Another Way to View Propagation Predictions for DXing and Contesting

By R. Dean Straw, N6BV

Senior Assistant Technical Editor, ARRL

Friday, May 19, 2006

Dayton Hamvention

Dayton, OH

I will talk about the following:

- Area-coverage predictions using *VOAAREA*.
- I will compare *VOAAREA* predictions to actual results for the 2005 Sweepstakes Phone contest.
- I will discuss how to make customized antennas for *VOAAREA*.

The *VOAAREA* Program

- *VOAAREA* is one of the programs in the software suite that come with *VOACAP*.
- *VOAAREA* creates customizable contours on several selectable map projections.
- One of the key parameters is setting the antenna properly, for both receiver and transmitter.

Table of Sigs/Elevs -- Chicago

04 = Zone, Nov., CA (San Francisco) to IL (Chicago), SSN = Very Low, S-Units

	3.8	3.8	7.1	7.1	14.1	14.1	21.2	21.2	28.6	28.6
GMT	Sig	Elev	Sig	Elev	Sig	Elev	Sig	Elev	Sig	Elev
0	9+	29.3	9+	22.6	9+	2.6	4	5.9	-	-
1	9+	22.1	9+	13.9	9+	6.1	-	-	-	-
2	9+	22.9	9+	15.7	9	6.3	-	-	-	-
3	9+	24.3	9	10.3	4	6.7	-	-	-	-
4	9+	25.7	9+	11.4	2	5.3	-	-	-	-
5	9+	26.2	9+	11.5	2	7.6	-	-	-	-
6	9+	25.9	9+	11.1	4	7.5	-	-	-	-
7	9+	25.2	9+	10.6	6	7.2	-	-	-	-
8	9+	24.7	9+	17.6	8	7.0	-	-	-	-
9	9+	24.8	9+	17.6	7	7.1	-	-	-	-
10	9+	25.7	9+	19.4	5	7.5	-	-	-	-
11	9+	26.8	9	4.1	-	-	-	-	-	-
12	9+	27.0	9	4.2	-	-	-	-	-	-
13	9+	25.6	9+	18.3	7	7.7	-	-	-	-
14	9+	31.5	9+	14.9	9+	4.9	-	-	-	-
15	9	27.5	9+	22.3	9+	2.4	9	6.3	-	-
16	5	34.7	9	15.6	9+	15.1	9+	6.4	1	6.0
17	-	-	9	22.4	9+	13.8	9+	3.1	5	6.0
18	-	-	7	22.5	9+	13.1	9	2.3	7	5.8
19	-	-	7	23.5	9+	13.0	9	2.2	8	5.9
20	-	-	7	23.7	9+	13.8	9+	2.6	8	5.8
21	-	-	9	17.9	9+	14.3	9+	3.1	6	6.1
22	7	34.9	9+	15.4	9+	14.8	9+	3.6	1	6.0
23	9	30.9	9+	21.9	9+	2.1	9+	5.9	-	-

Decent 15 meter opening predicted

Some 10 meter signals predicted

I've presented this tabular format in various forums in the past.

Table of Sigs/Elevs – Washington, DC

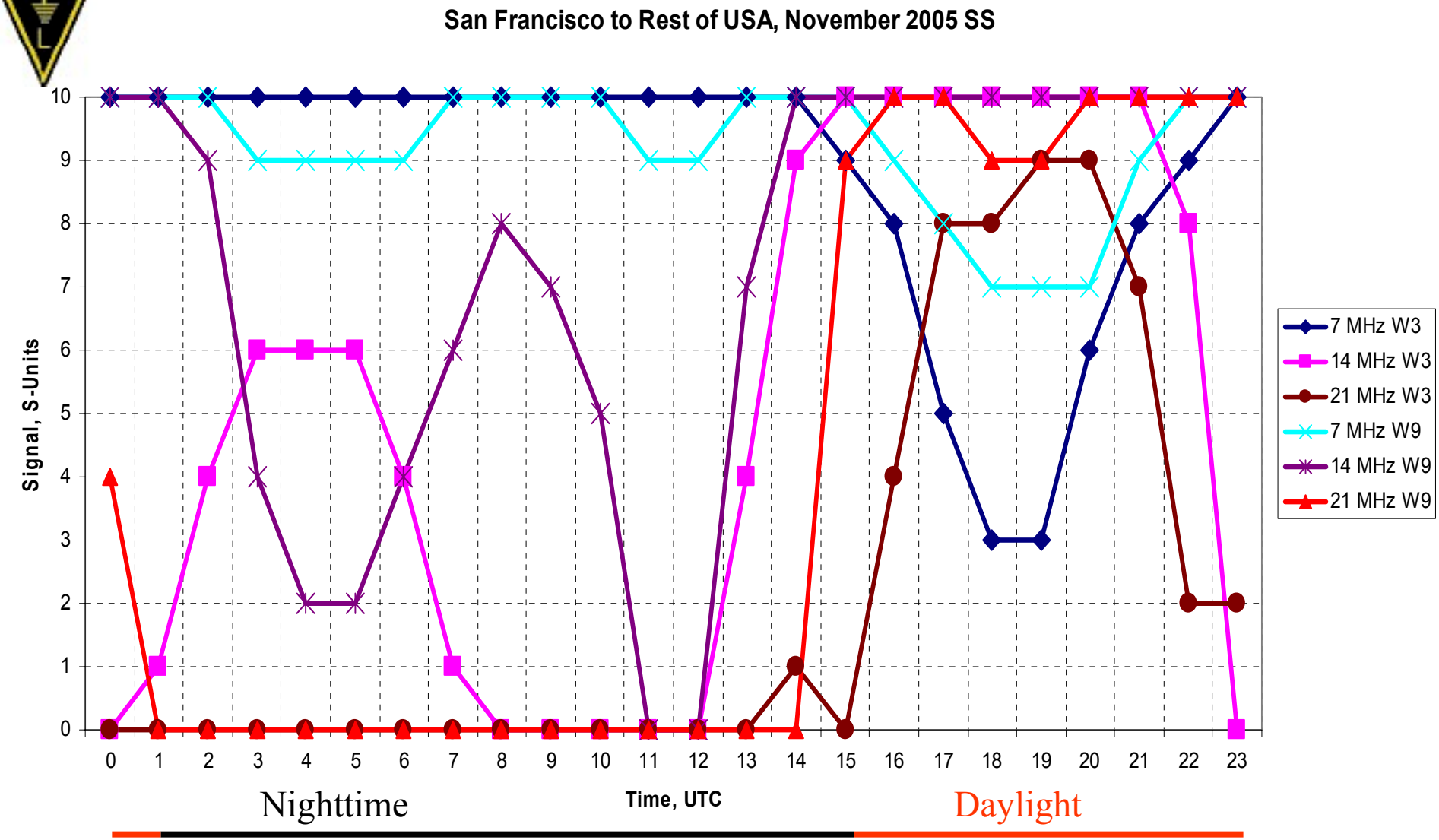
05 = Zone, Nov., CA (San Francisco) to Washington (D.C.), SSN = Very Low, S-Units

	3.8	3.8	7.1	7.1	14.1	14.1	21.2	21.2	28.6	28.6
GMT	Sig	Elev	Sig	Elev	Sig	Elev	Sig	Elev	Sig	Elev
0	9	21.9	9+	15.7	9	13.3	-	-	-	-
1	9+	22.1	9+	17.0	1	13.7	-	-	-	-
2	9+	23.2	9+	9.5	4	1.2	-	-	-	-
3	9+	24.7	9+	10.8	1	1.6	-	-	-	-
4	9+	25.9	9+	11.9	1	2.0	-	-	-	-
5	9+	26.3	9+	12.0	2	2.1	-	-	-	-
6	9+	25.8	9+	11.3	3	2.0	-	-	-	-
7	9+	25.0	9+	10.7	5	1.8	-	-	-	-
8	9+	24.5	9+	10.3	6	1.6	-	-	-	-
9	9+	24.8	9+	10.5	6	1.7	-	-	-	-
10	9+	25.8	9+	11.3	2	2.1	-	-	-	-
11	9+	26.7	9+	12.4	-	-	-	-	-	-
12	9+	26.0	9+	11.7	1	2.3	-	-	-	-
13	9	24.2	9+	19.2	8	1.9	-	-	-	-
14	8	23.9	9+	16.1	8	14.4	1	1.3	-	-
15	4	26.9	9	15.4	9+	8.5	-	-	-	-
16	-	-	8	16.7	9+	7.7	4	13.1	-	-
17	-	-	5	21.7	9+	7.4	8	12.6	-	-
18	-	-	3	22.7	9	15.7	8	13.0	-	-
19	-	-	3	24.1	9+	9.0	9	13.1	-	-
20	-	-	6	19.2	9+	8.5	9	13.0	-	-
21	1	34.8	8	17.6	9+	8.4	7	13.3	-	-
22	4	27.5	9	15.9	9+	8.4	2	13.2	-	-
23	8	23.3	9+	21.7	9+	9.1	2	13.2	-	-

No 10 meters

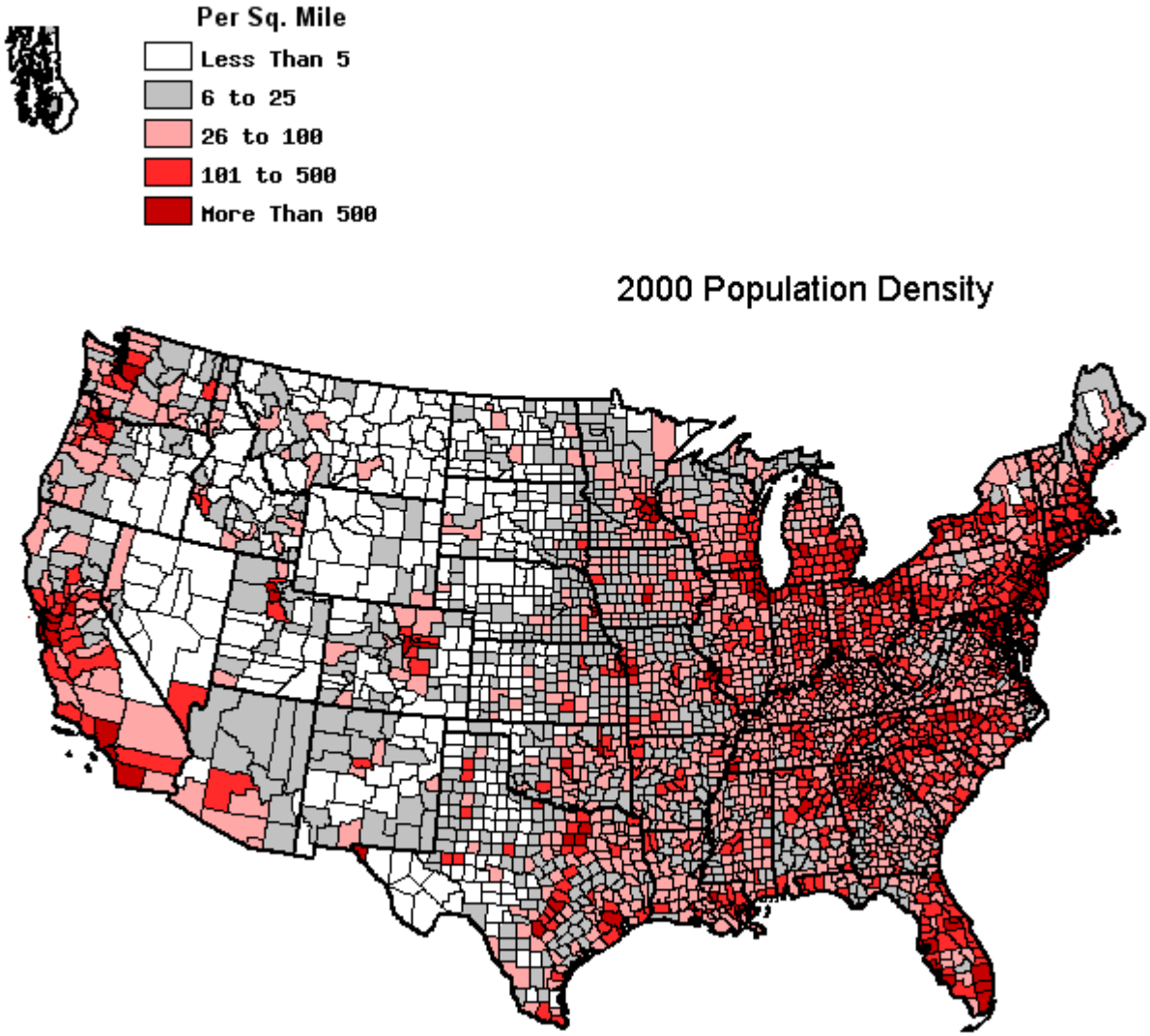
15 meters doesn't last long

“Traditional” Summary, All Bands



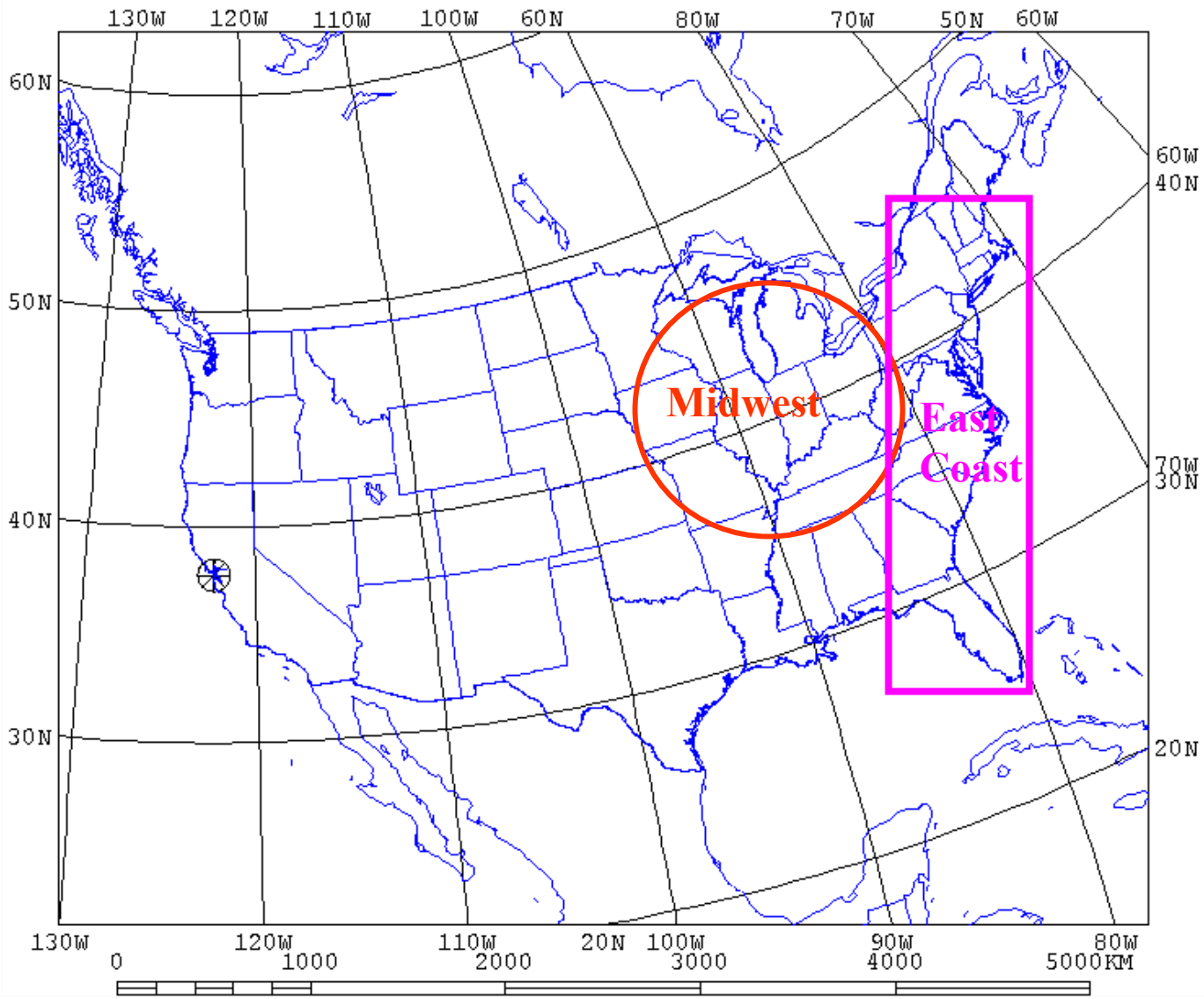
Complicated, isn’t it??

Coverage – Most Populous Areas



US Census 2000 Data

Coverage – Most Populous Areas



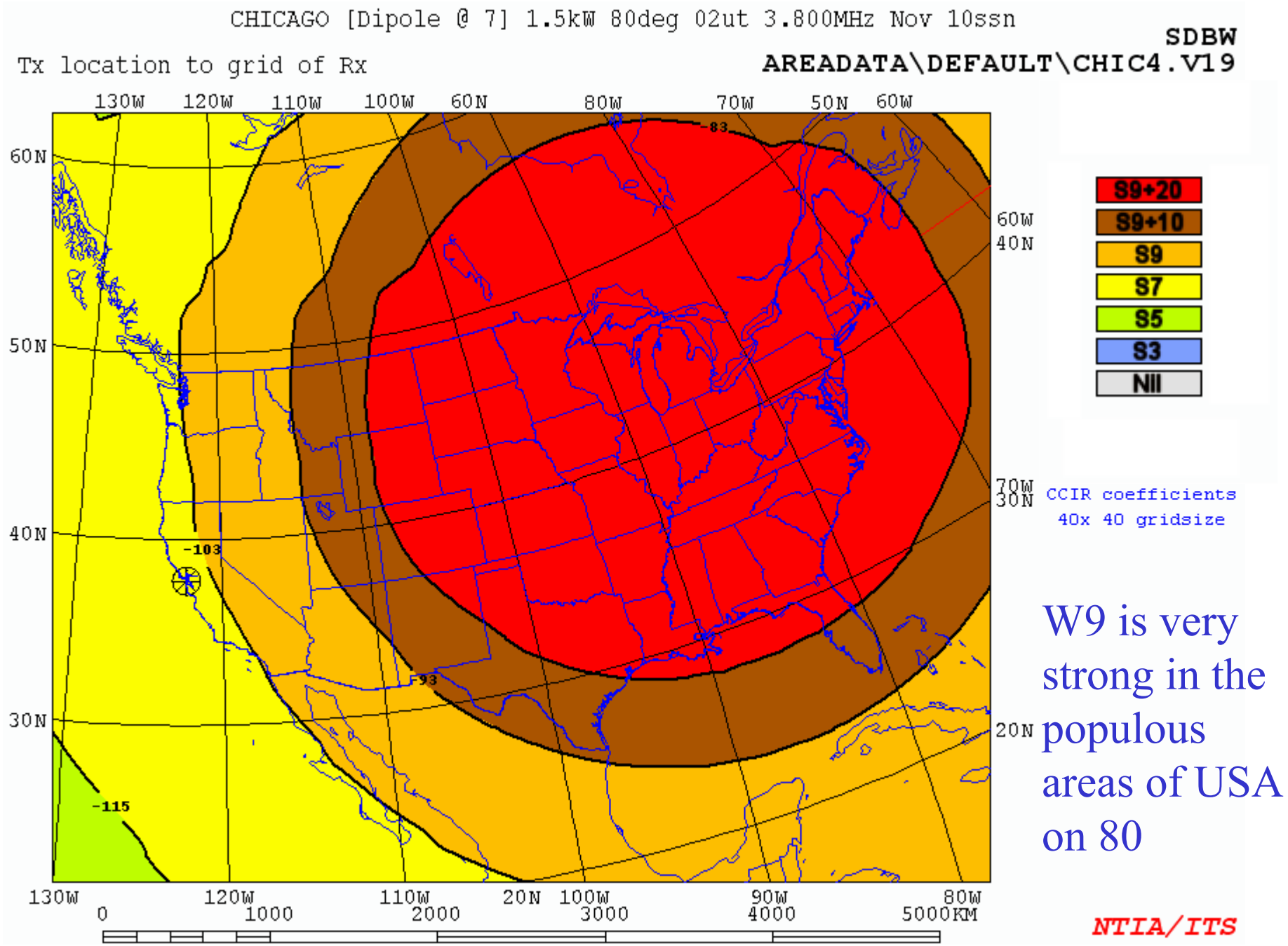
NTIA/ITS

Sweepstakes 2005 Modeling Assumptions for *VOAAREA*

- Antennas: 3-element Yagi at 55 feet over flat ground for 20, 15 and 10 meters.
- Antennas for 40 and 80 meters: Dipoles at 75 feet over flat ground.
- Antenna are a little smaller than my usual assumptions but represent realistic stations.
- 1500 W of RF power.
- Very Low SSN = 10.

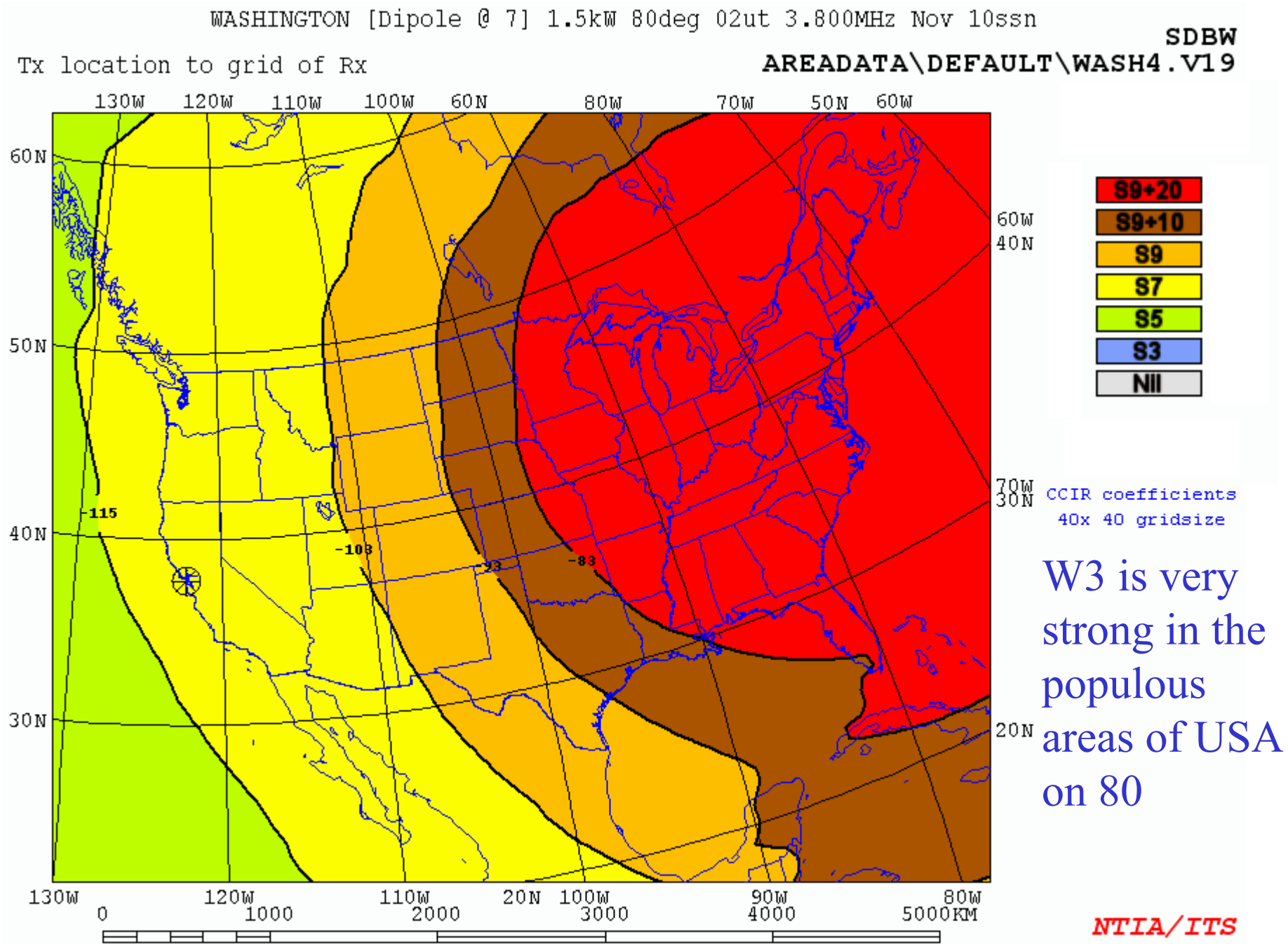
80-Meter Coverage

- Unless you have really big antennas on 80 meters, this band can be very challenging in Sweepstakes from California.
- Particularly to the East Coast.
- The area coverage plots that follow are centered on Chicago, Washington (DC) and San Francisco.

