8	7	6	5	5	6	5	3	4	4	2	2	3	5	6	8	8
	PY1 = 11	9	9	8	8	7	5	-	-	-	2	2	1	-	-	1	1	2	5	7	8	9	9	9	9
	CE = 12	8	8	5	5	7	8	7	5	-	-	-	1	-	2*	2*	1	1	1	2	6	6	7	9	9
	LU = 13	8	7	5	5	9	8	5	1	-	-	1	1	-	1*	1*	-	1	3	5	6	8	8	9	9
EU	G = 14	7	4*	2*	4	8	9+	9+	9+	9+	9+	9+	9+	9+	9+	9+	9+	9+	9+	9+	9+	9+	9+	9+	9
EU	I = 15	6	5	4	7	9	9+	9+	9+	9+	9+	9+	9+	9+	9+	9+	9+	9+	9+	9+	9+	9+	9+	9+	9
EU	UA3 = 16	8	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	8	8
EU	UN = 17	9	9	9+	9+	9+	5	6	8	8	8	8	2	9+	9+	9+	9+	9+	9+	9+	9+	9+	9+	9	9
EU	UA9 = 18	9	9+	9+	9+	9+	9+	7	8	9	8	9+	9+	9+	9+	9+	9+	9+	9+	9+	9+	9+	9+	9	9
EU	UA0 = 19	4	7	8	8	8	8	8	8	9	9	8	9	9	9	9	9	9	8	7	6	7	5	4	4
EU	4X = 20	9	9	9	9+	9+	9	9+	9+	9+	6	6	9+	9+	9+	9+	9+	9+	9+	9+	9+	9+	9+	9+	9+
EU	HZ = 21	9+	9	9+	9+	9	9	9	9	9	9	9	9	8	7	9	9+	9+	9+	9+	9	9+	9+	9+	9+
EU	VU = 22	4*	1	7	9	9	9	8	8	8	8	9	9	9	9	9+	9+	9+	9+	9+	9+	8	2	-	-
EU	JT = 23	1*	1	6	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	6	2	1*	-	-
JA	VR2 = 24	8	9	5	8	4	3	4	4	4	5	5	6	6	8	9	8	9	8	8	9	9	8	8	7
JA	JA1 = 25	8	8	7	8	8	8	8	8	8	8	8	8	9	9	9	9	9	9	9	8	9	8	8	8
	HS = 26	7	9	9	6	4	2	2	2	3	5	4	5	6	7	9	9	9	8	8	9+	9	9	8	6
	DU = 27	6	6	8	7	5	3	5	5	5	6	8	8	8	8	9	9	9	9	9	9	8	8	6	5
	YB = 28	8	8	7	5	5	1	2	2	3	5	5	7	8	8	9	9	8	9	9	9	6	4	1	7
	VK6 = 29	7	6	6	3	-	-	1*	1*	1	2	3	2	6	7	6	5	5	5	5	6	2	-	-	5
	VK3 = 30	5	4	2	-	1*	2*	3*	2*	-	1	1	4	5	5	6	7	8	8	8	9	8	8	8	6
	KH6 = 31	3	4	5	6	7	7	8	8	8	8	8	8	8	7	6	5	7	8	8	6	5	5	4	3
	KH8 = 32	-	1	2	8	8	6	7	4	4	5	5	8	8	8	8	5	-	1	3	7	6	3	1	-
	CN = 33	2*	2*	2*	2	3	5	8	9	9	9	9	9	9	9	9	9	9	9+	9+	9+	9+	9+	8	4
	SU = 34	9+	9	9	9+	9+	9	6	5	8	8	8	7	4	9+	9+	9+	9+	9+	9+	9+	9+	9+	9+	9+
	6W = 35	9	5	2	2	5	5	9	7	6	2	4	4	3	4	4	8	9	9	9	9+	9+	9+	9+	9
	D2 = 36	9	7	4	-	1	8	7	6	2	2	3	3	4	5	6	8	9	9	9	9	9	9	9	9
	5Z = 37	7	3	1	8	8	8	6	5	4	3	2	4	6	7	8	9	9	9+	9+	9+	9	9	9	8
	ZS6 = 38	3	1	-	-	-	7	5	3	2	1	1	1	1	3	6	8	9	9	9	9	8	5	1	-
	FR = 39	7	-	1	8	8	9	5	3	2	2	1	4	5	7	8	9	9	9	9	9	9	9	9	9
	FJL = 40	7	7	8	9	9	9	9+	9+	9+	9+	9+	9+	9+	9+	9+	9+	9+	9+	9+	9+	9	9	9	8
	Zone	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
		UTC -->							* = Longpath																

Expected signal levels using 1500 W and 12 dBi isotropic antennas.

20-meter band, 24 hours, 40 CQ Zones around the world.

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- The N6BV Prediction Tables give detailed signal-strength predictions to aid in planning for a contest or DXpedition.
- Large geographic areas are much easier to see in a detailed table than in a worldwide map.

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- The N6BV Prediction Tables give detailed signal-strength predictions to aid in planning for a contest or DXpedition.
- Large geographic areas are much easier to see in a detailed table than in a worldwide map.
- Long-path openings aren't shown in a map.
- However, a complex table can be visually overwhelming!

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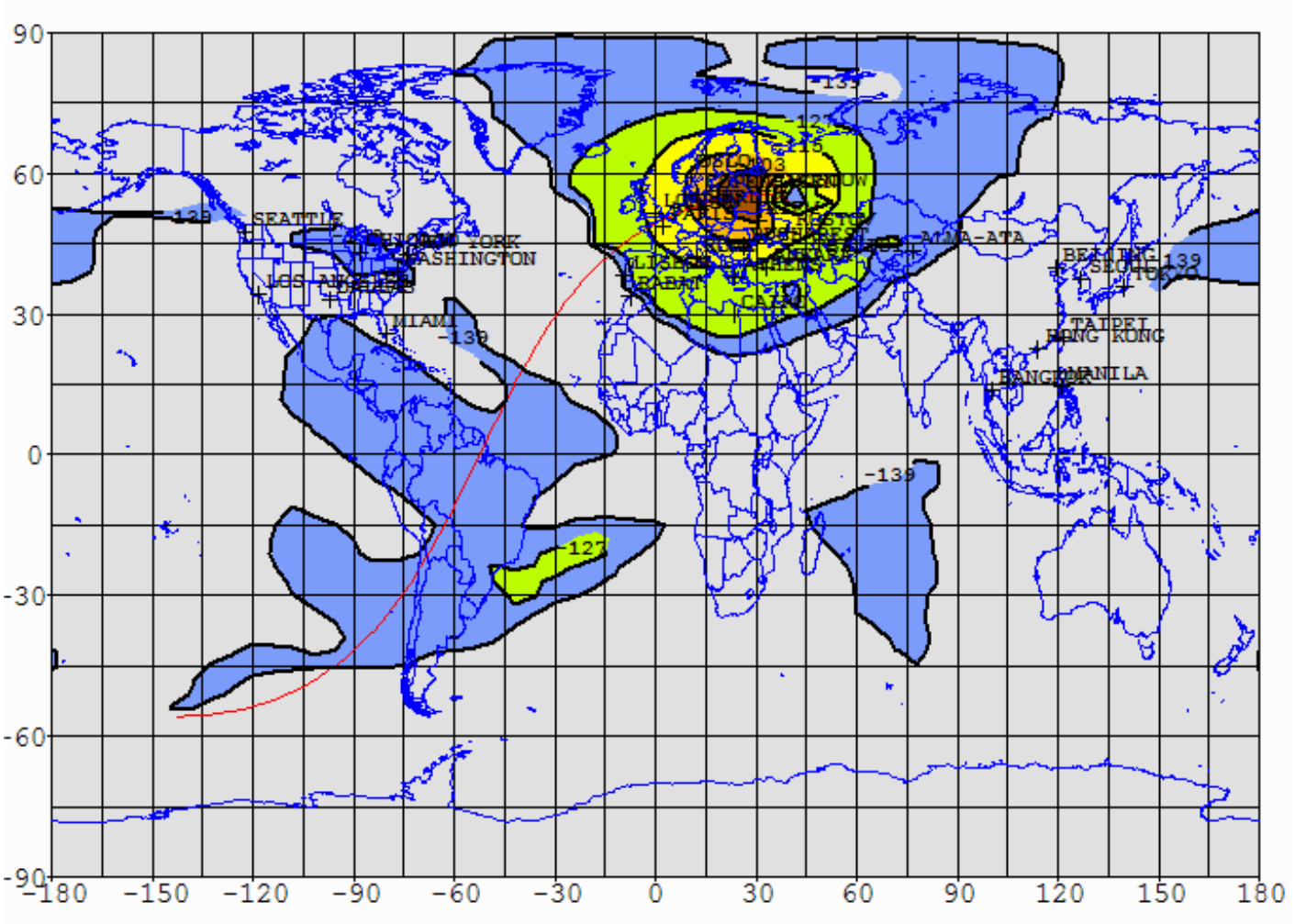
Worldwide Mercator Projection Loses Detail.