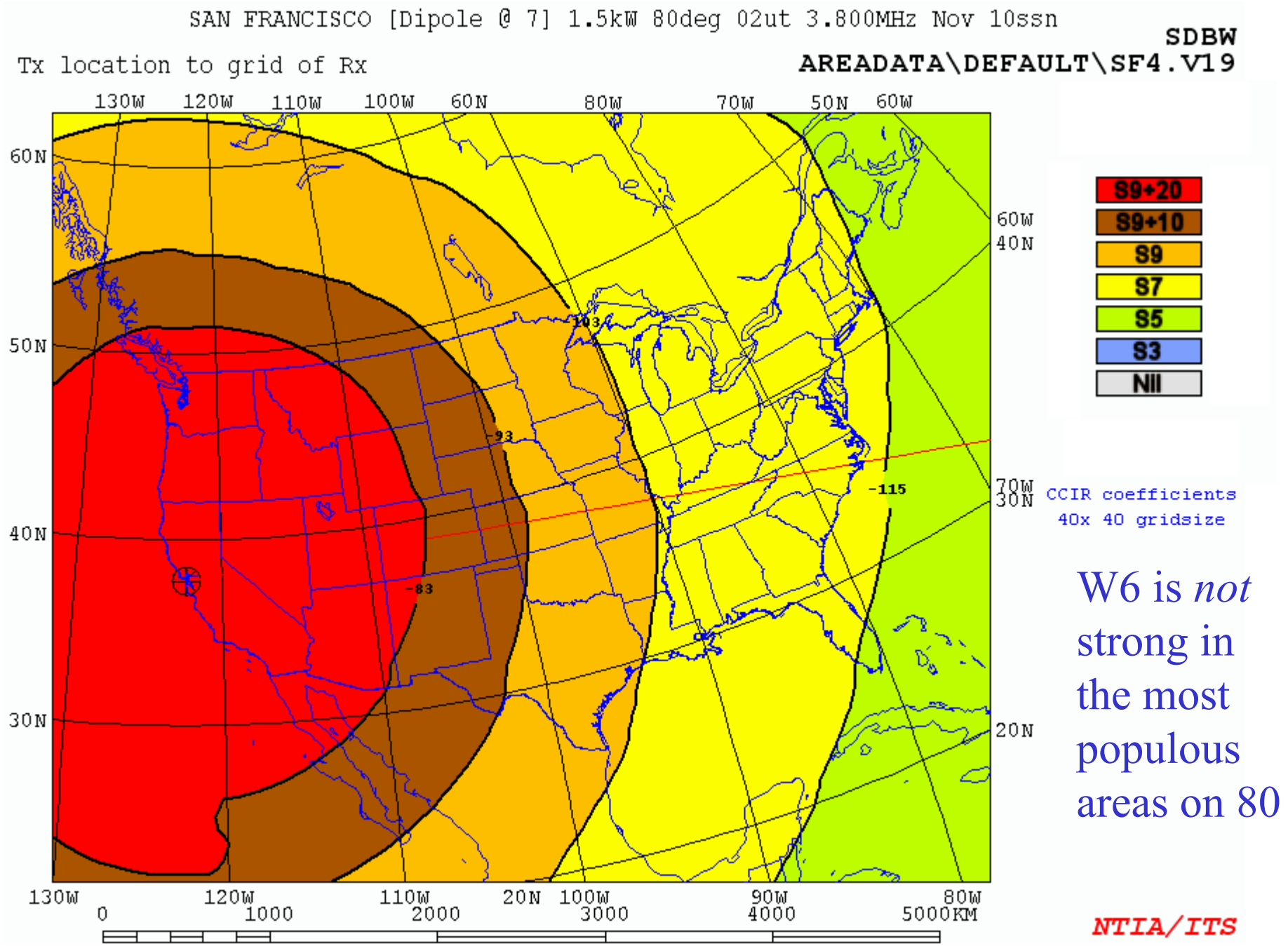


W9 is very strong in the populous areas of USA on 80

NTIA/ITS



W3 is very strong in the populous areas of USA on 80

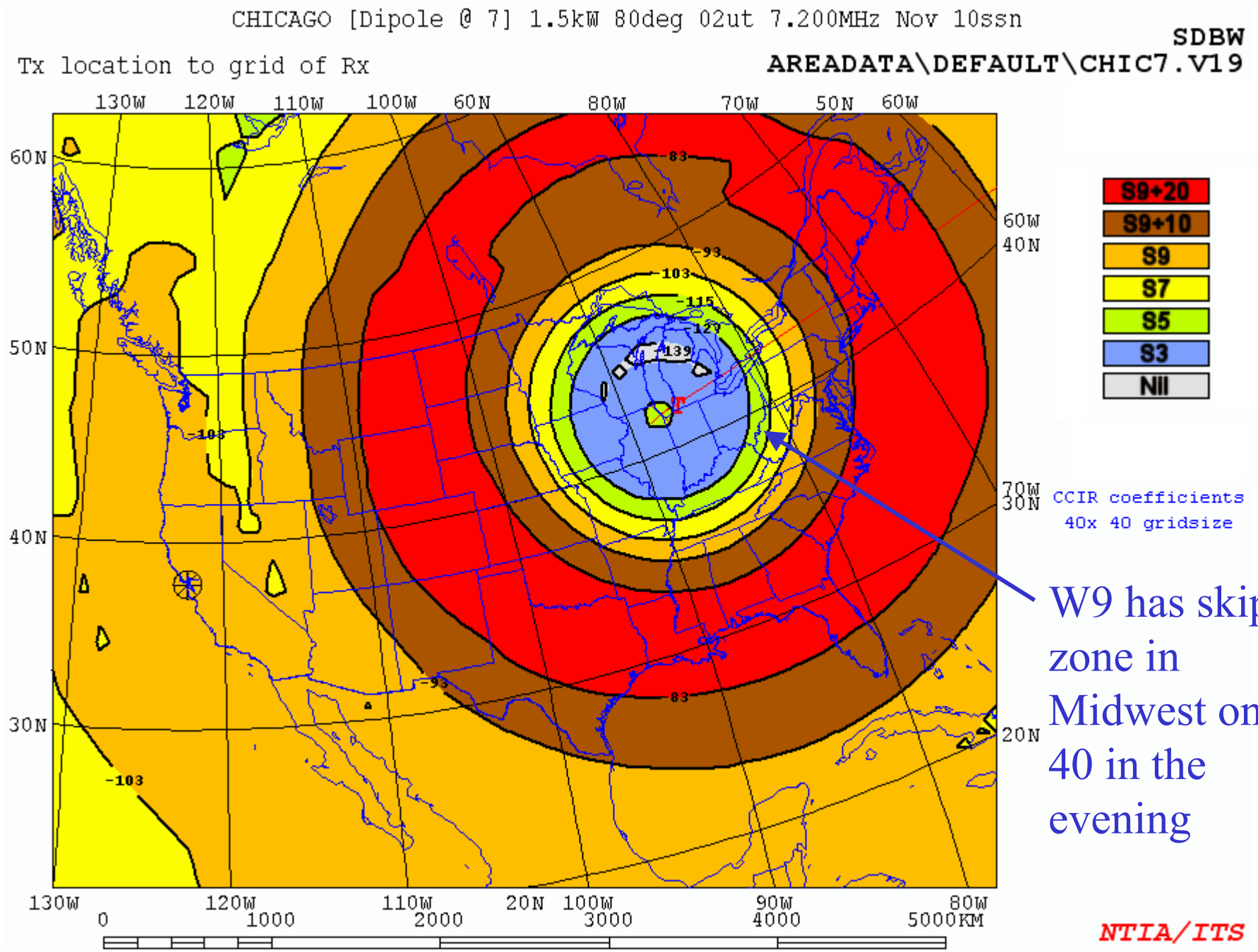


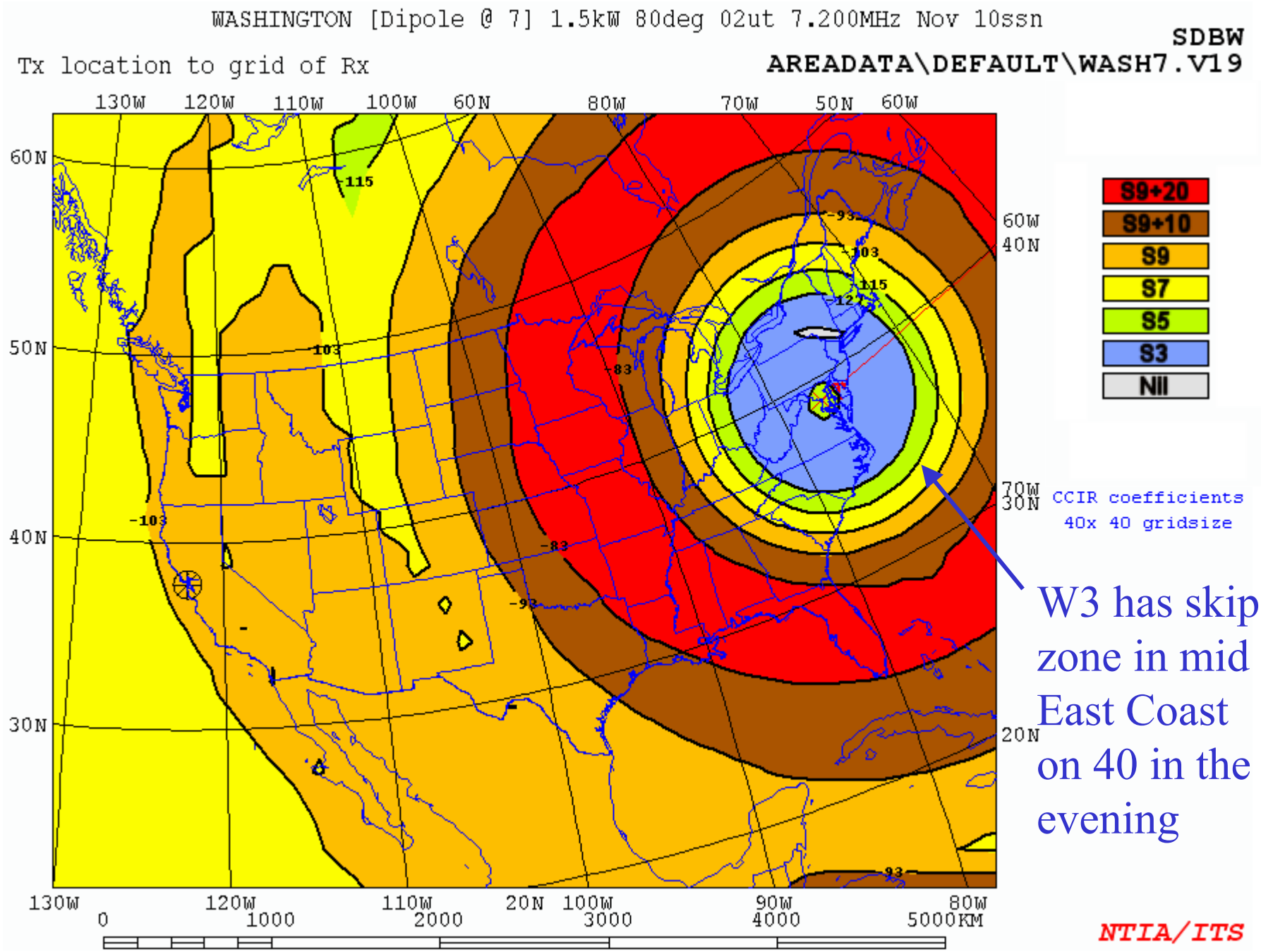
W6 is *not* strong in the most populous areas on 80

NTIA/ITS

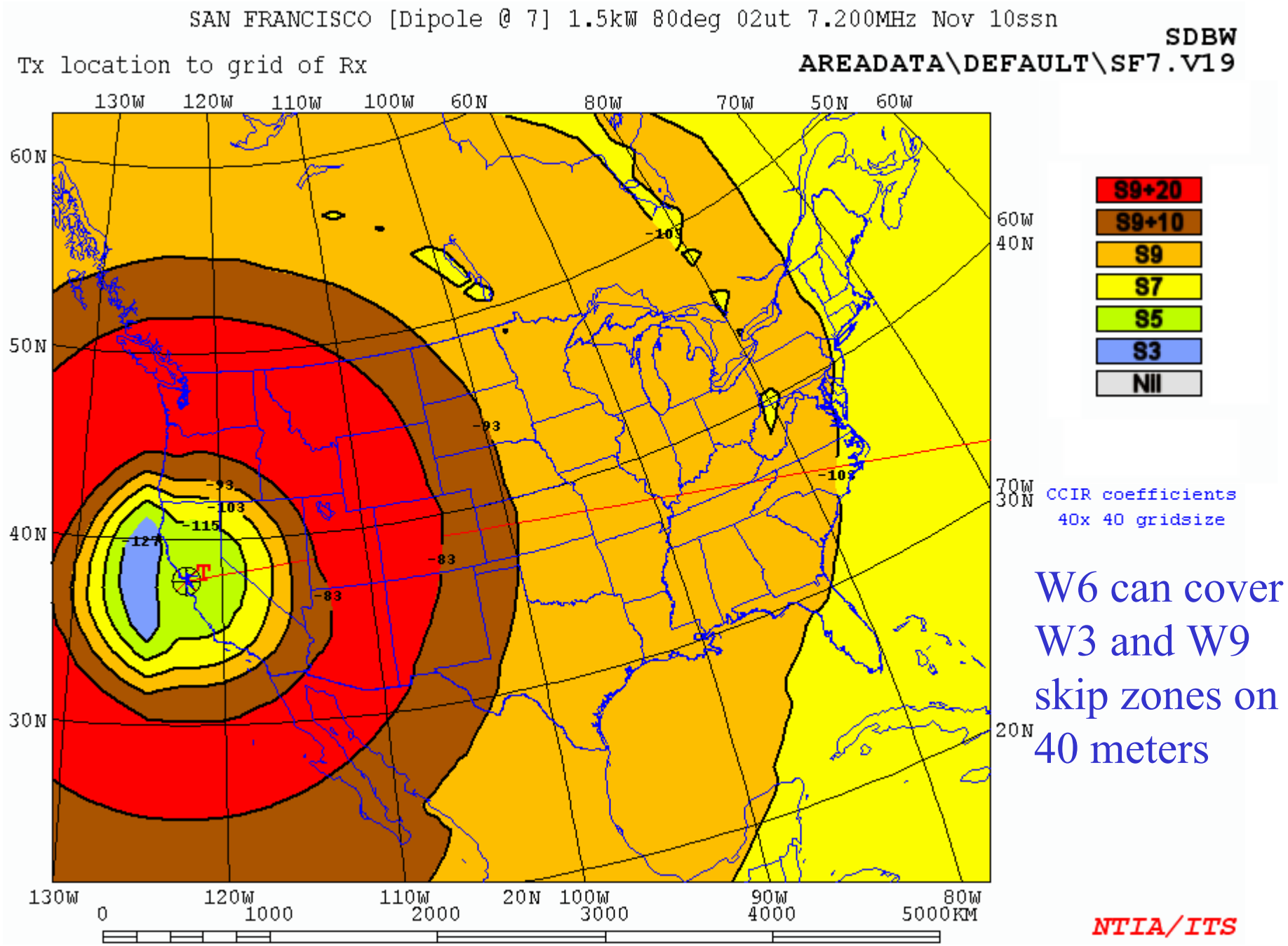
40-Meter Coverage

- Bigger antennas help on 40 meters (although dipoles don't do badly).
- Big antennas are needed on phone, especially to run the East Coast.
- QRO is important for rate on 40.
- There are times when the East Coast and Midwest go "long skip" and then Californians can have some advantages.


CHICAGO [Dipole @ 7] 1.5kW 80deg 02ut 7.200MHz Nov 10ssn
SDBW
AREADATA\DEFAULT\CHIC7.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
-83
-93
-103
-115
-127
-139
S9+20
S9+10
S9
S7
S5
S3
Nil
CCIR coefficients
40x 40 gridsize
130W 120W 110W 20N 100W 90W 80W
0 1000 2000 3000 4000 5000KM
W9 has skip zone in Midwest on 40 in the evening
NTIA/ITS



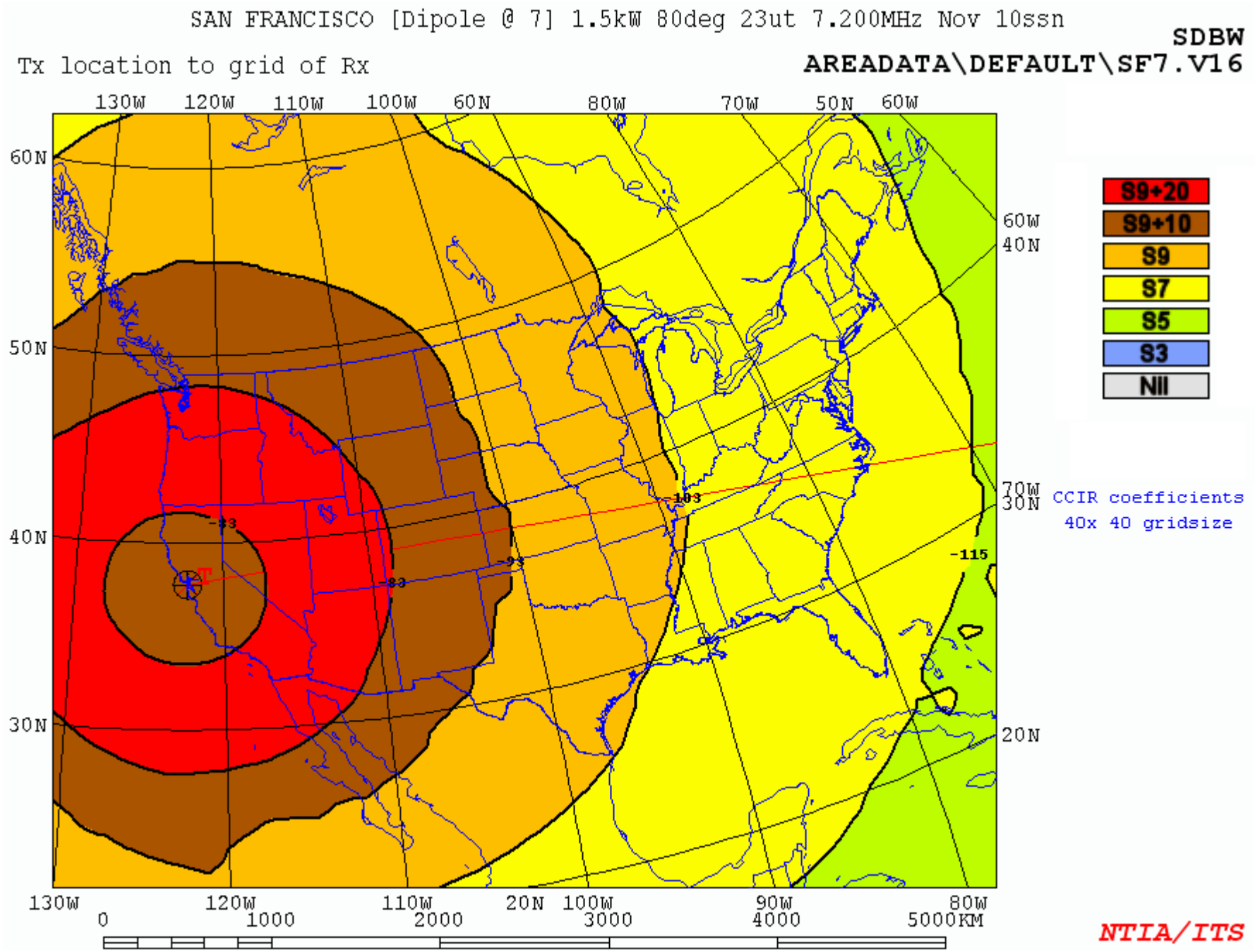
W3 has skip zone in mid East Coast on 40 in the evening

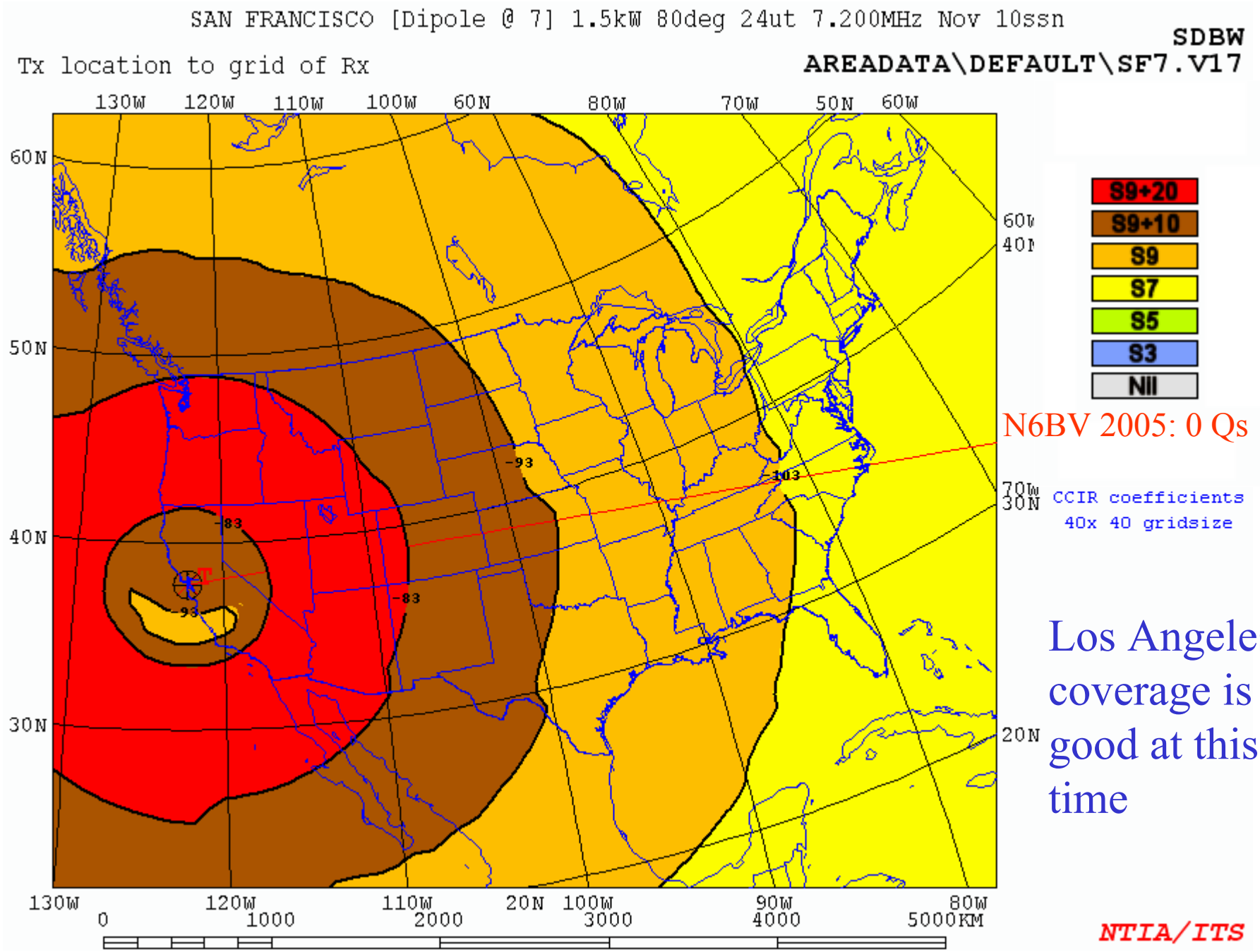


W6 can cover W3 and W9 skip zones on 40 meters

40-Meter Slideshow

- From 23 UTC to 12 UTC (late afternoon to East Coast sunrise).
- Assumes 75-foot high 40-meter dipoles.
- Assumes 1500 W.