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Detailed Prediction Table for 20 Meters

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USA

EU

JA

Zone	UTC --> 00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
KL7 = 01	4	4	8	8	7	8	8	9	8	5	6	6	7	8	8	8	6	5	4	8	6	5	5	4
VO2 = 02	2	1*	1*	1*	-	-	-	-	2	8	8	8	8	8	8	8	9	9	9	9	9	9	8	5
W6 = 03	5	5	6	6	7	8	8	7	5	4	2	2	1	2	7	8	8	8	8	7	6	6	6	6
W9 = 04	8	7	7	7	6	2	-	-	-	-	1	6	6	8	8	8	8	7	7	7	7	7	8	8
W3 = 05	8	7	6	7	2	4	1	1	2	5	8	7	8	8	8	8	8	7	7	8	8	8	8	8
XE1 = 06	6	6	6	6	7	8	5	-	-	-	-	1	6	6	7	6	7	5	4	4	5	6	7	7
TI = 07	8	6	6	6	7	8	6	4	1	1	3	7	6	6	6	5	5	3	4	4	5	7	8	8
VP2 = 08	8	5	2	2	4	6	3	2	1	7	6	8	8	7	7	6	7	7	8	8	8	8	9	8
P4 = 09	8	7	4	5	6	8	7	5	4	6	8	8	8	8	6	7	7	6	5	7	8	8	8	9
HC = 10	8	8	6	6	7	8	9	8	7	6	5	5	6	5	3	4	4	2	2	3	5	6	8	8
PY1 = 11	9	9	8	8	7	5	-	-	-	2	2	1	-	-	1	1	2	5	7	8	9	9	9	9
CE = 12	8	8	5	5	7	8	7	5	-	-	-	1	-	2*	2*	1	1	1	2	6	6	7	9	9
LU = 13	8	7	5	5	9	8	5	1	-	-	1	1	-	1*	1*	-	1	3	5	6	8	8	9	9
G = 14	7	4*	2*	4	8	9+	9+	9+	9+	9+	9+	9+	9+	9+	9+	9+	9+	9+	9+	9+	9+	9+	9+	9
I = 15	6	5	4	7	9	9+	9+	9+	9+	9+	9+	9+	9+	9+	9+	9+	9+	9+	9+	9+	9+	9+	9+	9
UA3 = 16	8	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	8	8
UN = 17	9	9	9+	9+	9+	5	6	8	8	8	8	2	9+	9+	9+	9+	9+	9+	9+	9+	9+	9+	9	9
UA9 = 18	9	9+	9+	9+	9+	9+	7	8	9	8	9+	9+	9+	9+	9+	9+	9+	9+	9+	9+	9+	9+	9	9
UA0 = 19	4	7	8	8	8	8	8	8	9	9	8	9	9	9	9	9	9	8	7	6	7	5	4	4
4X = 20	9	9	9	9+	9+	9	9+	9+	9+	6	6	9+	9+	9+	9+	9+	9+	9+	9+	9+	9+	9+	9+	9+
HZ = 21	9+	9	9+	9+	9	9	9	9	9	9	9	9	8	7	9	9+	9+	9+	9+	9	9+	9+	9+	9+
VU = 22	4*	1	7	9	9	9	8	8	8	8	9	9	9	9	9+	9+	9+	9+	9+	9+	8	2	-	-
JT = 23	1*	1	6	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	6	2	1*	-	-
VR2 = 24	8	9	5	8	4	3	4	4	4	5	5	6	6	8	9	8	9	8	8	9	9	8	8	7
JA1 = 25	8	8	7	8	8	8	8	8	8	8	8	8	9	9	9	9	9	9	9	8	9	8	8	8
HS = 26	7	9	9	6	4	2	2	2	3	5	4	5	6	7	9	9	9	8	8	9+	9	9	8	6