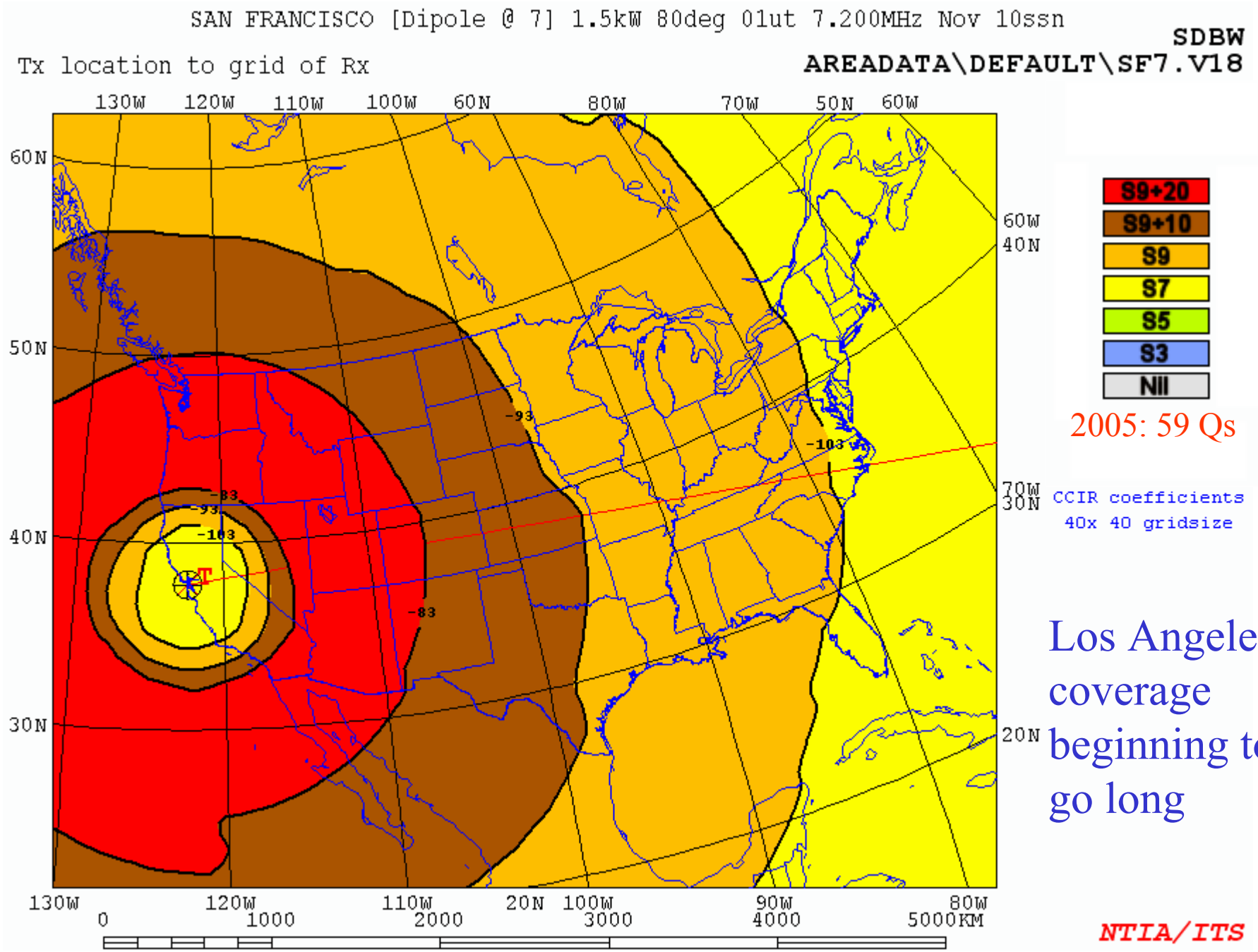

SAN FRANCISCO [Dipole @ 7] 1.5kW 80deg 23ut 7.200MHz Nov 10ssn
SDBW
AREADATA\DEFAULT\SF7.V16
Tx location to grid of Rx
130W 120W 110W 100W 60N 80W 70W 50N 60W
60N
50N
40N
30N
60W
40N
70W
30N
20N
S9+20
S9+10
S9
S7
S5
S3
Nil
CCIR coefficients
40x 40 gridsize
-103
-93
-93
-93
-115
130W 120W 110W 20N 100W 90W 80W
0 1000 2000 3000 4000 5000KM
NTIA/ITS

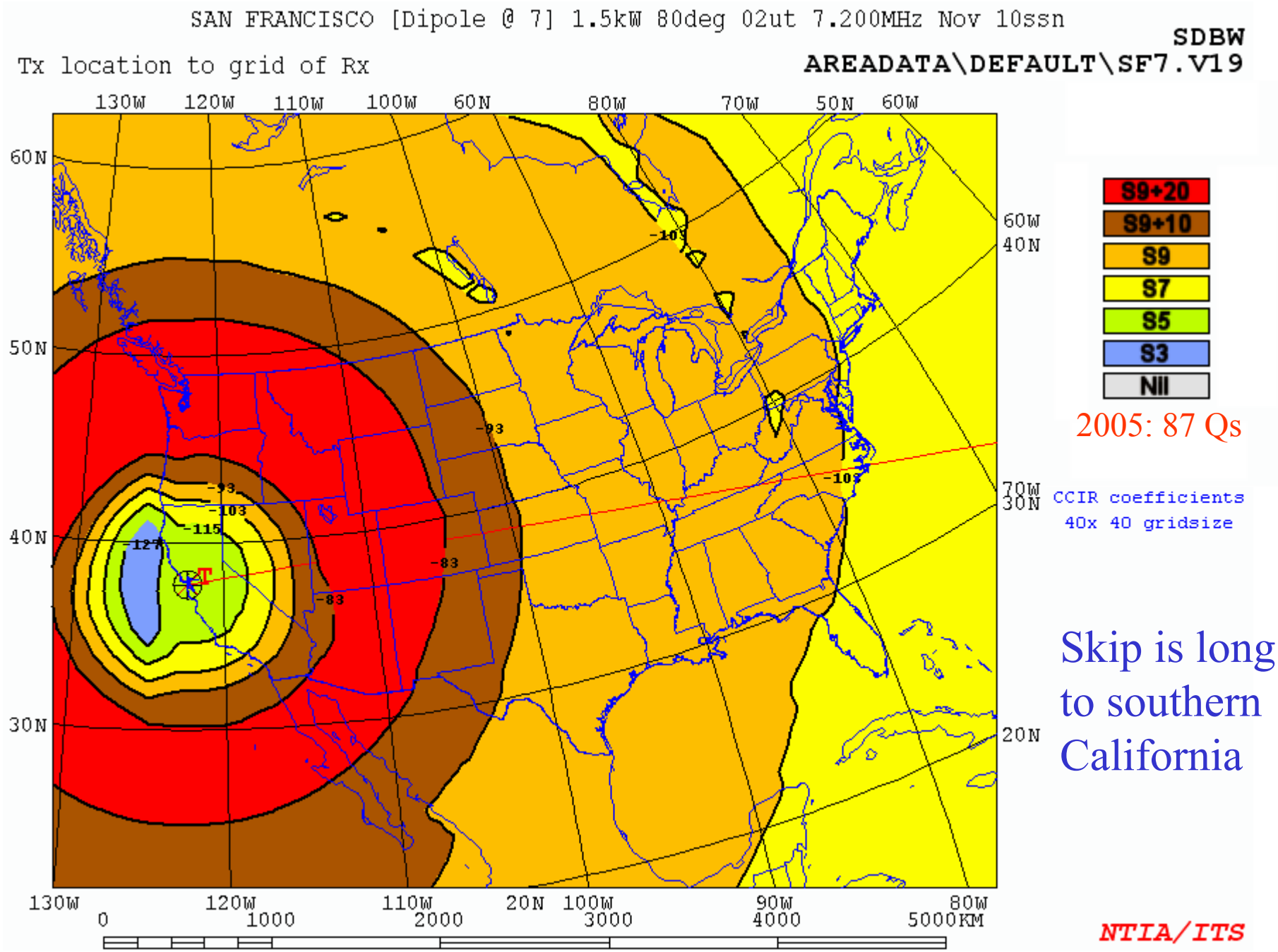


N6BV 2005: 0 Qs

Los Angeles coverage is good at this time

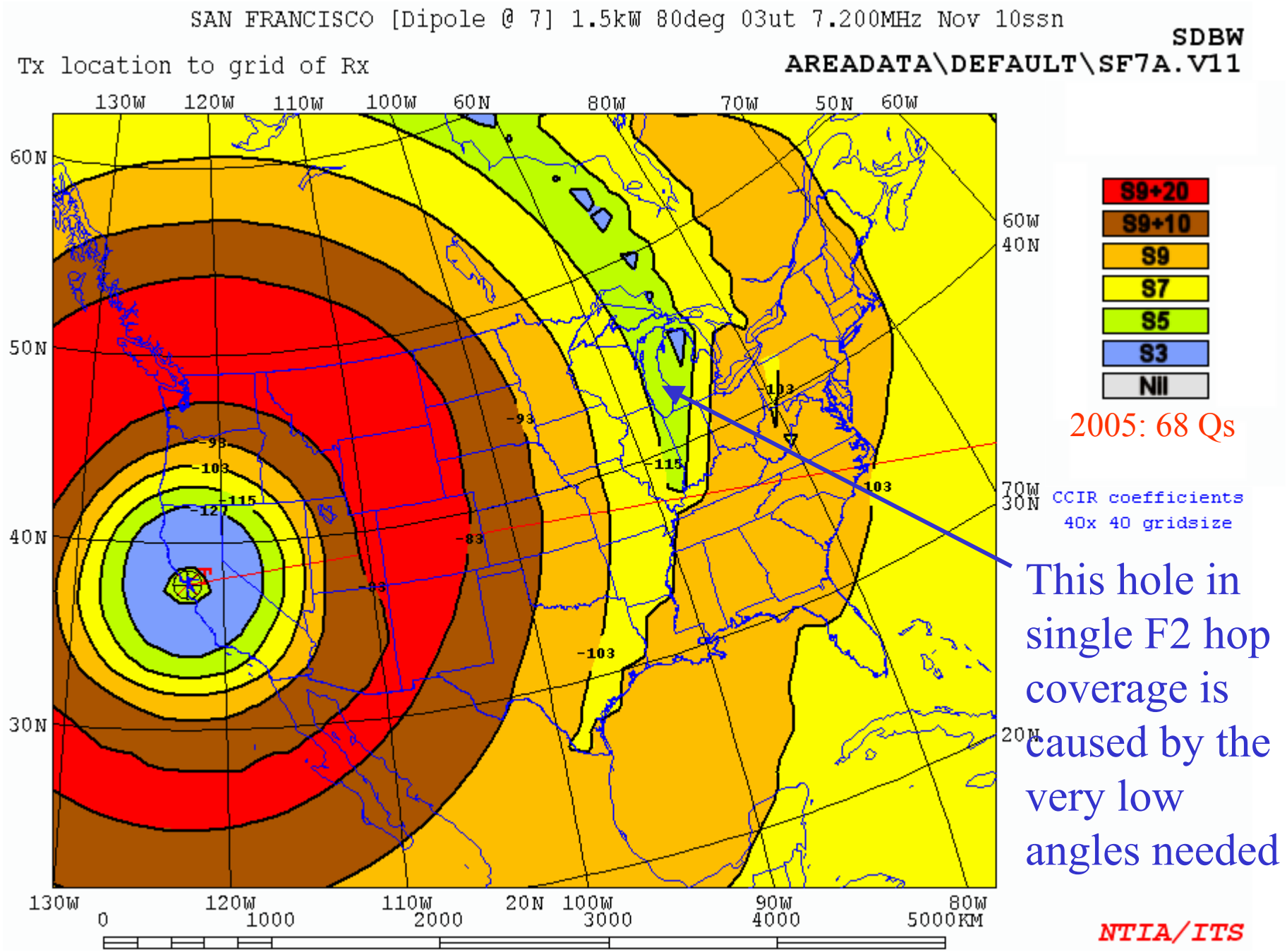
NTIA/ITS

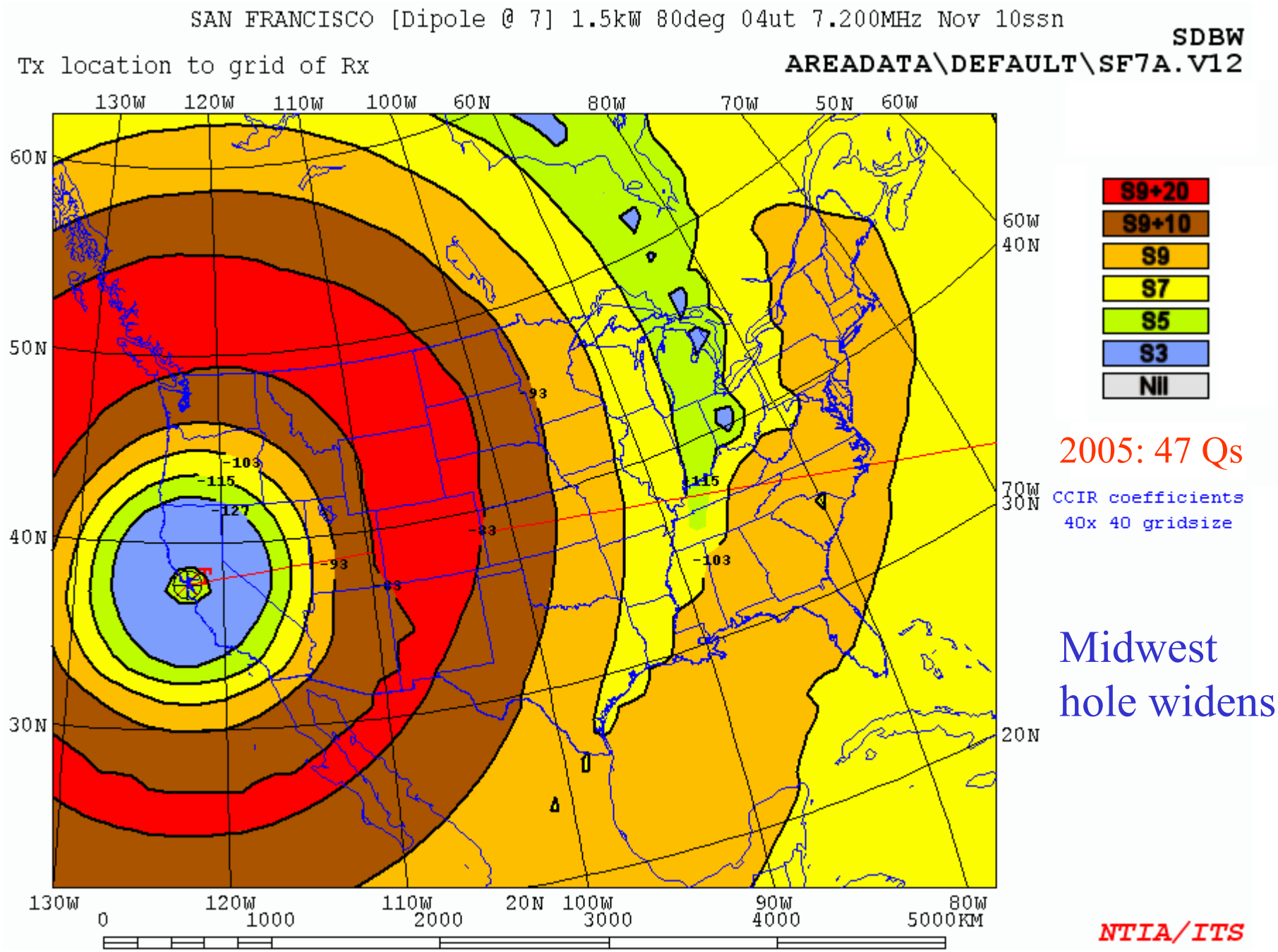

SAN FRANCISCO [Dipole @ 7] 1.5kW 80deg 01ut 7.200MHz Nov 10ssn
SDBW
Tx location to grid of Rx
AREADATA\DEFAULT\SF7.V18
130W 120W 110W 100W 60N 80W 70W 50N 60W
60N
50N
40N
30N
60W
40N
70W
30N
20N
-93
-103
-83
-93
-103
-83
T
S9+20
S9+10
S9
S7
S5
S3
Nil
2005: 59 Qs
CCIR coefficients
40x 40 gridsize
130W 120W 110W 20N 100W 90W 80W
0 1000 2000 3000 4000 5000KM
Los Angeles coverage beginning to go long
NTIA/ITS

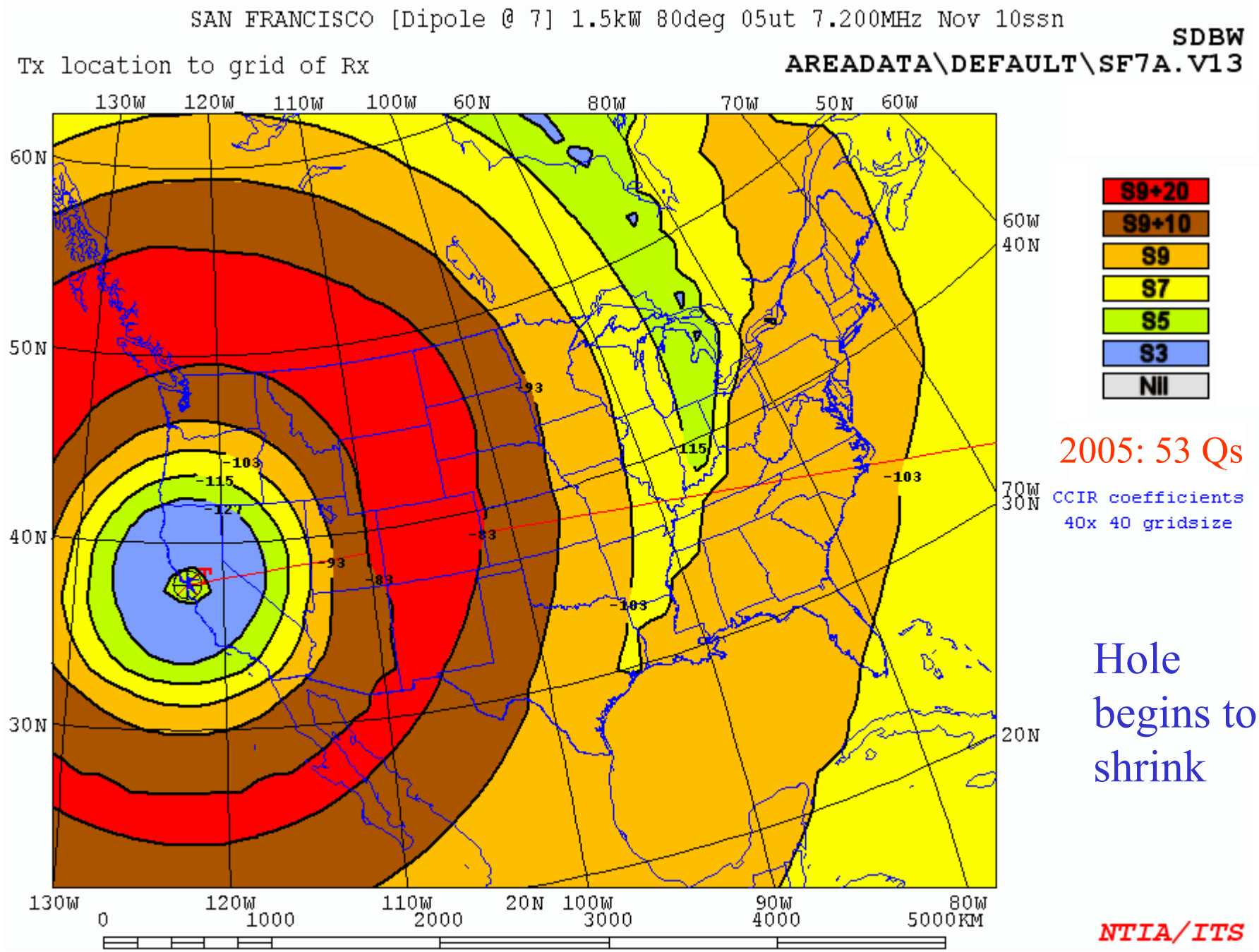


Skip is long to southern California

NTIA/ITS

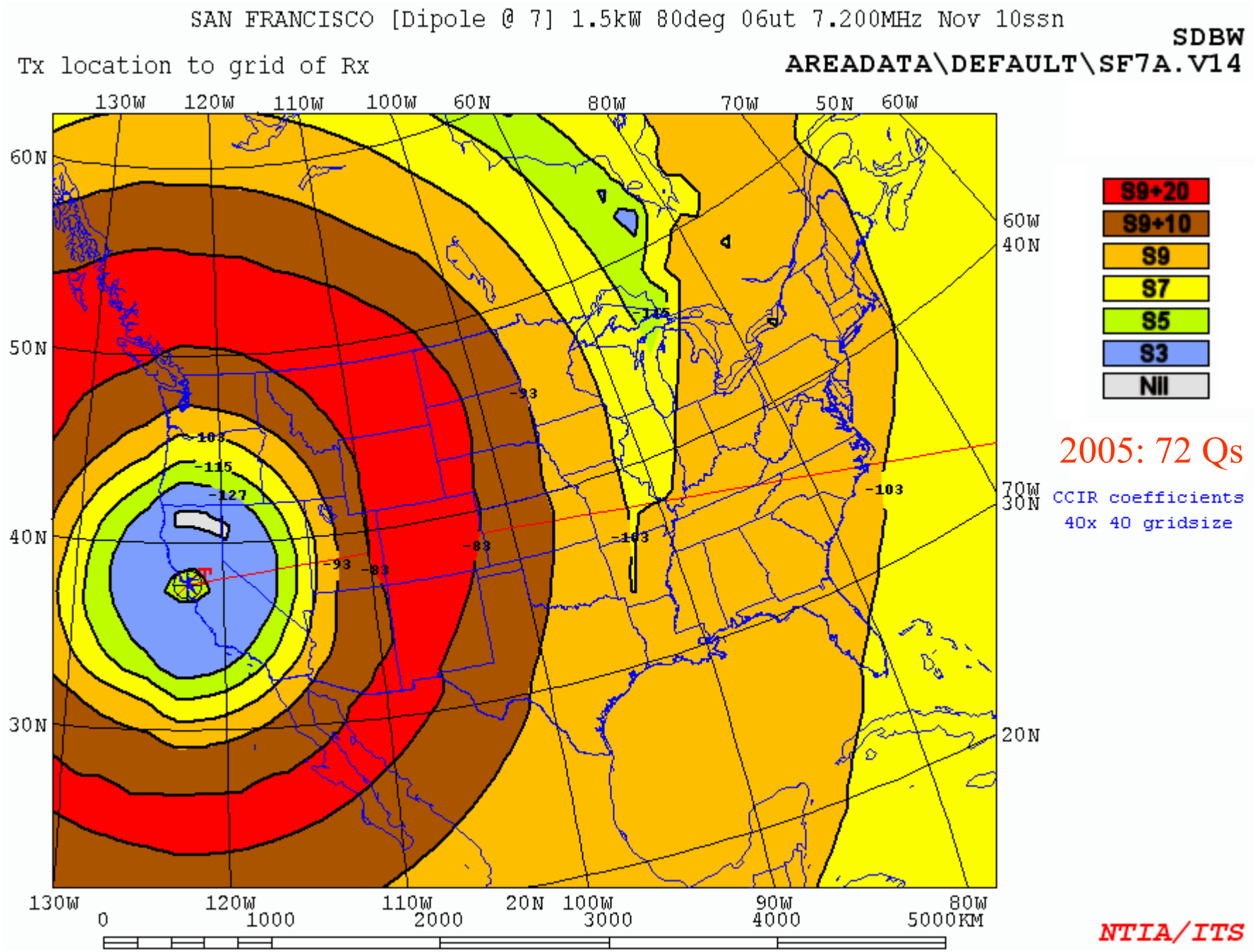

SAN FRANCISCO [Dipole @ 7] 1.5kW 80deg 03ut 7.200MHz Nov 10ssn
SDBW
Tx location to grid of Rx
AREADATA\DEFAULT\SF7A.V11
130W 120W 110W 100W 60N 80W 70W 50N 60W
60N
50N
40N
30N
60W
40N
70W
30N
20N
S9+20
S9+10
S9
S7
S5
S3
Nil
2005: 68 Qs
CCIR coefficients
40x 40 gridsize
-93
-103
-115
-127
-83
-93
-103
-93
-115
-103
-103
This hole in single F2 hop coverage is caused by the very low angles needed
130W 120W 110W 20N 100W 90W 80W
0 1000 2000 3000 4000 5000KM
NTIA/ITS