DU = 27	6	6	8	7	5	3	5	5	5	6	8	8	8	8	9	9	9	9	9	9	8	8	6	5
YB = 28	8	8	7	5	5	1	2	2	3	5	5	7	8	8	9	9	8	9	9	9	6	4	1	7
VK6 = 29	7	6	6	3	-	-	1*	1*	1	2	3	2	6	7	6	5	5	5	5	6	2	-	-	5
VK3 = 30	5	4	2	-	1*	2*	3*	2*	-	1	1	4	5	5	6	7	8	8	8	9	8	8	8	6
KH6 = 31	3	4	5	6	7	7	8	8	8	8	8	8	8	7	6	5	7	8	8	6	5	5	4	3
KH8 = 32	-	1	2	8	8	6	7	4	4	5	5	8	8	8	8	5	-	1	9	7	6	3	1	-
CN = 33	2*	2*	2*	2	3	5	8	9	9	9	9	9	9	9	9	9	9	9+	9+	9+	9+	9+	8	4
SU = 34	9+	9	9	9+	9+	9	6	5	8	8	8	7	4	9+	9+	9+	9+	9+	9+	9+	9+	9+	9+	9+
6W = 35	9	5	2	2	5	5	9	7	6	2	4	4	3	4	4	8	9	9	9	9+	9+	9+	9+	9
D2 = 36	9	7	4	-	1	8	7	6	2	2	3	3	4	5	6	8	9	9	9	9	9	9	9	9
5Z = 37	7	3	1	8	8	8	6	5	4	3	2	4	6	7	8	9	9	9+	9+	9+	9	9	9	8
ZS6 = 38	3	1	-	-	-	7	5	3	2	1	1	1	1	3	6	8	9	9	9	9	8	5	1	-
FR = 39	7	-	1	8	8	9	5	3	2	2	1	4	5	7	8	9	9	9	9	9	9	9	9	9
FJL = 40	7	7	8	9	9	9	9+	9+	9+	9+	9+	9+	9+	9+	9+	9+	9+	9+	9+	9+	9	9	9	8
Zone	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23

UTC --> * = Longpath

Expected signal levels using 1500 W and 12 dBi isotropic antennas.

Lots of detail can be a little overwhelming…

Summary, HF Propagation Planning

- I have presented two ways to see “the big picture” of worldwide HF propagation for contest or DX planning.

  1. *VOAAREA* maps

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- I have presented two ways to see "the big picture" of worldwide HF propagation for contest or DX planning.

  1. *VOAAREA* maps
  2. N6BV Prediction Tables

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Summary, HF Propagation Planning

- I have presented two ways to see "the big picture" of worldwide HF propagation for contest or DX planning.

  1. *VOAAREA* maps
  2. N6BV Prediction Tables
  3. Of course, the best way to experience HF propagation is actually getting on the air and working some stations!

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