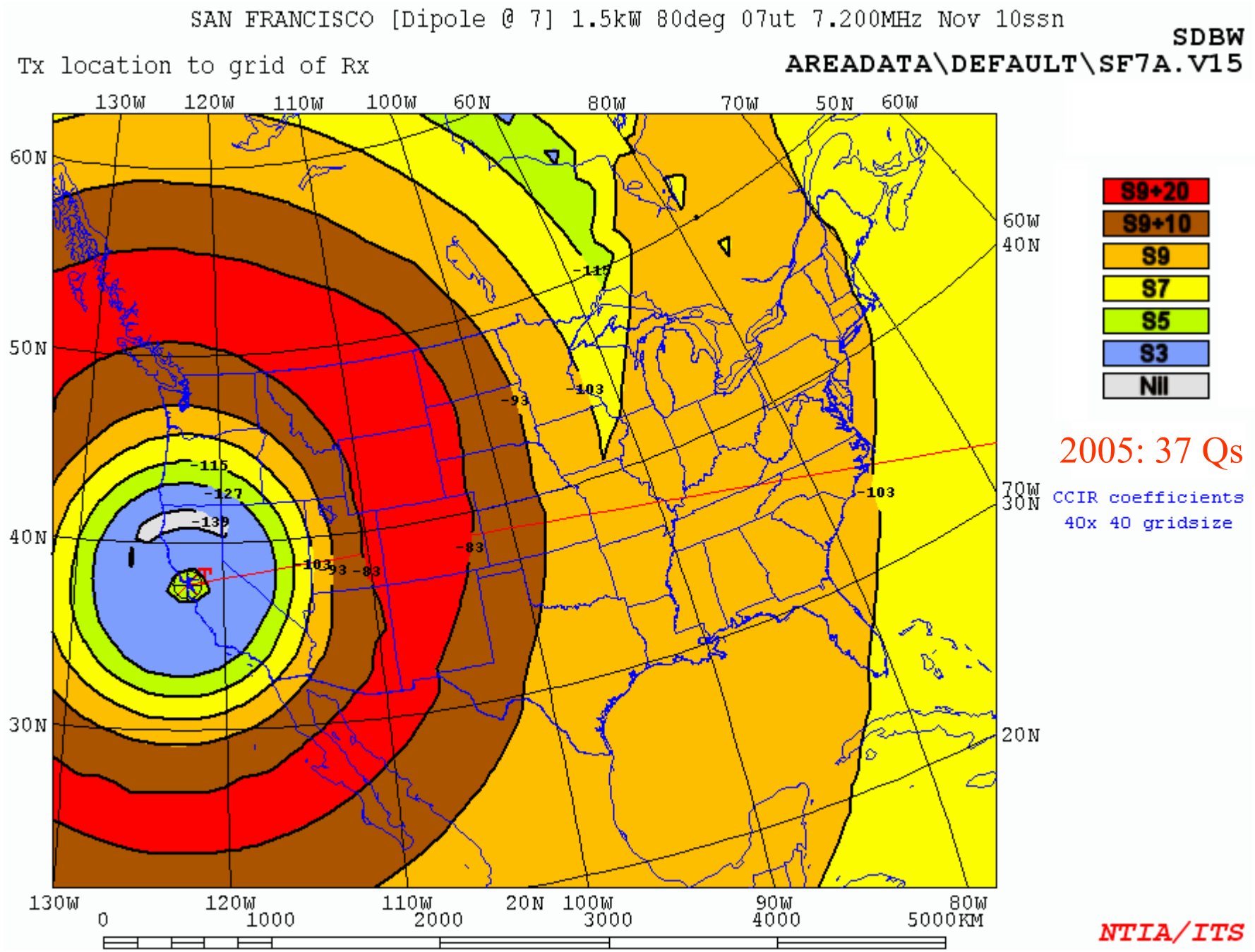

SAN FRANCISCO [Dipole @ 7] 1.5kW 80deg 04ut 7.200MHz Nov 10ssn
SDBW
Tx location to grid of Rx
AREADATA\DEFAULT\SF7A.V12
130W 120W 110W 100W 60N 80W 70W 50N 60W
60N
50N
40N
30N
60W
40N
70W
30N
20N
S9+20
S9+10
S9
S7
S5
S3
NII
-93
-103
-115
-127
-83
-93
-115
-103
2005: 47 Qs
CCIR coefficients
40x 40 gridsize
Midwest
hole widens
130W 120W 110W 20N 100W 90W 80W
0 1000 2000 3000 4000 5000KM
NTIA/ITS

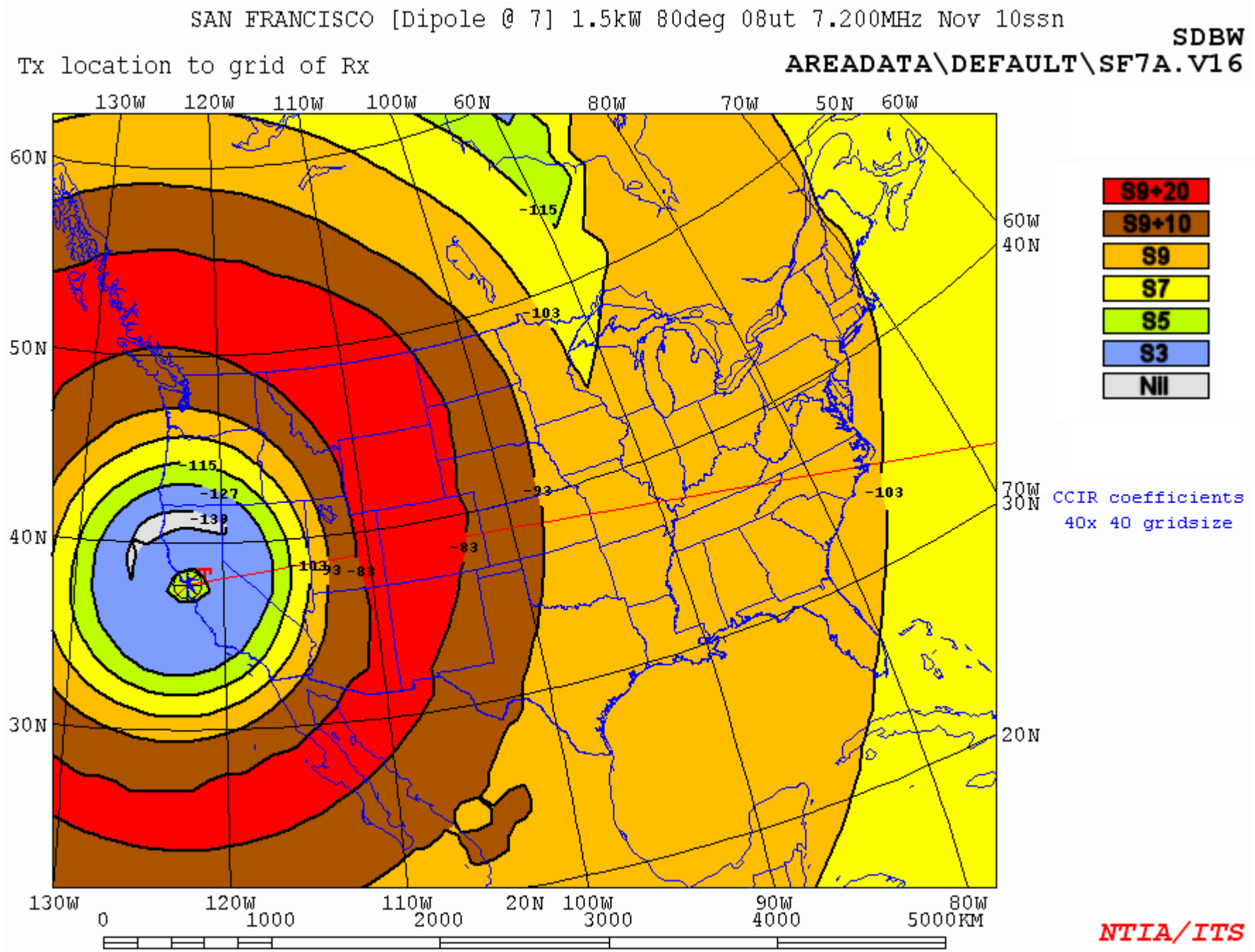


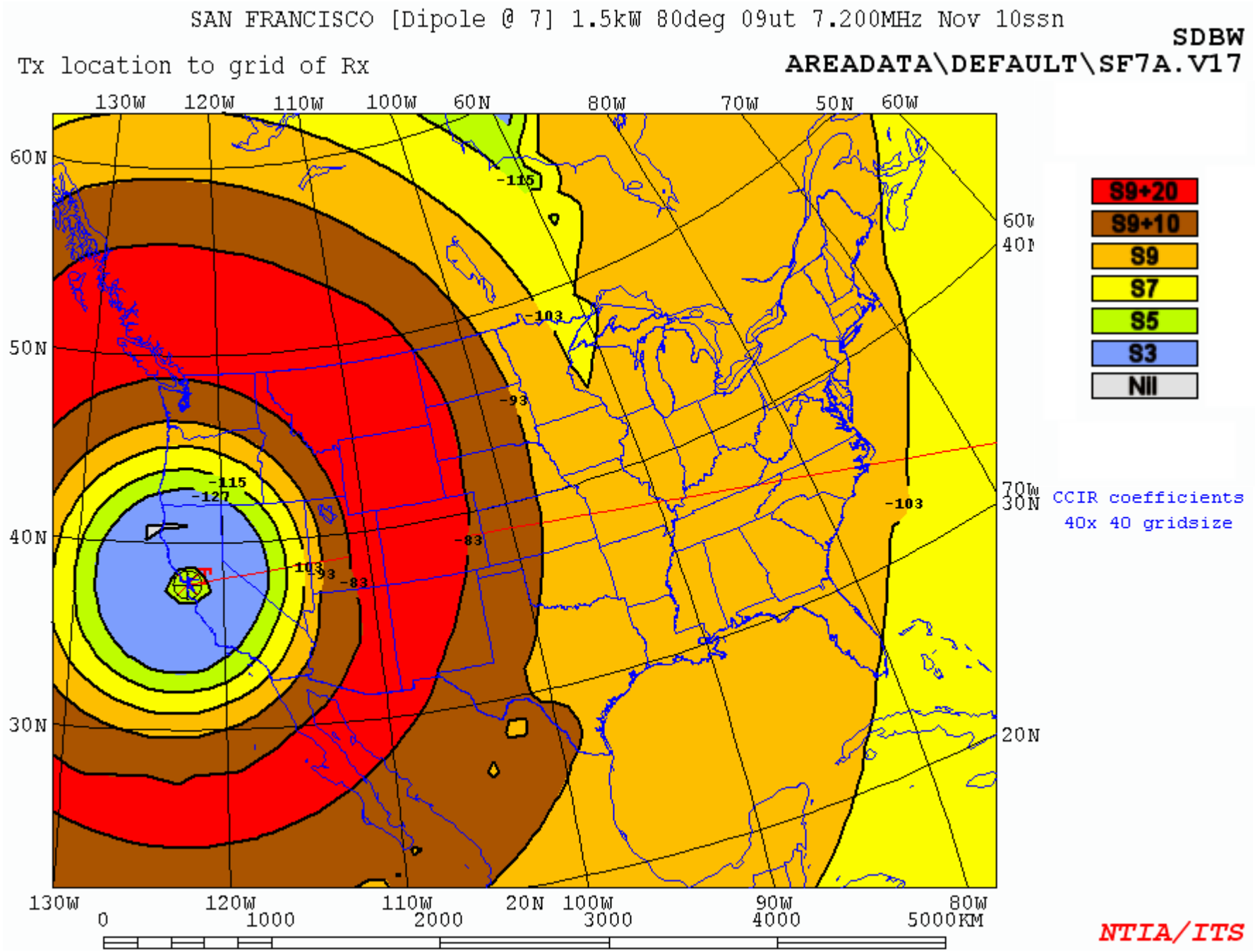
Hole begins to shrink

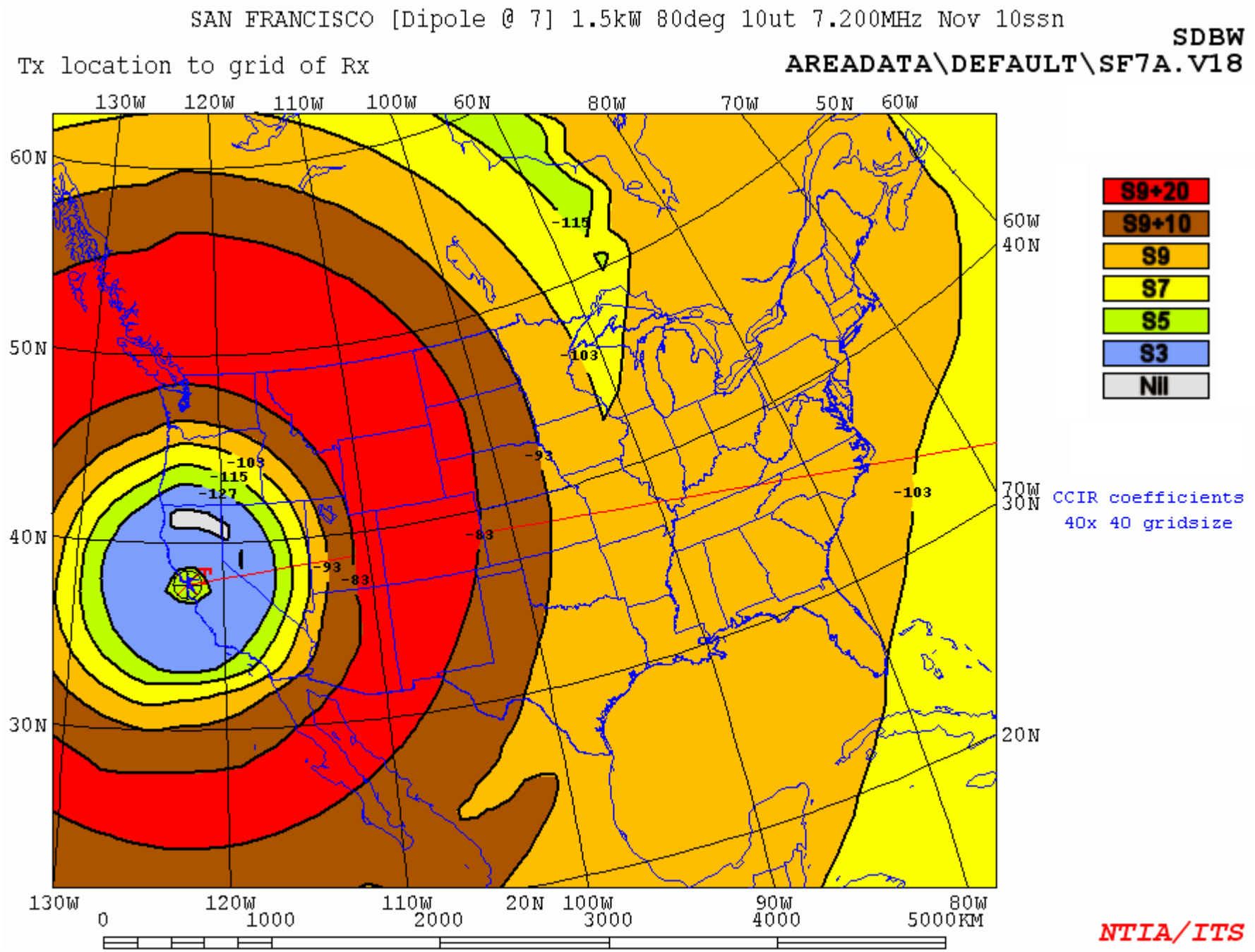
NTIA/ITS

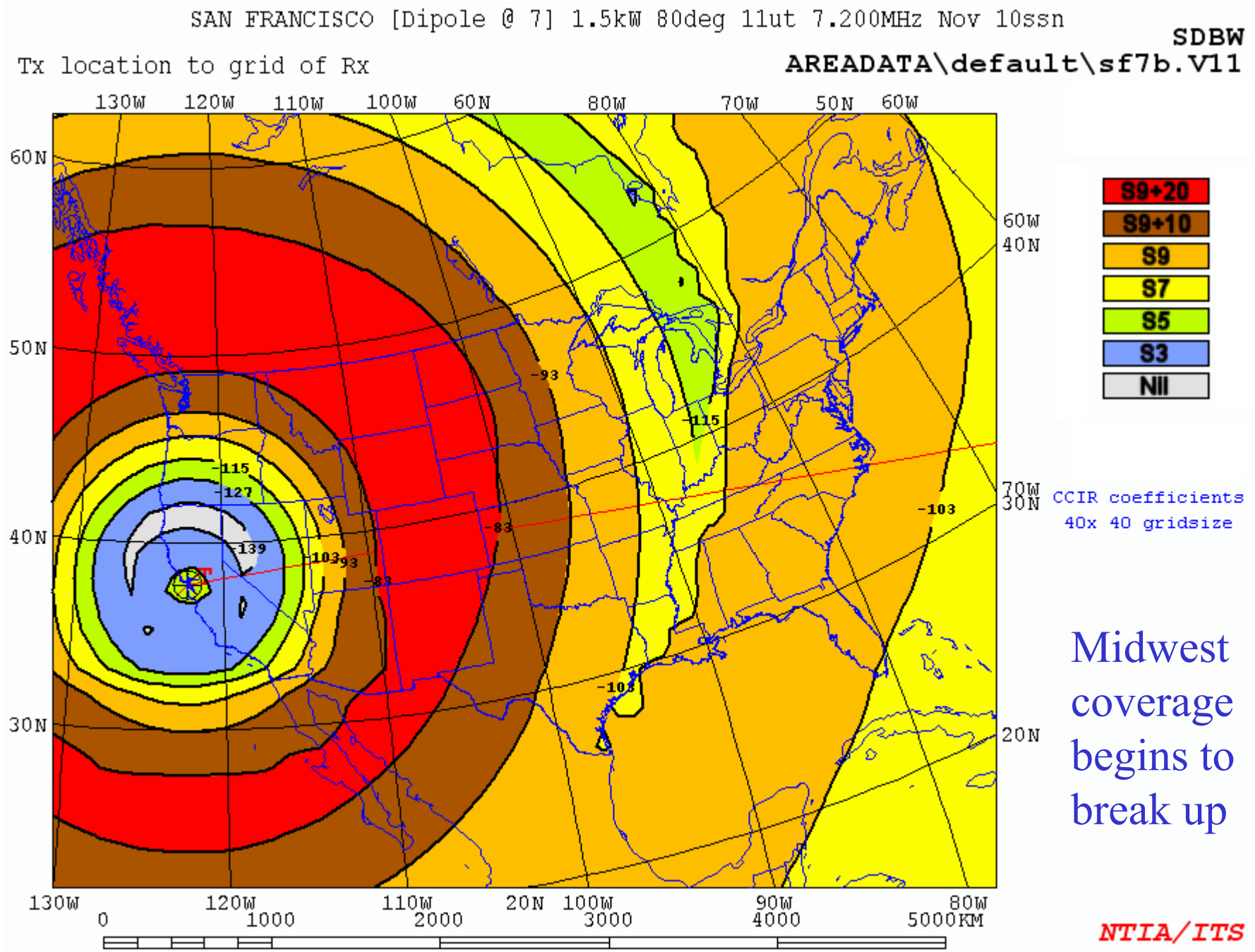

SAN FRANCISCO [Dipole @ 7] 1.5kW 80deg 06ut 7.200MHz Nov 10ssn
SDBW
Tx location to grid of Rx
AREADATA\DEFAULT\SF7A.V14
130W 120W 110W 100W 60N 80W 70W 50N 60W
60N
50N
40N
30N
60W
40N
70W
30N
20N
-93
-103
-115
-127
-83
-103
-103
-93
-83
S9+20
S9+10
S9
S7
S5
S3
Nil
2005: 72 Qs
CCIR coefficients
40x 40 gridsize
130W 120W 110W 20N 100W 90W 80W
0 1000 2000 3000 4000 5000KM
NTIA/ITS

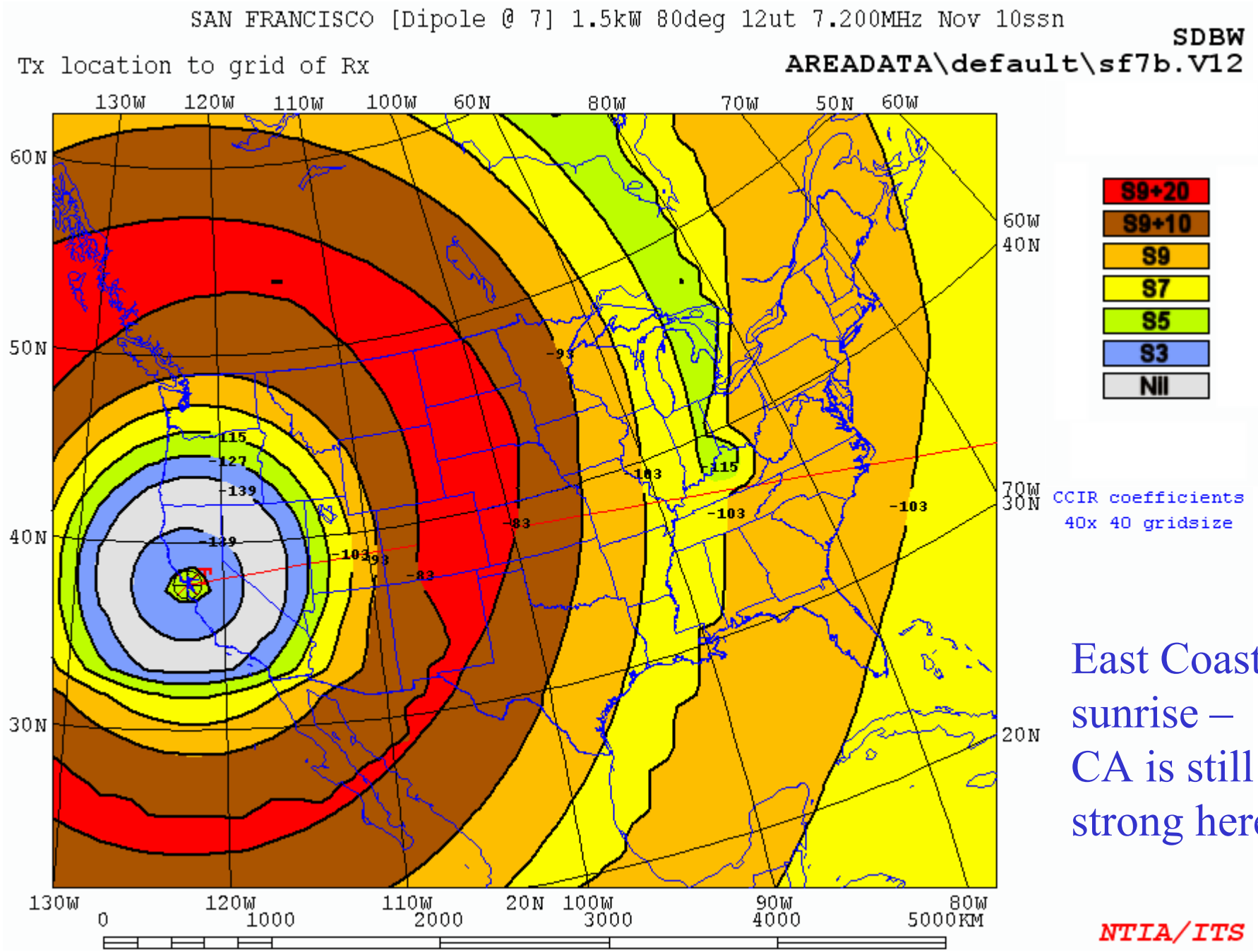

SAN FRANCISCO [Dipole @ 7] 1.5kW 80deg 07ut 7.200MHz Nov 10ssn
SDBW
Tx location to grid of Rx
AREADATA\DEFAULT\SF7A.V15
130W 120W 110W 100W 60N 80W 70W 50N 60W
60N
50N
40N
30N
60W
40N
70W
30N
20N
-115
-93
-103
-115
-127
-139
-103
-93
-83
-103
-83
S9+20
S9+10
S9
S7
S5
S3
NII
2005: 37 Qs
CCIR coefficients
40x 40 gridsize
130W 120W 110W 20N 100W 90W 80W
0 1000 2000 3000 4000 5000KM
NTIA/ITS


SAN FRANCISCO [Dipole @ 7] 1.5kW 80deg 08ut 7.200MHz Nov 10ssn
SDBW
AREADATA\DEFAULT\SF7A.V16
Tx location to grid of Rx
130W 120W 110W 100W 60N 80W 70W 50N 60W
60N
50N
40N
30N
60W
40N
70W
30N
20N
-115
-103
-115
-127
-139
-93
-103
-83
-103
-93
-83
S9+20
S9+10
S9
S7
S5
S3
Nil
CCIR coefficients
40x 40 gridsize
130W 120W 110W 20N 100W 90W 80W
0 1000 2000 3000 4000 5000KM
NTIA/ITS


SAN FRANCISCO [Dipole @ 7] 1.5kW 80deg 09ut 7.200MHz Nov 10ssn
SDBW
AREADATA\DEFAULT\SF7A.V17
Tx location to grid of Rx
130W 120W 110W 100W 60N 80W 70W 50N 60W
60N
50N
40N
30N
20N
60W
40N
70W
30N
-115
-103
-93
-115
-127
-103
-93
-83
-83
-103
S9+20
S9+10
S9
S7
S5
S3
Nil
CCIR coefficients
40x 40 gridsize
130W 120W 110W 20N 100W 90W 80W
0 1000 2000 3000 4000 5000KM
NTIA/ITS


SAN FRANCISCO [Dipole @ 7] 1.5kW 80deg 10ut 7.200MHz Nov 10ssn
SDBW
Tx location to grid of Rx
AREADATA\DEFAULT\SF7A.V18
130W 120W 110W 100W 60N 80W 70W 50N 60W
60N
50N
40N
30N
60W
40N
70W
30N
20N
-115
-103
-93
-103
-103
-115
-127
-93
-83
-83
S9+20
S9+10
S9
S7
S5
S3
Nil
CCIR coefficients
40x 40 gridsize
130W 120W 110W 20N 100W 90W 80W
0 1000 2000 3000 4000 5000KM
NTIA/ITS

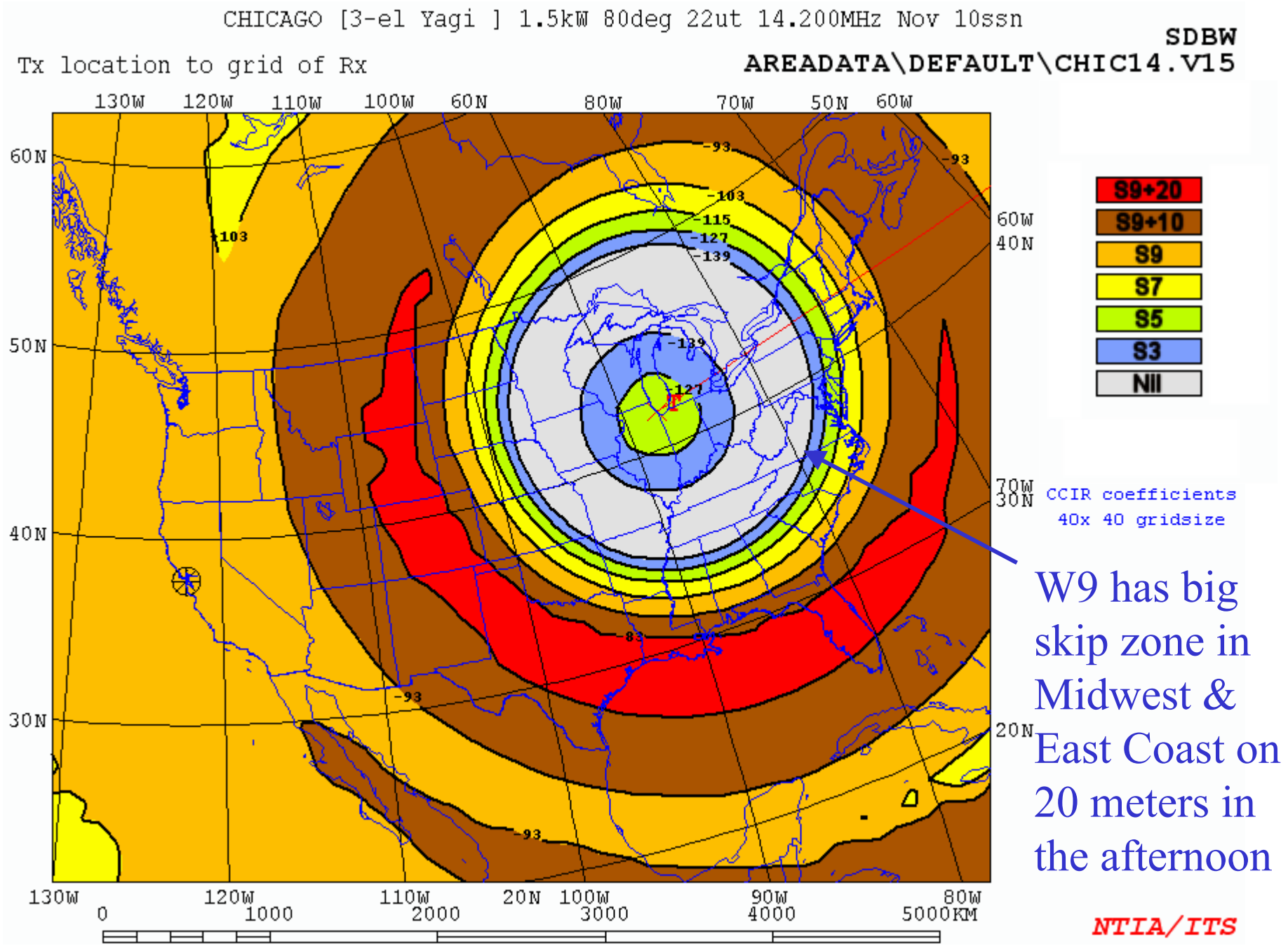

SAN FRANCISCO [Dipole @ 7] 1.5kW 80deg 11ut 7.200MHz Nov 10ssn
SDBW
Tx location to grid of Rx
AREADATA\default\sf7b.V11
130W 120W 110W 100W 60N 80W 70W 50N 60W
60N
50N
40N
30N
60W
40N
70W
30N
20N
S9+20
S9+10
S9
S7
S5
S3
Nil
CCIR coefficients
40x 40 gridsize
-93
-115
-115
-127
-139
-103
-93
-83
-83
-103
-101
130W 120W 110W 20N 100W 90W 80W
0 1000 2000 3000 4000 5000KM
Midwest coverage begins to break up
NTIA/ITS

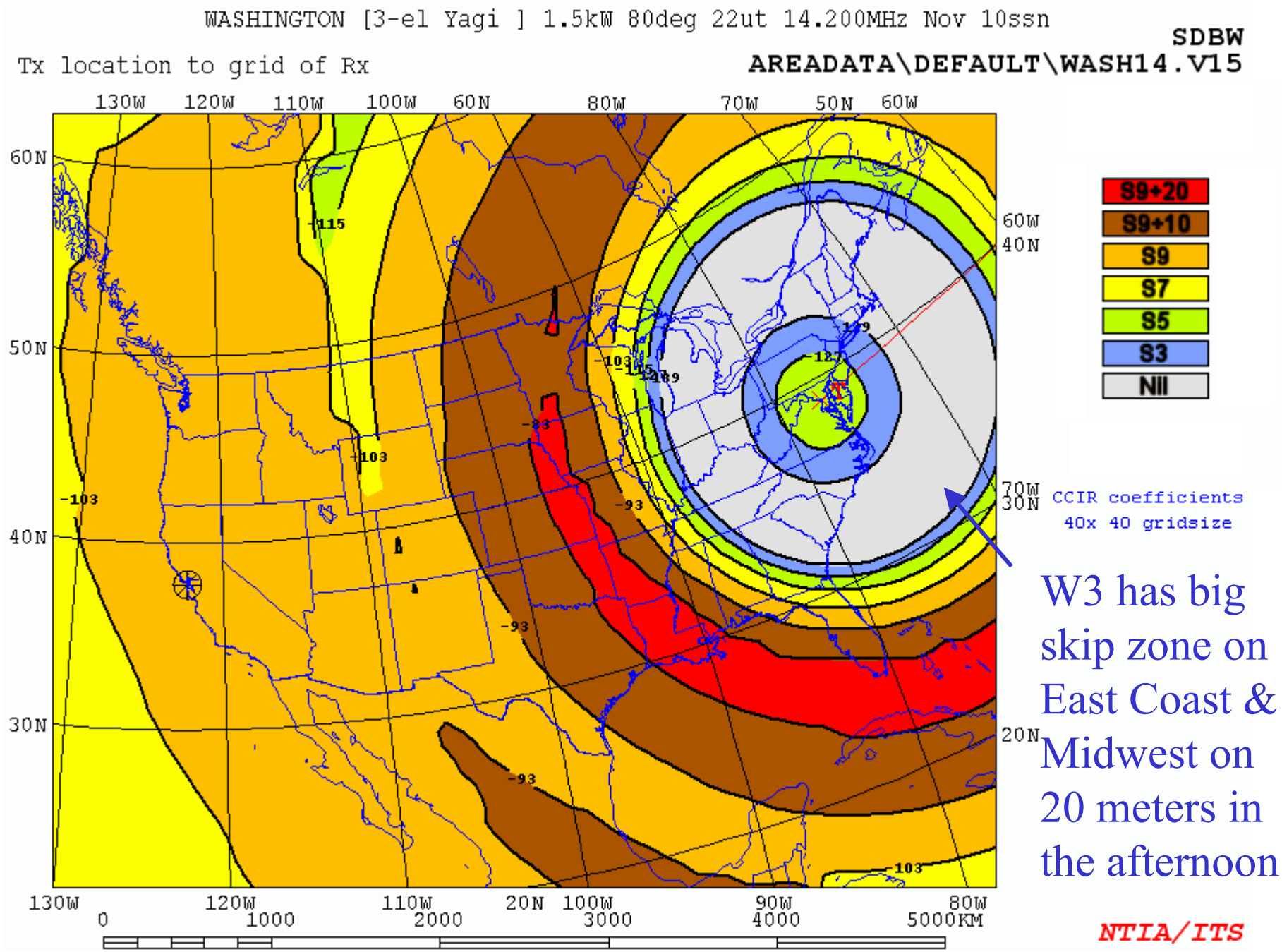


East Coast sunrise – CA is still strong here

20-Meter Coverage

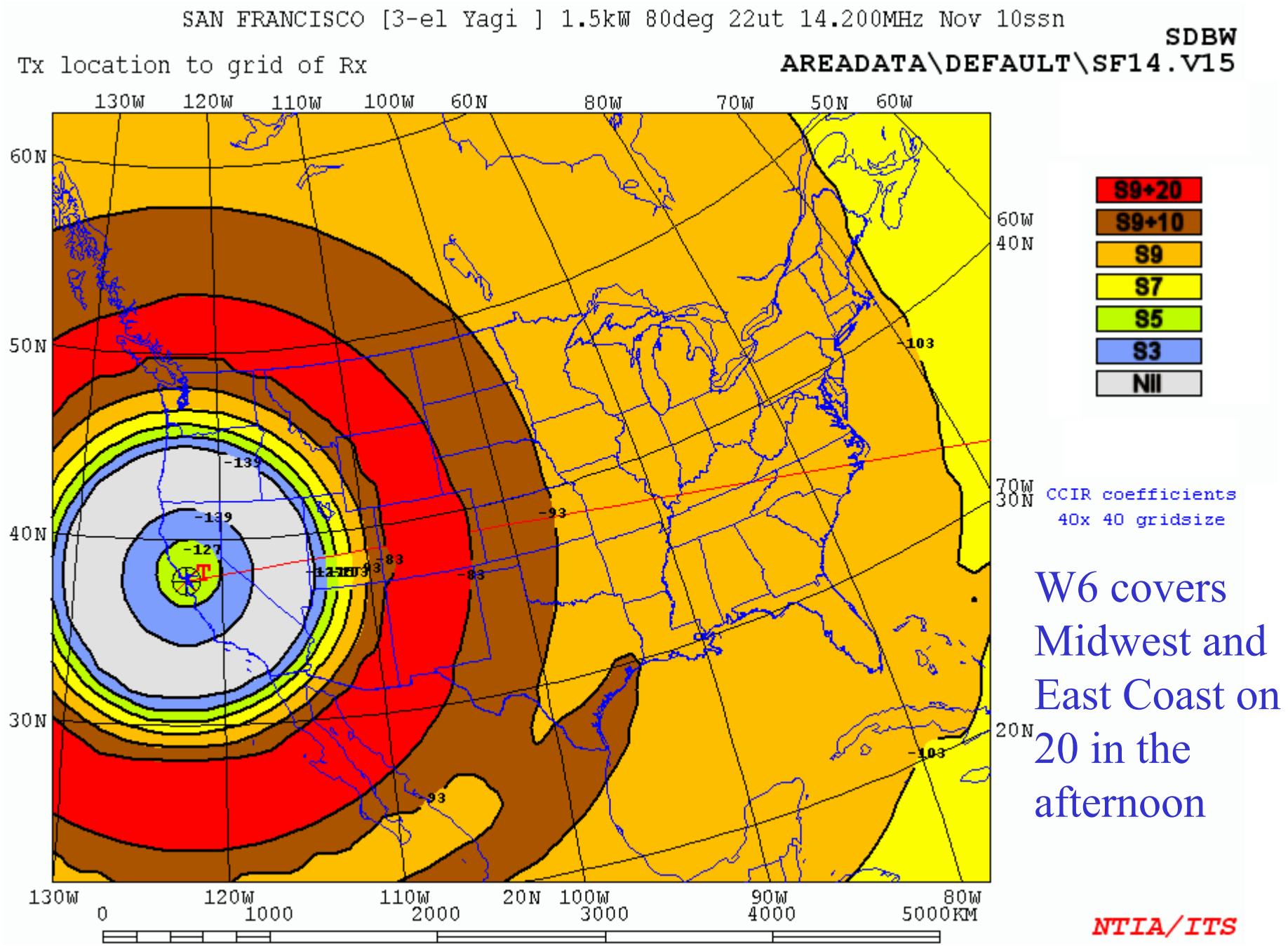
- 20 is usually a *zoo* on phone, particularly during low part of Solar Cycle, when 15 and 10 meters are marginal or non-existent.
- Big stacks rule, although 1500 W and a 3-element Yagi can easily run rate.
- Moral of this story: Run QRO if you possibly can, with big antennas!


CHICAGO [3-el Yagi] 1.5kW 80deg 22ut 14.200MHz Nov 10ssn
SDBW
AREADATA\DEFAULT\CHIC14.V15
Tx location to grid of Rx
130W 120W 110W 100W 60N 80W 70W 50N 60W
60N
50N
40N
30N
60W 40N
70W 30N
20N
-93
-103
-115
-127
-139
S9+20
S9+10
S9
S7
S5
S3
Nil
CCIR coefficients
40x 40 gridsize
130W 120W 110W 20N 100W 90W 80W
0 1000 2000 3000 4000 5000KM
W9 has big skip zone in Midwest & East Coast on 20 meters in the afternoon
NTIA/ITS



W3 has big skip zone on East Coast & Midwest on 20 meters in the afternoon

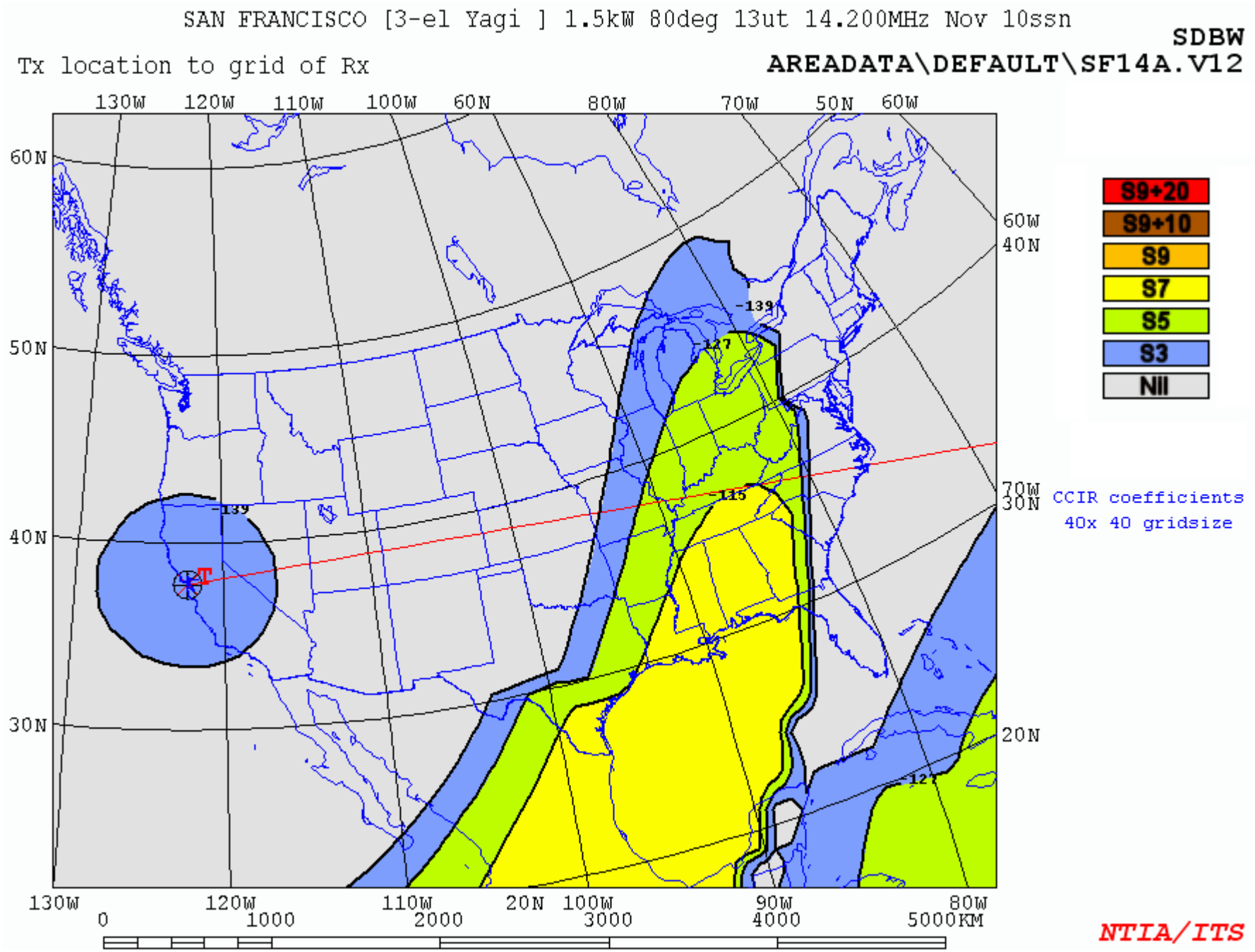
NTIA/ITS

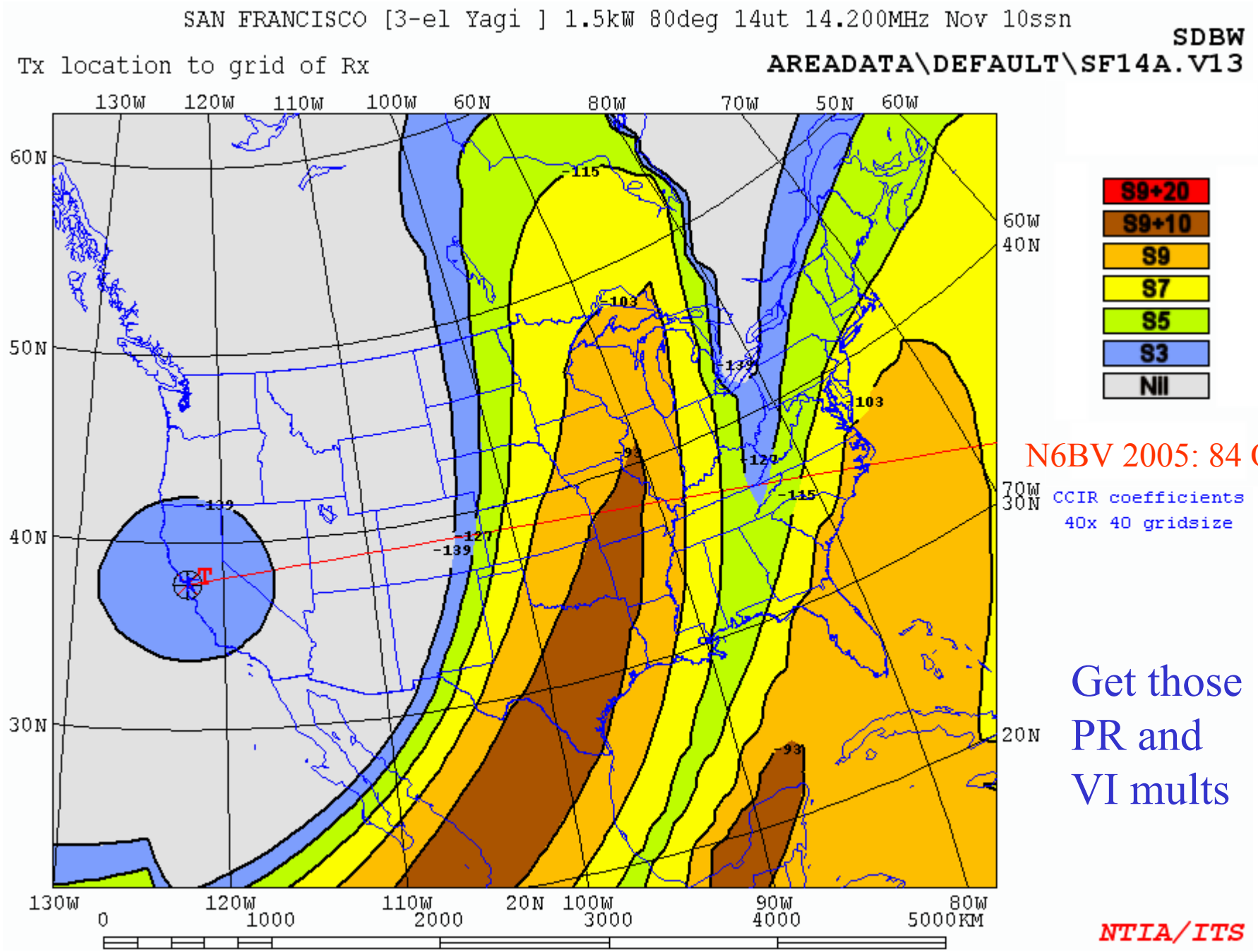


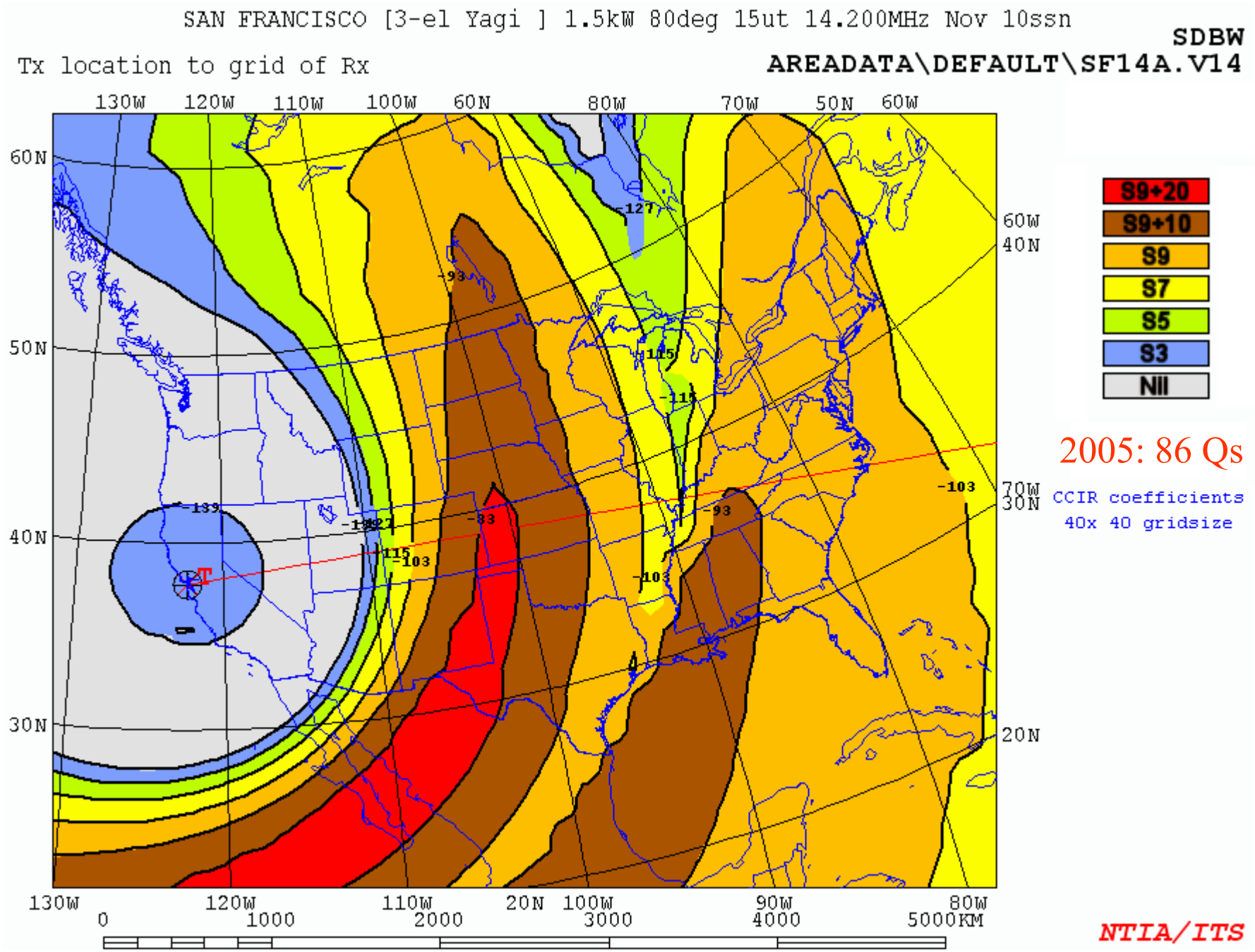
W6 covers Midwest and East Coast on 20 in the afternoon

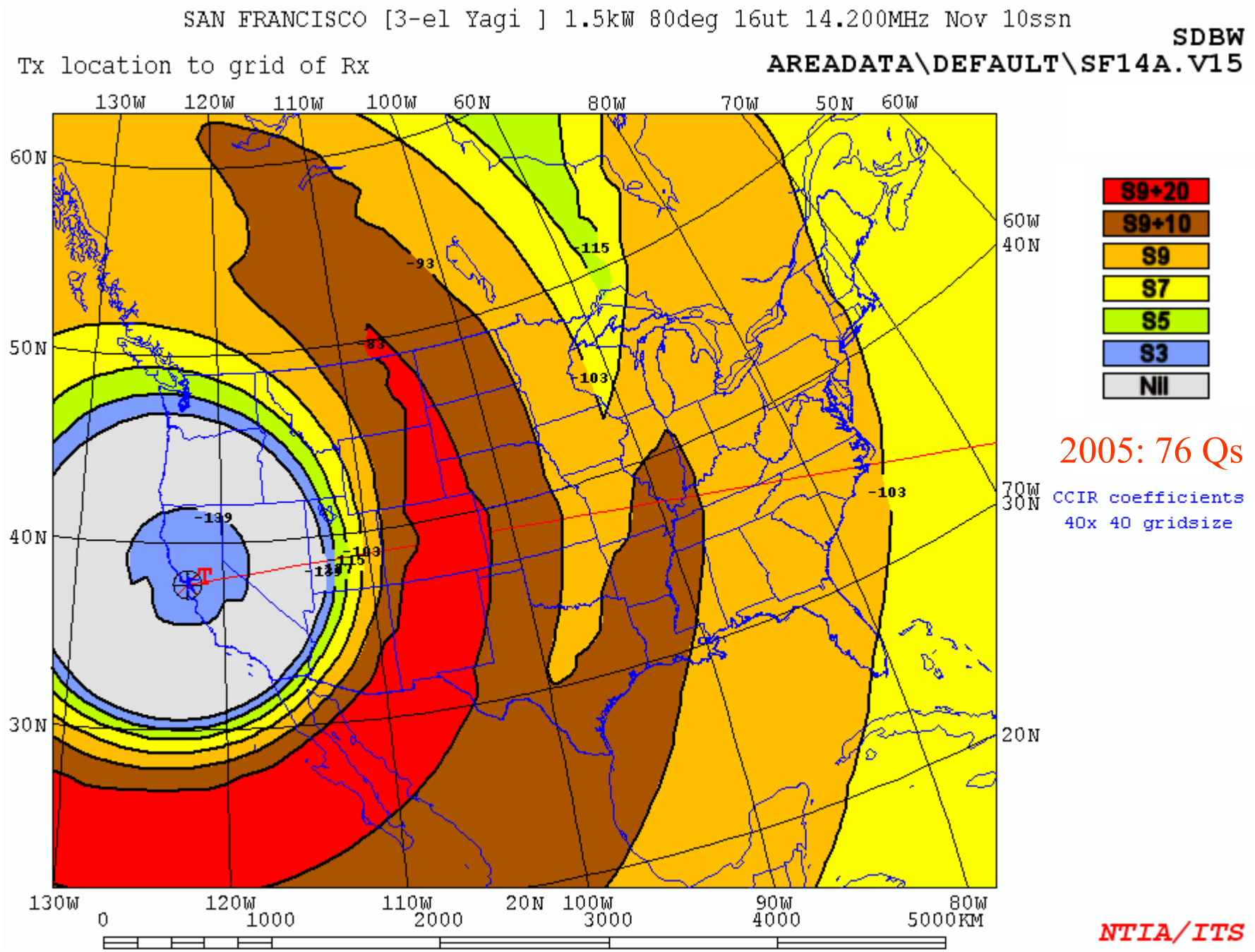
20-Meter Slideshow

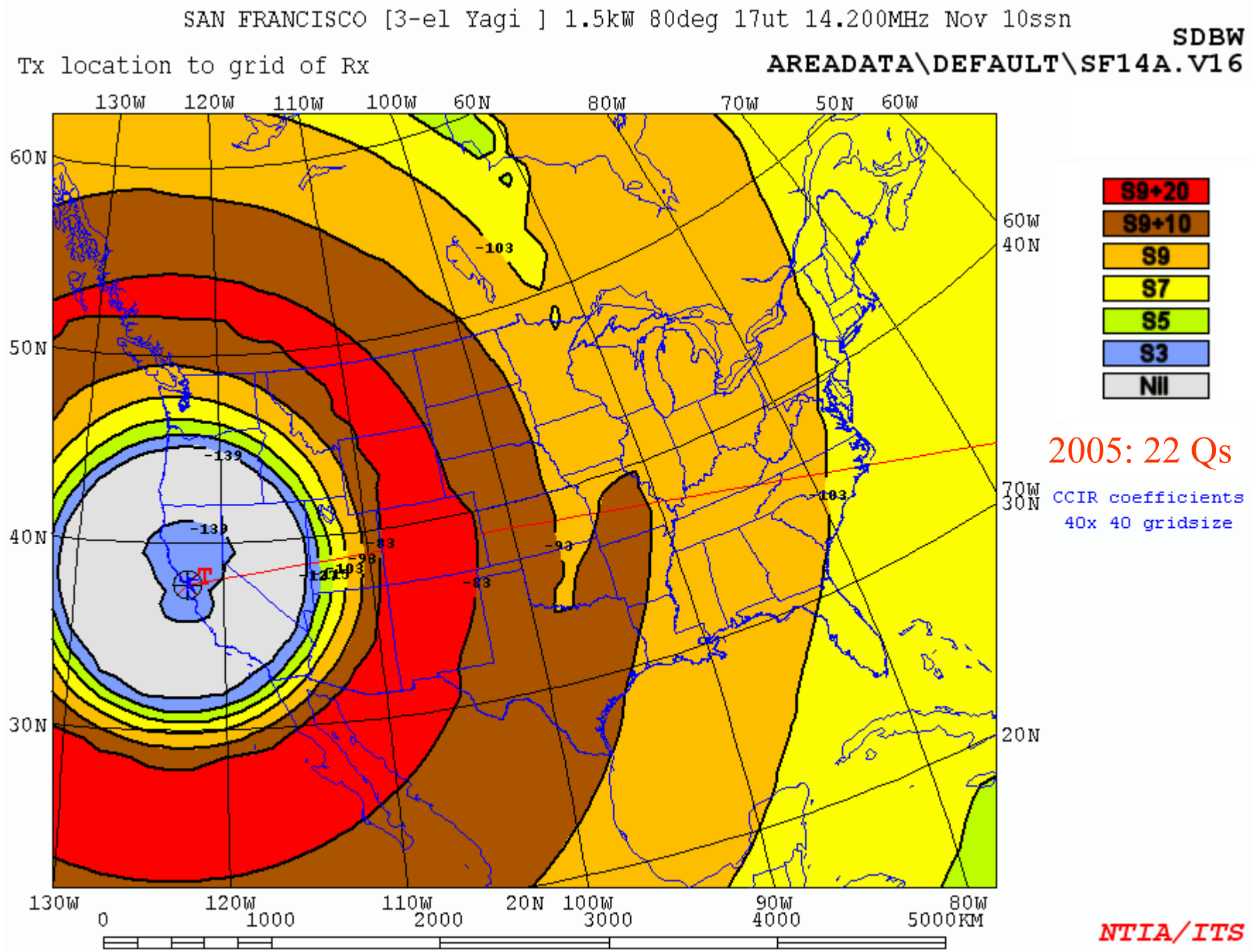
- From 13 UTC to 02 UTC (W6 sunrise to evening)
- Assumes 3-element Yagis at 55 feet.
- Assumes 1500 W.

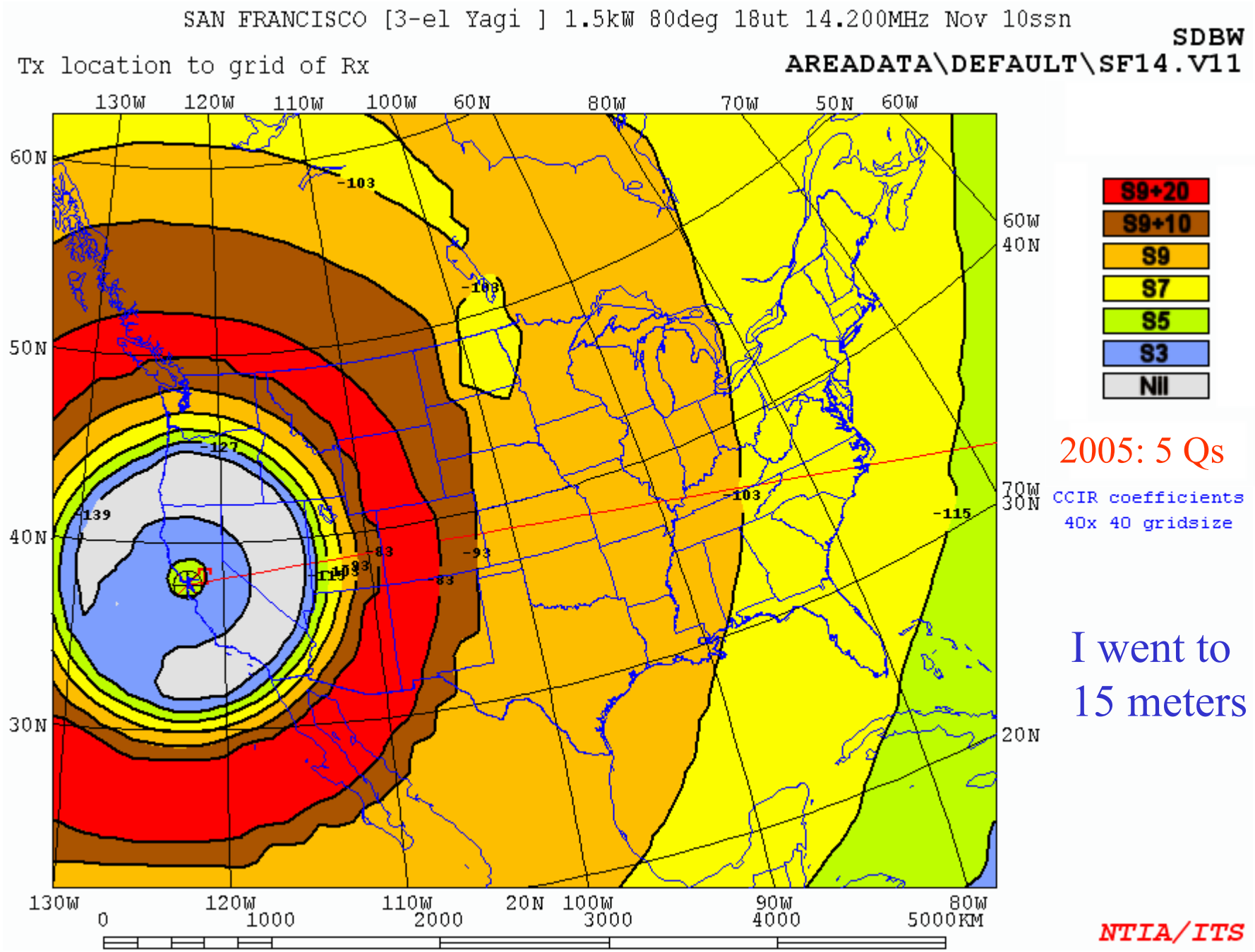

SAN FRANCISCO [3-el Yagi] 1.5kW 80deg 13ut 14.200MHz Nov 10ssn
SDBW
AREADATA\DEFAULT\SF14A.V12
Tx location to grid of Rx
130W 120W 110W 100W 60N 80W 70W 50N 60W
60N
50N
40N
30N
60W
40N
70W
30N
20N
-139
-127
-115
-139
-127
T
S9+20
S9+10
S9
S7
S5
S3
Nil
CCIR coefficients
40x 40 gridsize
130W 120W 110W 20N 100W 90W 80W
0 1000 2000 3000 4000 5000KM
NTIA/ITS

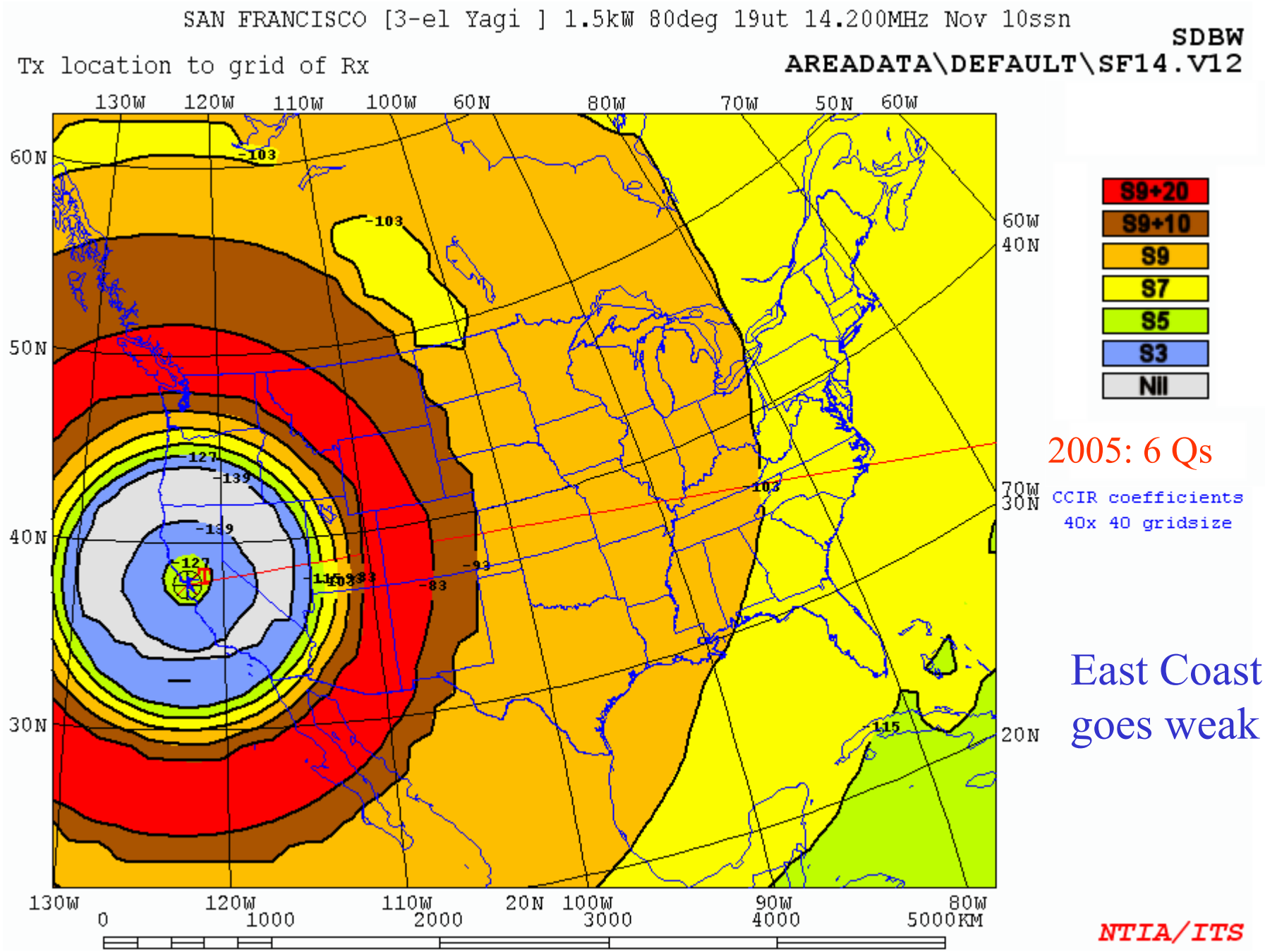

SAN FRANCISCO [3-el Yagi] 1.5kW 80deg 14ut 14.200MHz Nov 10ssn
SDBW
Tx location to grid of Rx
AREADATA\DEFAULT\SF14A.V13
130W 120W 110W 100W 60N 80W 70W 50N 60W
60N
50N
40N
30N
60W
40N
70W
30N
20N
S9+20
S9+10
S9
S7
S5
S3
Nil
N6BV 2005: 84 Qs
CCIR coefficients
40x 40 gridsize
Get those
PR and
VI mults
NTIA/ITS
130W 120W 110W 20N 100W 90W 80W
0 1000 2000 3000 4000 5000KM

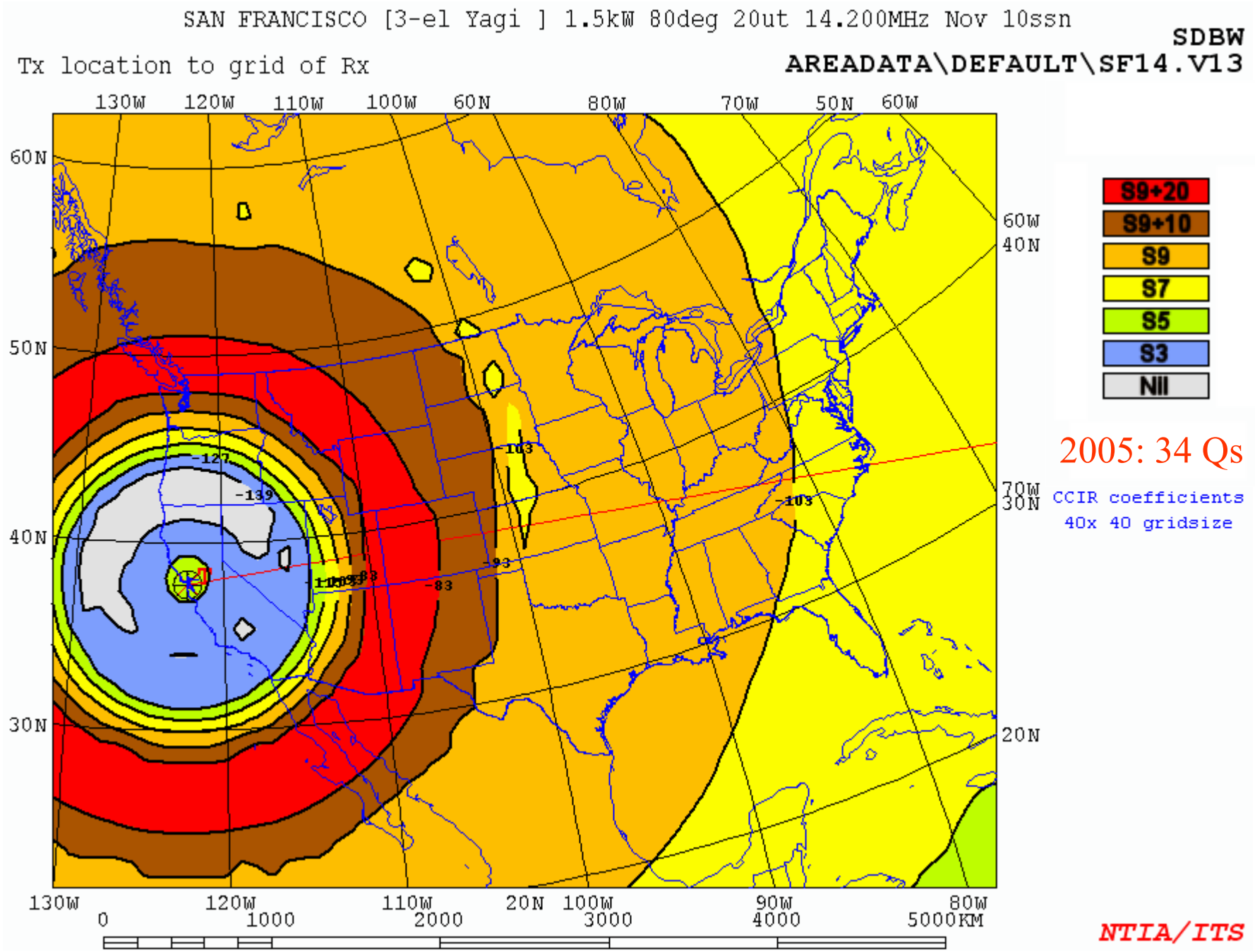

SAN FRANCISCO [3-el Yagi] 1.5kW 80deg 15ut 14.200MHz Nov 10ssn
SDBW
AREADATA\DEFAULT\SF14A.V14
Tx location to grid of Rx
130W 120W 110W 100W 60N 80W 70W 50N 60W
60N
50N
40N
30N
60W
40N
70W
30N
20N
S9+20
S9+10
S9
S7
S5
S3
Nil
2005: 86 Qs
CCIR coefficients
40x 40 gridsize
T
-127
-93
-115
-103
-139
-33
130W 120W 110W 20N 100W 90W 80W
0 1000 2000 3000 4000 5000KM
NTIA/ITS

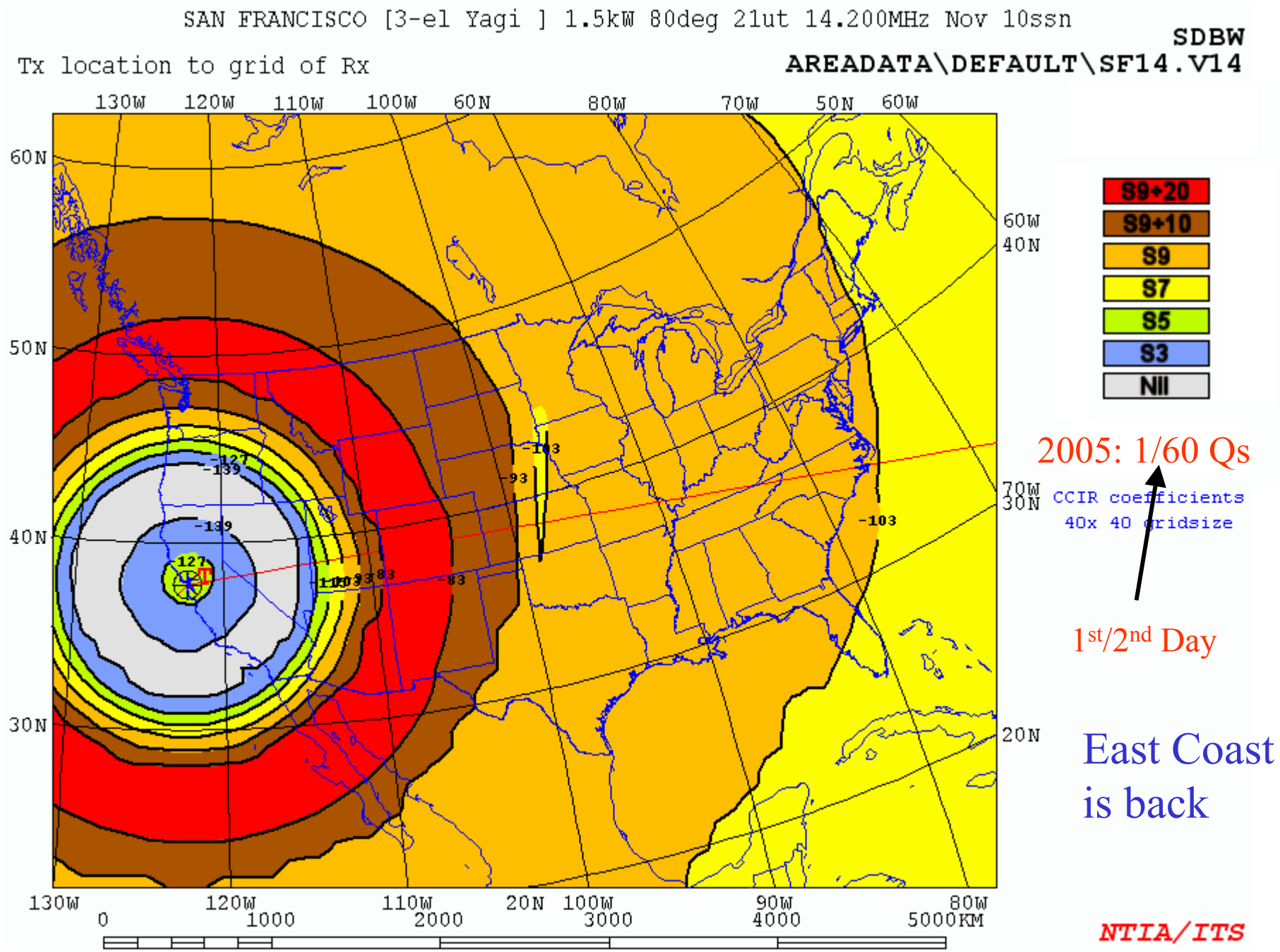

SAN FRANCISCO [3-el Yagi] 1.5kW 80deg 16ut 14.200MHz Nov 10ssn
SDBW
AREADATA\DEFAULT\SF14A.V15
Tx location to grid of Rx
130W 120W 110W 100W 60N 80W 70W 50N 60W
60N
50N
40N
30N
60W
40N
70W
30N
20N
-93
-115
-83
-103
-139
-103
-103
-115
T
S9+20
S9+10
S9
S7
S5
S3
Nil
2005: 76 Qs
CCIR coefficients
40x 40 gridsize
130W 120W 110W 20N 100W 90W 80W
0 1000 2000 3000 4000 5000KM
NTIA/ITS

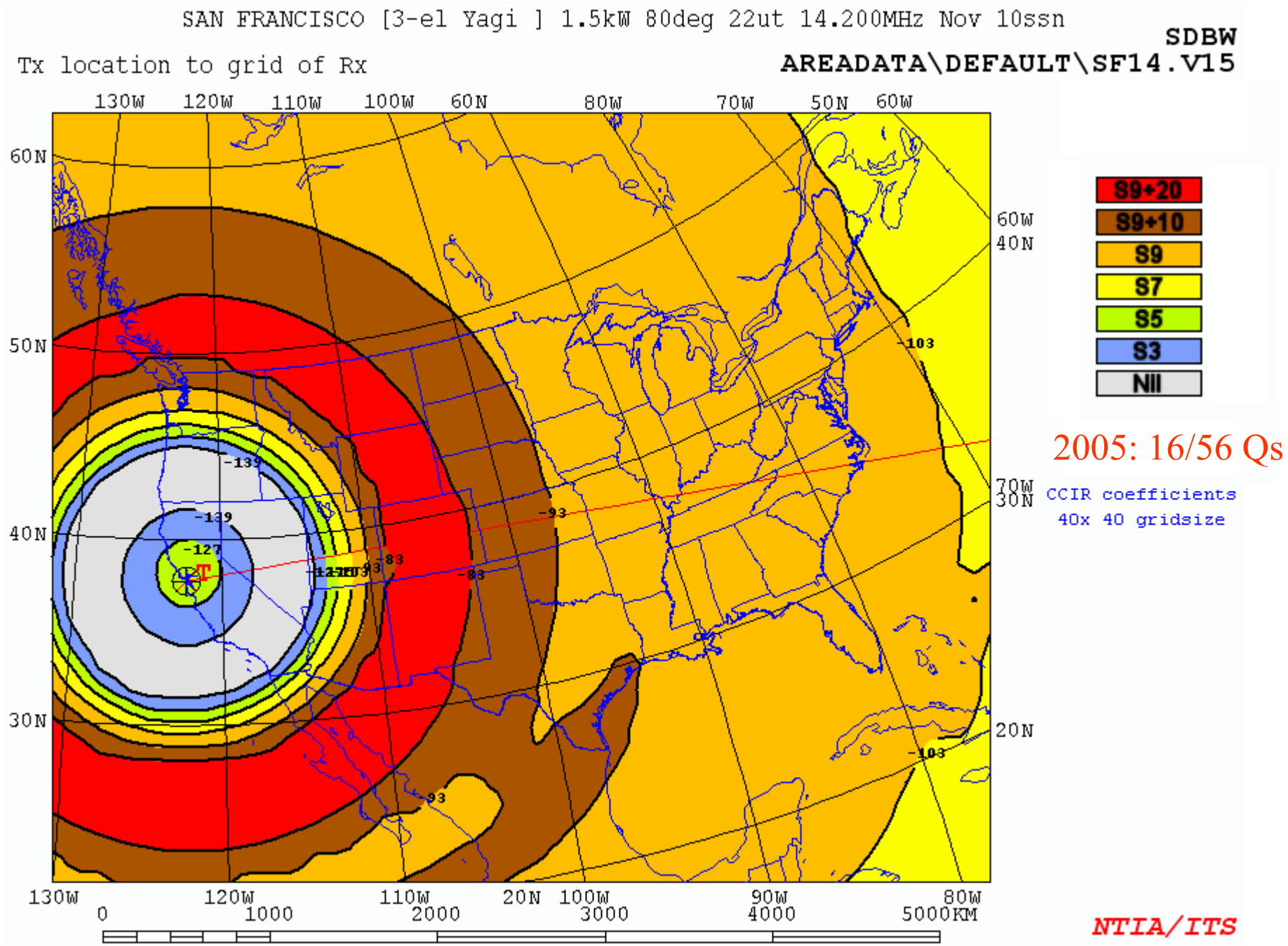

SAN FRANCISCO [3-el Yagi] 1.5kW 80deg 17ut 14.200MHz Nov 10ssn
SDBW
AREADATA\DEFAULT\SF14A.V16
Tx location to grid of Rx
130W 120W 110W 100W 60N 80W 70W 50N 60W
60N
50N
40N
30N
60W
40N
70W
30N
20N
-103
-139
-93
-83
-98
-123
S9+20
S9+10
S9
S7
S5
S3
Nil
2005: 22 Qs
CCIR coefficients
40x 40 gridsize
130W 120W 110W 20N 100W 90W 80W
0 1000 2000 3000 4000 5000KM
NTIA/ITS

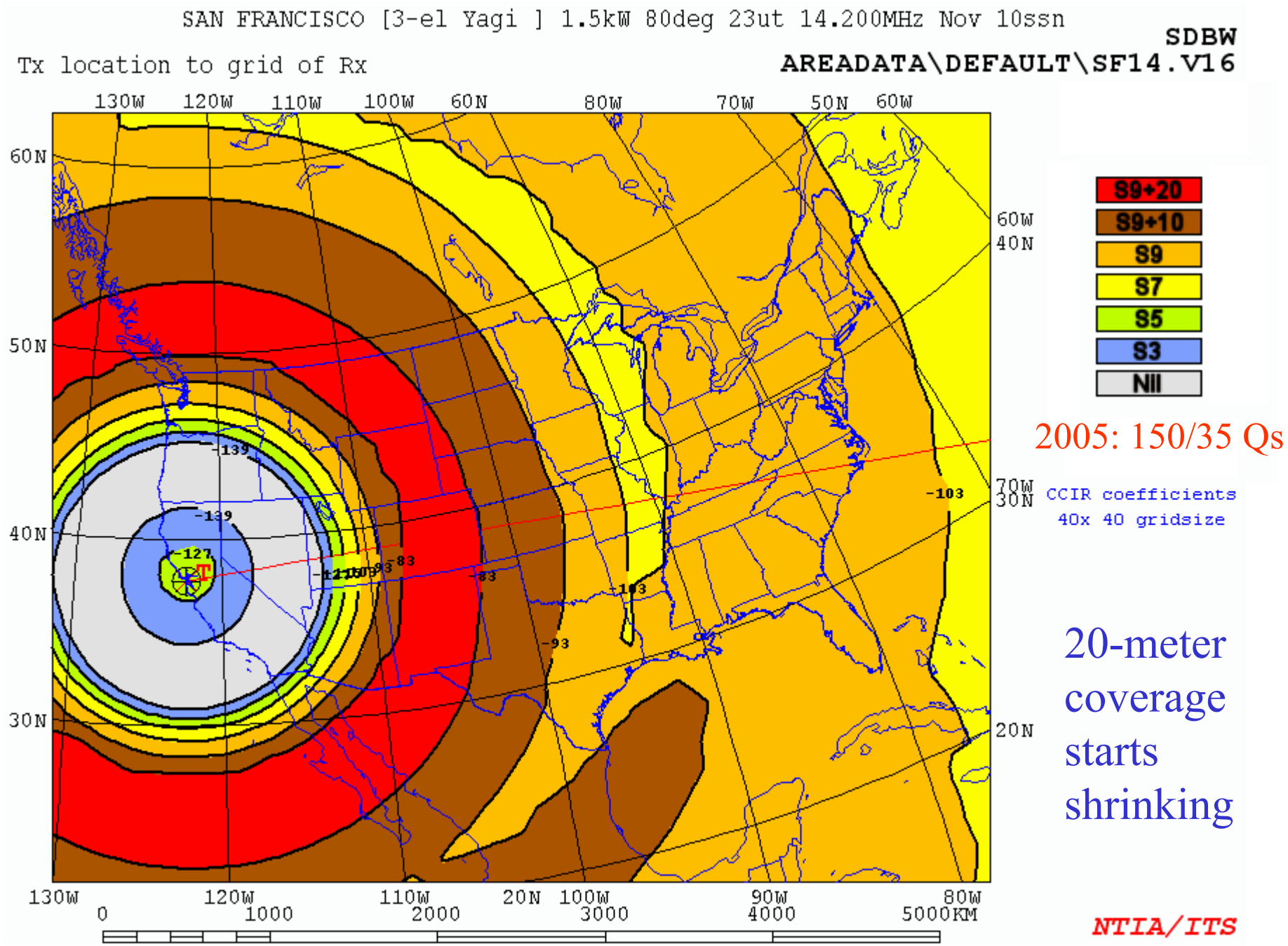

SAN FRANCISCO [3-el Yagi] 1.5kW 80deg 18ut 14.200MHz Nov 10ssn
SDBW
Tx location to grid of Rx
AREADATA\DEFAULT\SF14.V11
130W 120W 110W 100W 60N 80W 70W 50N 60W
60N
50N
40N
30N
60W 40N
70W 30N
20N
-103
-108
-127
139
-103
-115
-83
-93
-83
-93
S9+20
S9+10
S9
S7
S5
S3
NII
2005: 5 Qs
CCIR coefficients
40x 40 gridsize
I went to
15 meters
130W 120W 110W 20N 100W 90W 80W
0 1000 2000 3000 4000 5000KM
NTIA/ITS


SAN FRANCISCO [3-el Yagi] 1.5kW 80deg 19ut 14.200MHz Nov 10ssn
SDBW
Tx location to grid of Rx
AREADATA\DEFAULT\SF14.V12
130W 120W 110W 100W 60N 80W 70W 50N 60W
60N
50N
40N
30N
60W
40N
70W
30N
20N
-103
-103
-127
-139
-139
-127
-103
-93
-83
-103
-115
S9+20
S9+10
S9
S7
S5
S3
Nil
2005: 6 Qs
CCIR coefficients
40x 40 gridsize
East Coast
goes weak
130W 120W 110W 20N 100W 90W 80W
0 1000 2000 3000 4000 5000KM
NTIA/ITS


SAN FRANCISCO [3-el Yagi] 1.5kW 80deg 20ut 14.200MHz Nov 10ssn
SDBW
AREADATA\DEFAULT\SF14.V13
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
-127
-139
-103
-103
-93
-83
2005: 34 Qs
CCIR coefficients
40x 40 gridsize
130W 120W 110W 20N 100W 90W 80W
0 1000 2000 3000 4000 5000KM
NTIA/ITS


SAN FRANCISCO [3-el Yagi] 1.5kW 80deg 21ut 14.200MHz Nov 10ssn
SDBW
Tx location to grid of Rx
AREADATA\DEFAULT\SF14.V14
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
NII
-103
-93
-127
-139
-139
-127
-103
-93
-83
2005: 1/60 Qs
CCIR coefficients
40x 40 gridsize
1st/2nd Day
East Coast
is back
130W 120W 110W 20N 100W 90W 80W
0 1000 2000 3000 4000 5000KM
NTIA/ITS

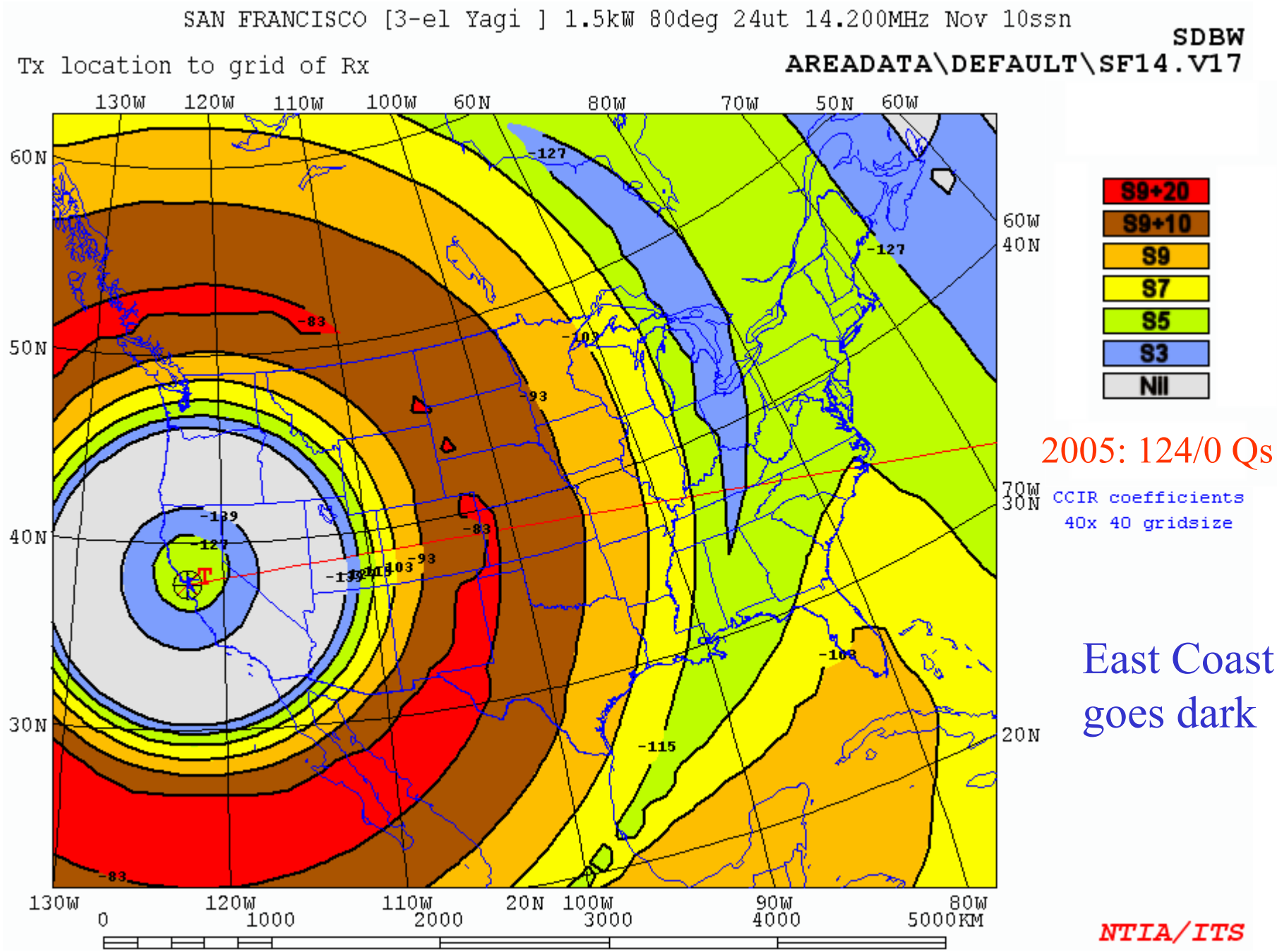

SAN FRANCISCO [3-el Yagi] 1.5kW 80deg 22ut 14.200MHz Nov 10ssn
SDBW
AREADATA\DEFAULT\SF14.V15
Tx location to grid of Rx
130W 120W 110W 100W 60N 80W 70W 50N 60W
60N
50N
40N
30N
60W
40N
70W
30N
20N
S9+20
S9+10
S9
S7
S5
S3
Nil
-103
-139
-139
-127
-93
-83
-93
-103
-93
2005: 16/56 Qs
CCIR coefficients
40x 40 gridsize
130W 120W 110W 20N 100W 90W 80W
0 1000 2000 3000 4000 5000KM
NTIA/ITS

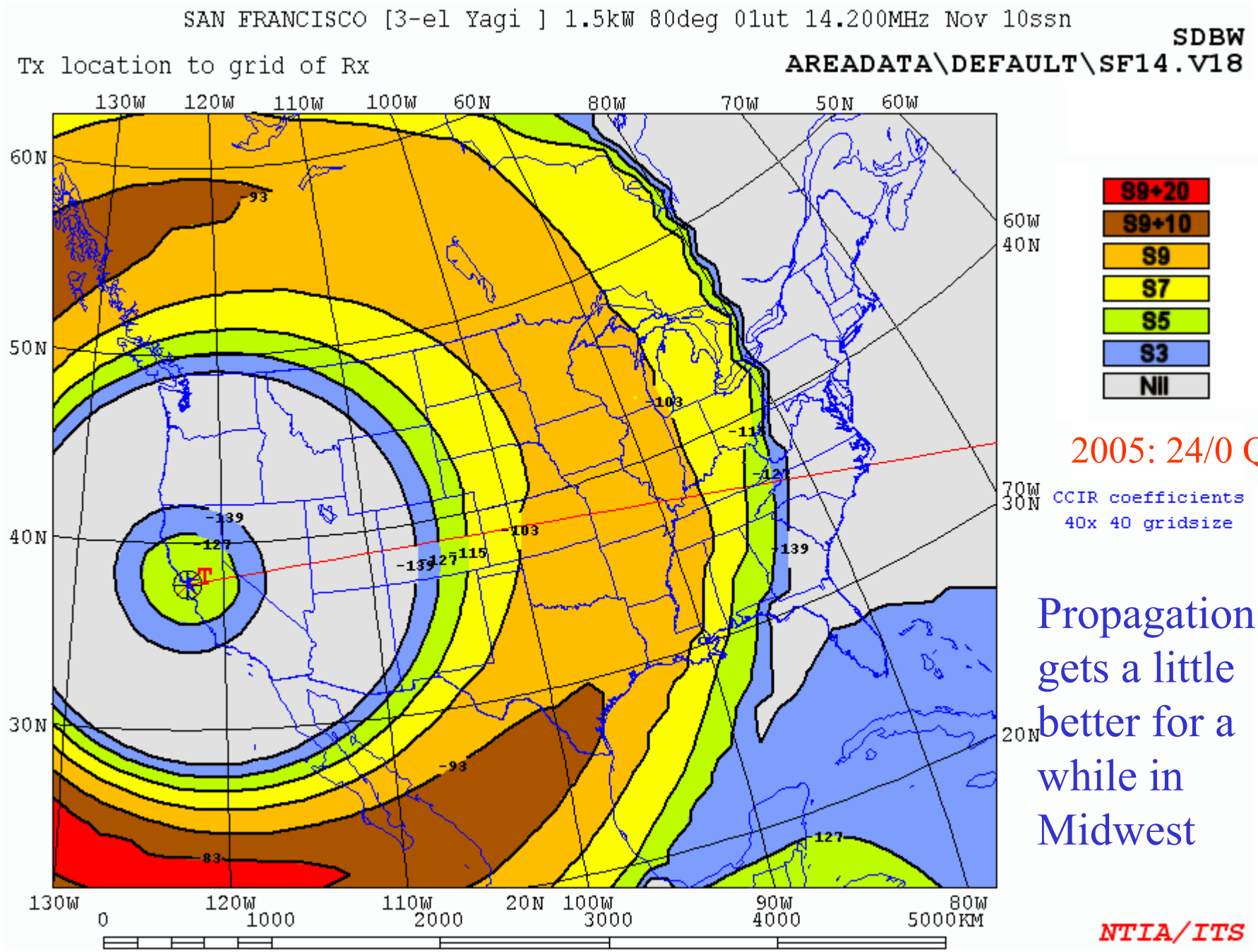


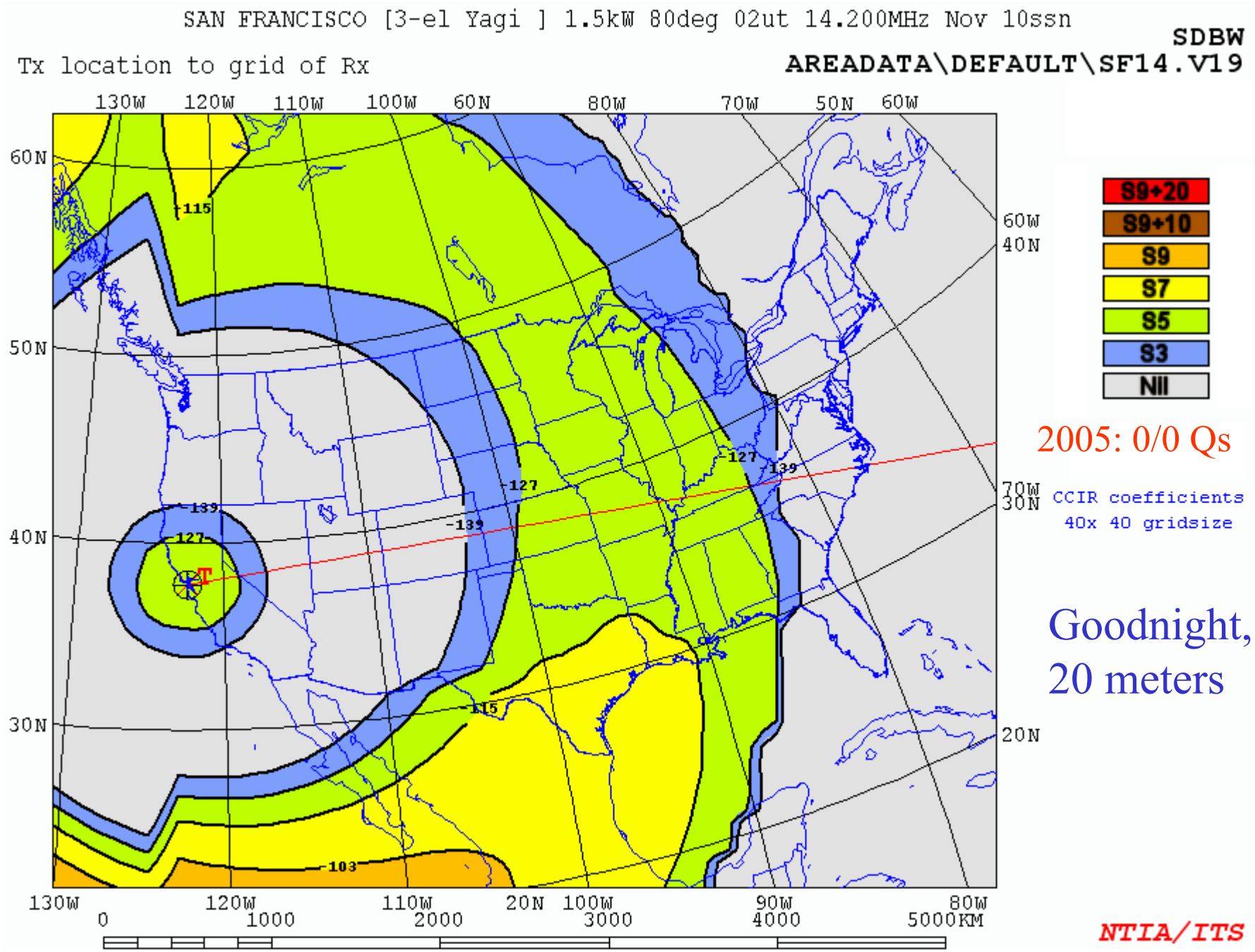
2005: 150/35 Qs

20-meter coverage starts shrinking

NTIA/ITS

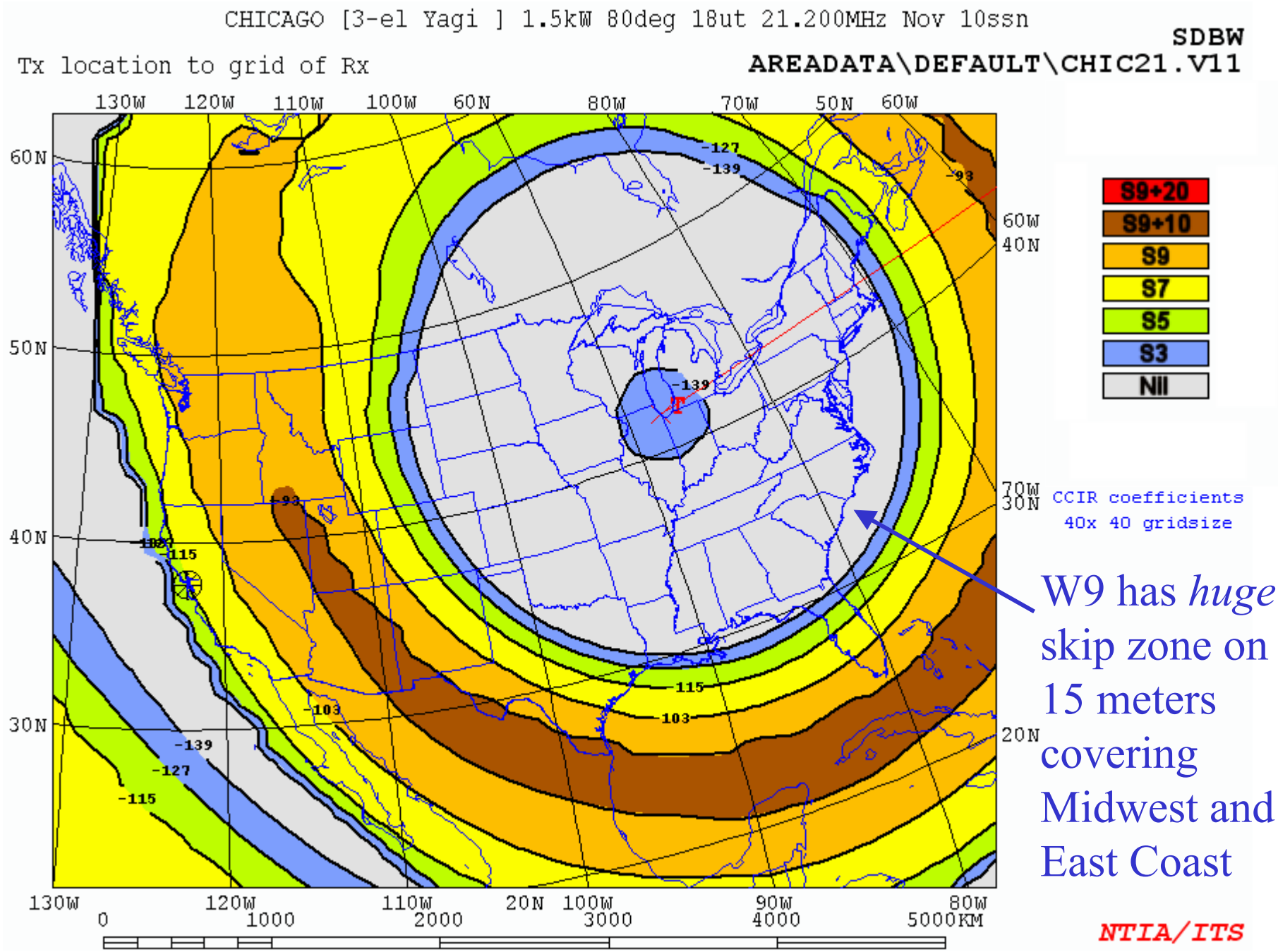

SAN FRANCISCO [3-el Yagi] 1.5kW 80deg 24ut 14.200MHz Nov 10ssn
SDBW
Tx location to grid of Rx
AREADATA\DEFAULT\SF14.V17
130W 120W 110W 100W 60N 80W 70W 50N 60W
60N
50N
40N
30N
60W
40N
70W
30N
20N
S9+20
S9+10
S9
S7
S5
S3
Nil
2005: 124/0 Qs
CCIR coefficients
40x 40 gridsize
East Coast goes dark
-127
-83
-103
-93
-139
-115
-108
T
130W 120W 110W 20N 100W 90W 80W
0 1000 2000 3000 4000 5000KM
NTIA/ITS


SAN FRANCISCO [3-el Yagi] 1.5kW 80deg 01ut 14.200MHz Nov 10ssn
SDBW
AREADATA\DEFAULT\SF14.V18
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
2005: 24/0 Qs
CCIR coefficients
40x 40 gridsize
Propagation gets a little better for a while in Midwest
NTIA/ITS
130W 120W 110W 20N 100W 90W 80W
0 1000 2000 3000 4000 5000KM


SAN FRANCISCO [3-el Yagi] 1.5kW 80deg 02ut 14.200MHz Nov 10ssn
SDBW
Tx location to grid of Rx
AREADATA\DEFAULT\SF14.V19
130W 120W 110W 100W 60N 80W 70W 50N 60W
60N
50N
40N
30N
60W
40N
70W
30N
20N
-115
-127
-139
-103
T
S9+20
S9+10
S9
S7
S5
S3
Nil
2005: 0/0 Qs
CCIR coefficients
40x 40 gridsize
Goodnight,
20 meters
130W 120W 110W 20N 100W 90W 80W
0 1000 2000 3000 4000 5000KM
NTIA/ITS

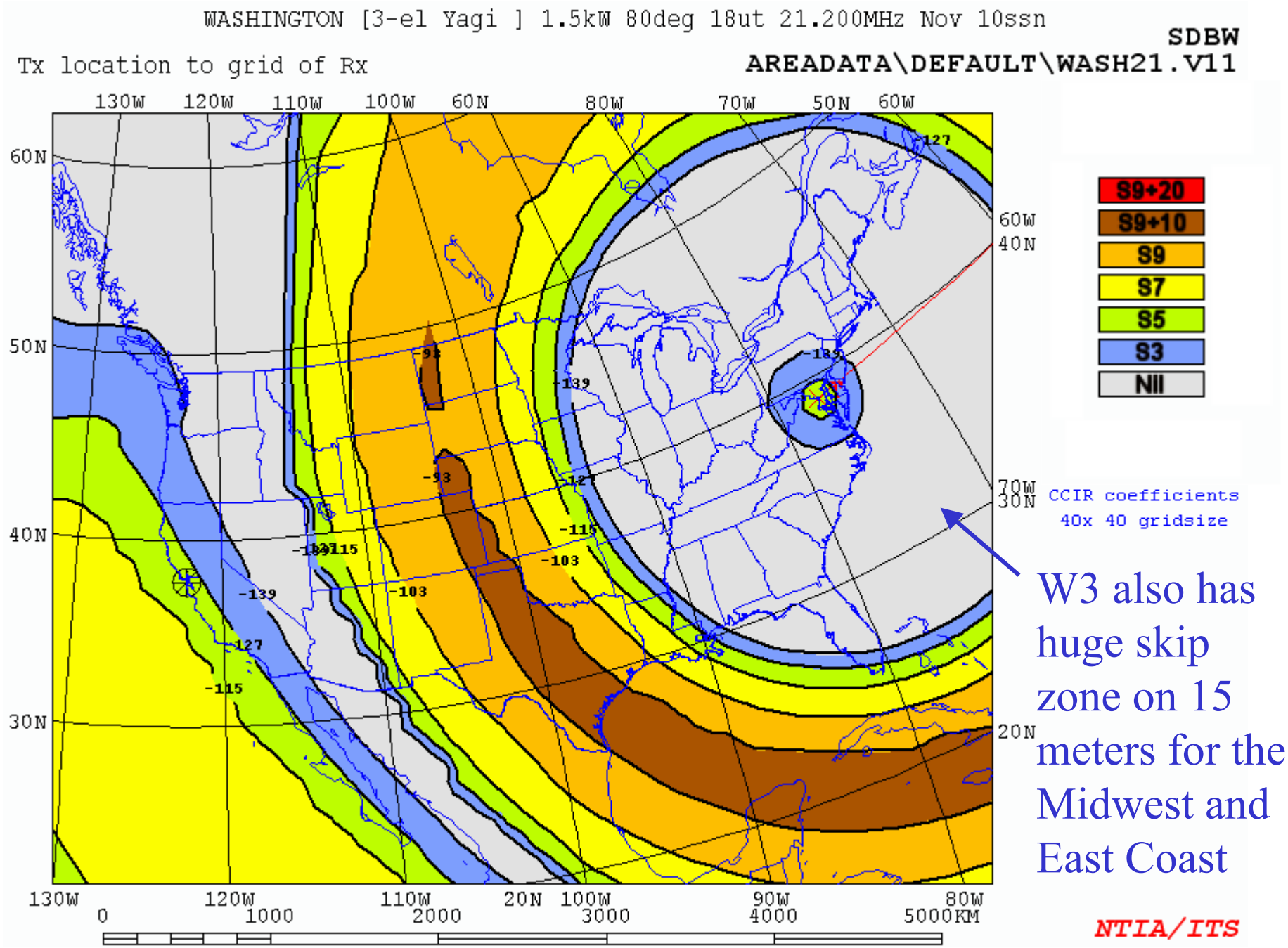
15-Meter Coverage

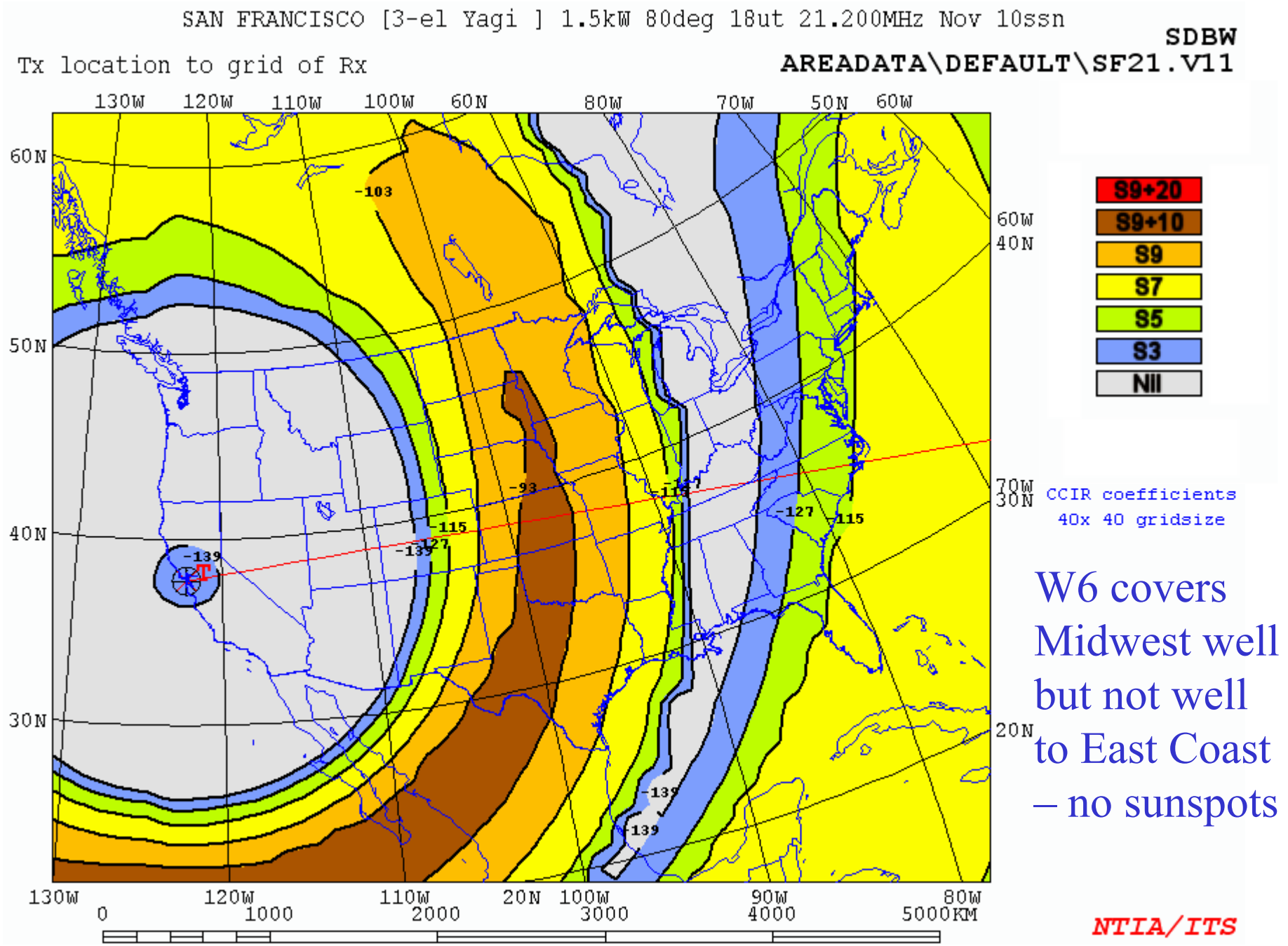
- During low portion of Solar Cycle, 15 meters will be reasonably good to Midwest, but marginal to East Coast.
- Big stacks help, of course, but relatively modest 15-meter beams can do well on 15.



W9 has *huge* skip zone on 15 meters covering Midwest and East Coast

NTIA/ITS


WASHINGTON [3-el Yagi] 1.5kW 80deg 18ut 21.200MHz Nov 10ssn
SDBW
Tx location to grid of Rx
AREADATA\DEFAULT\WASH21.V11
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
CCIR coefficients
40x 40 gridsize
-127
-139
-115
-103
-93
-121
130W 120W 110W 20N 100W 90W 80W
0 1000 2000 3000 4000 5000KM
W3 also has huge skip zone on 15 meters for the Midwest and East Coast
NTIA/ITS

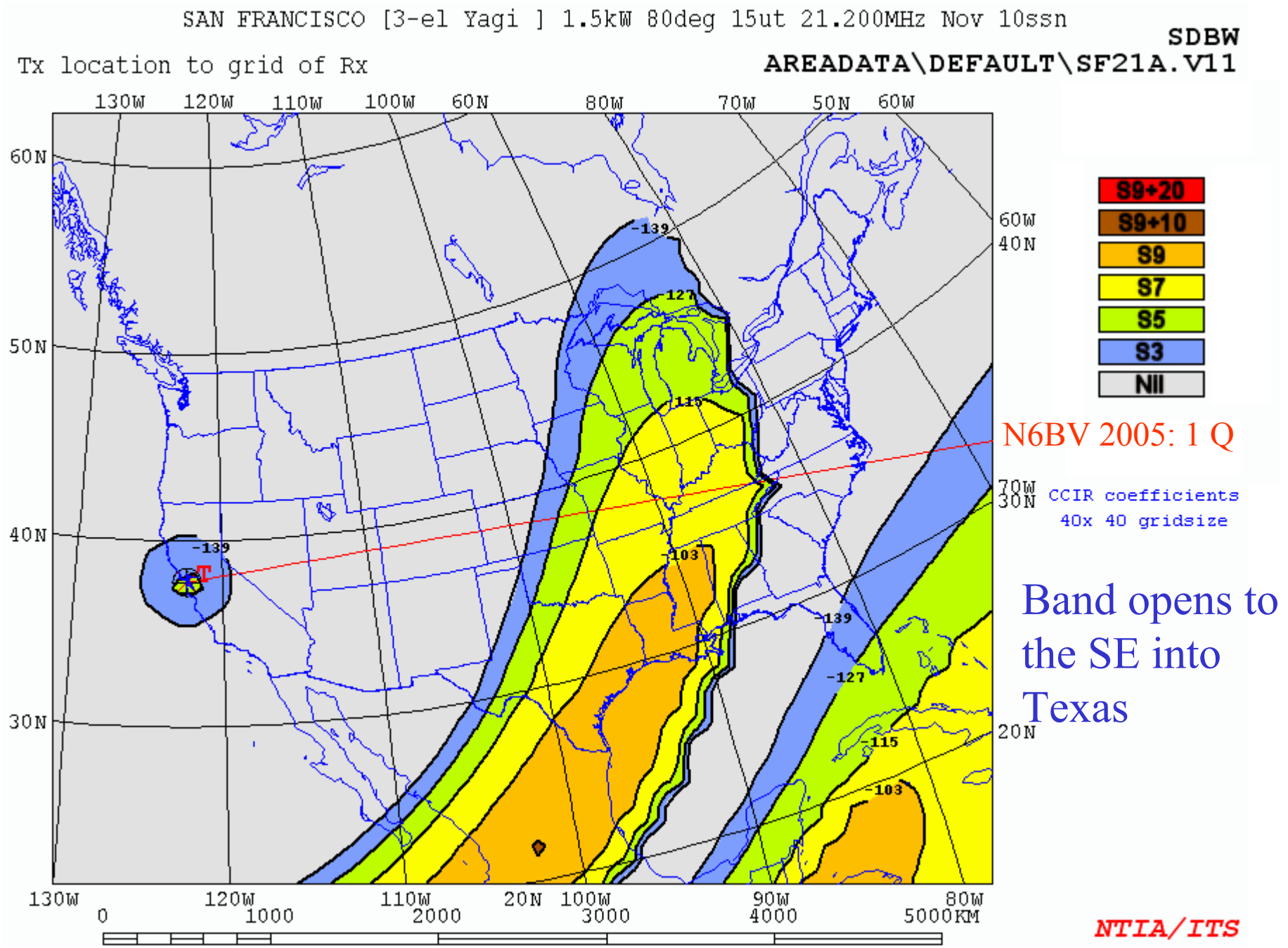


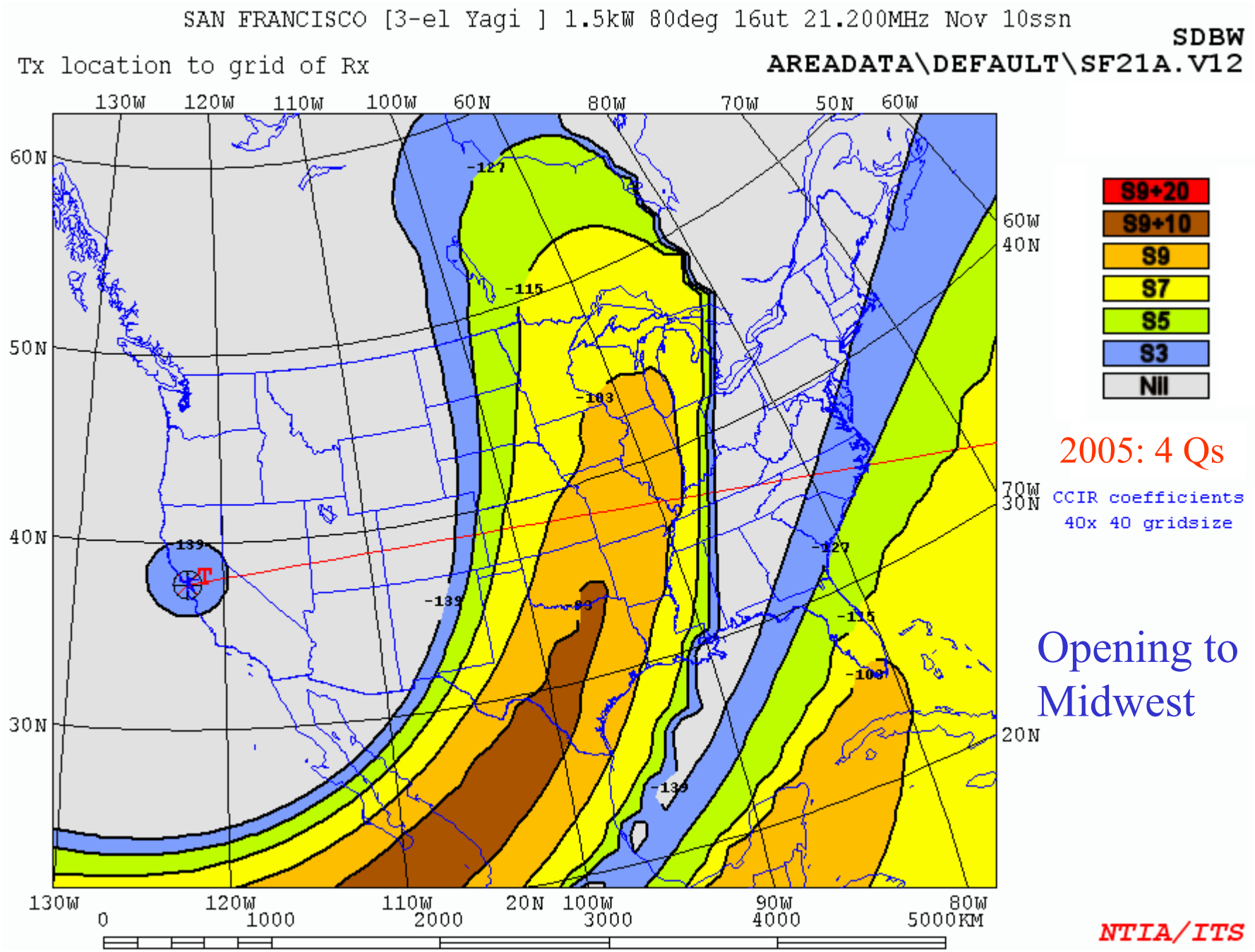
W6 covers Midwest well but not well to East Coast – no sunspots

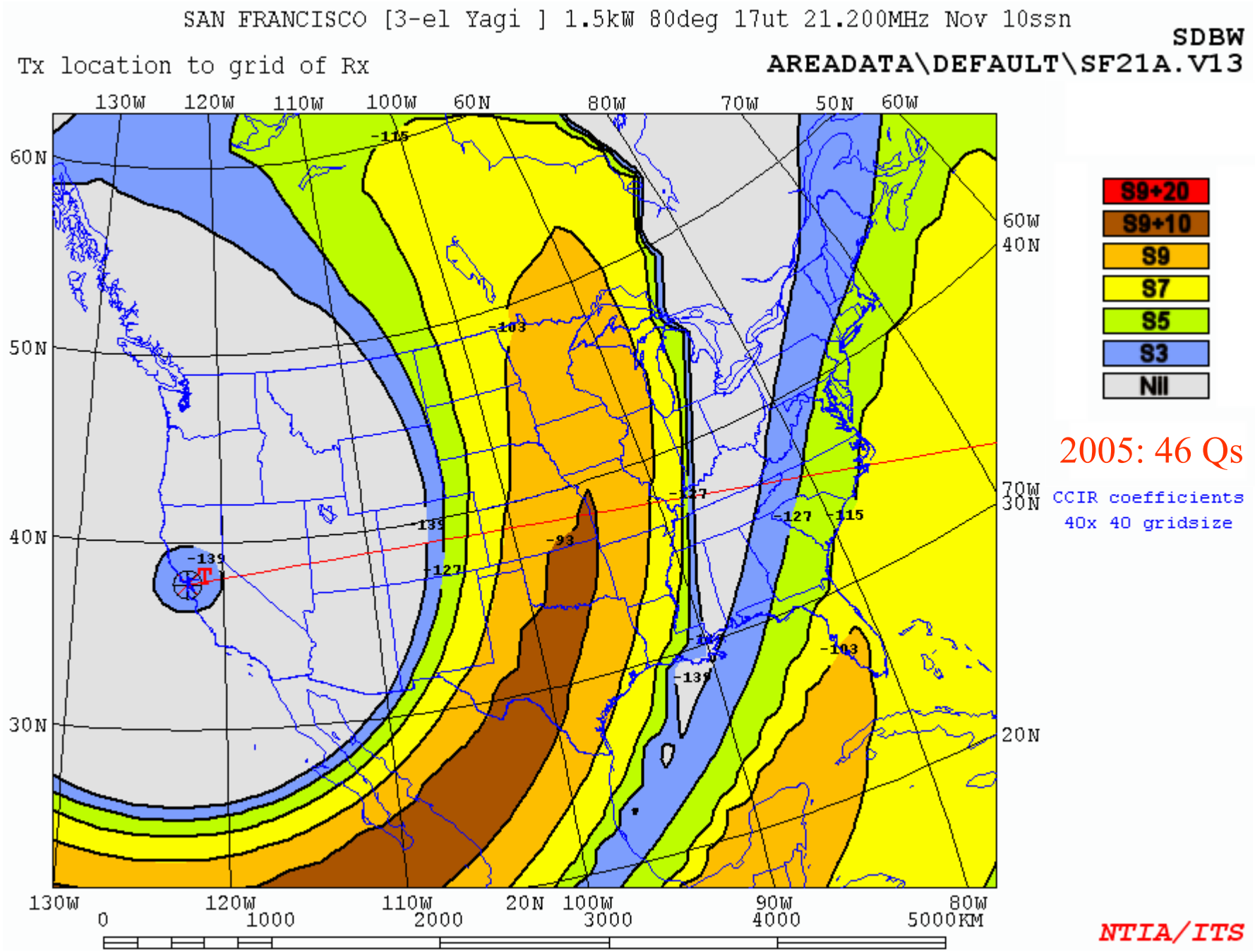
NTIA/ITS

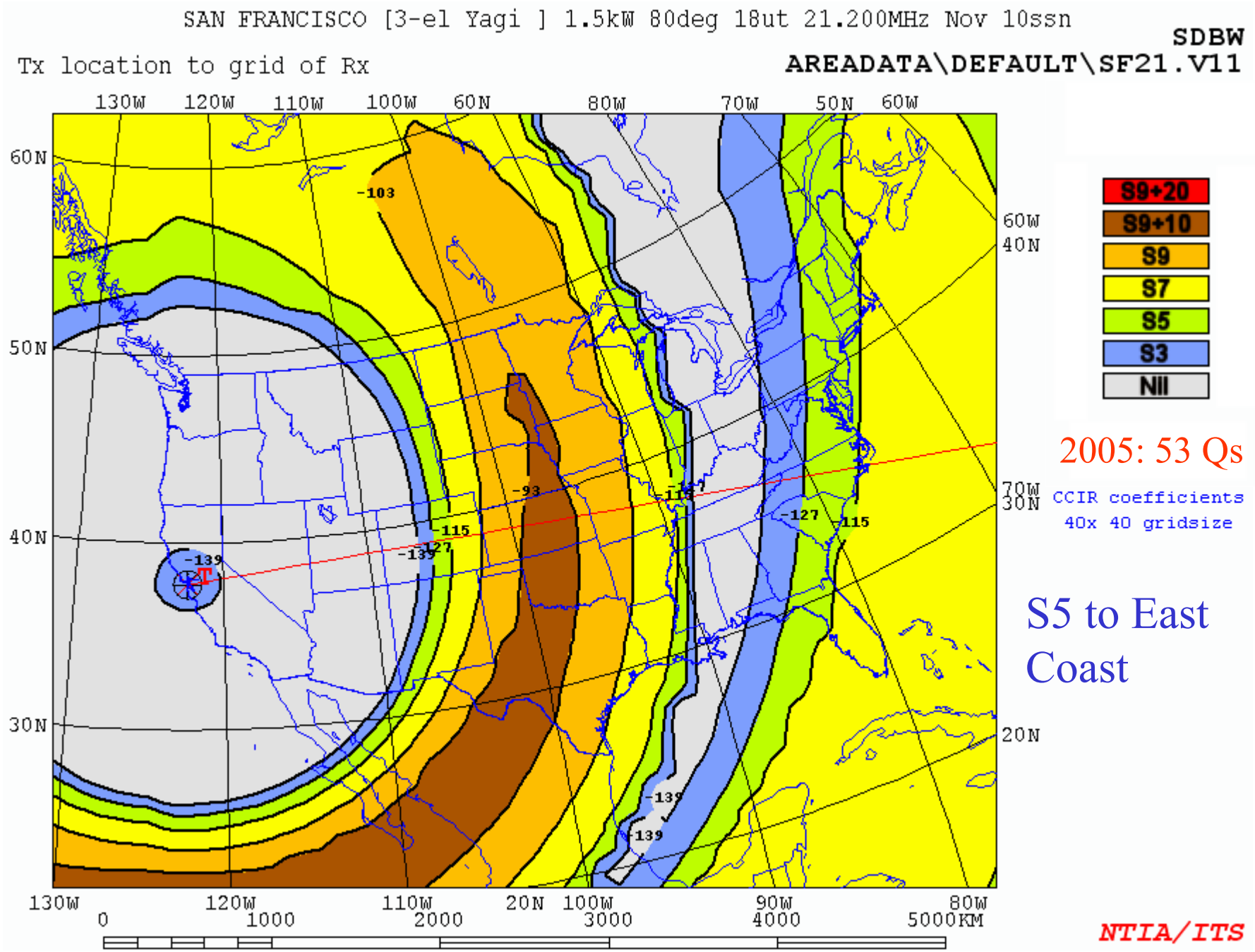
15-Meter Slideshow

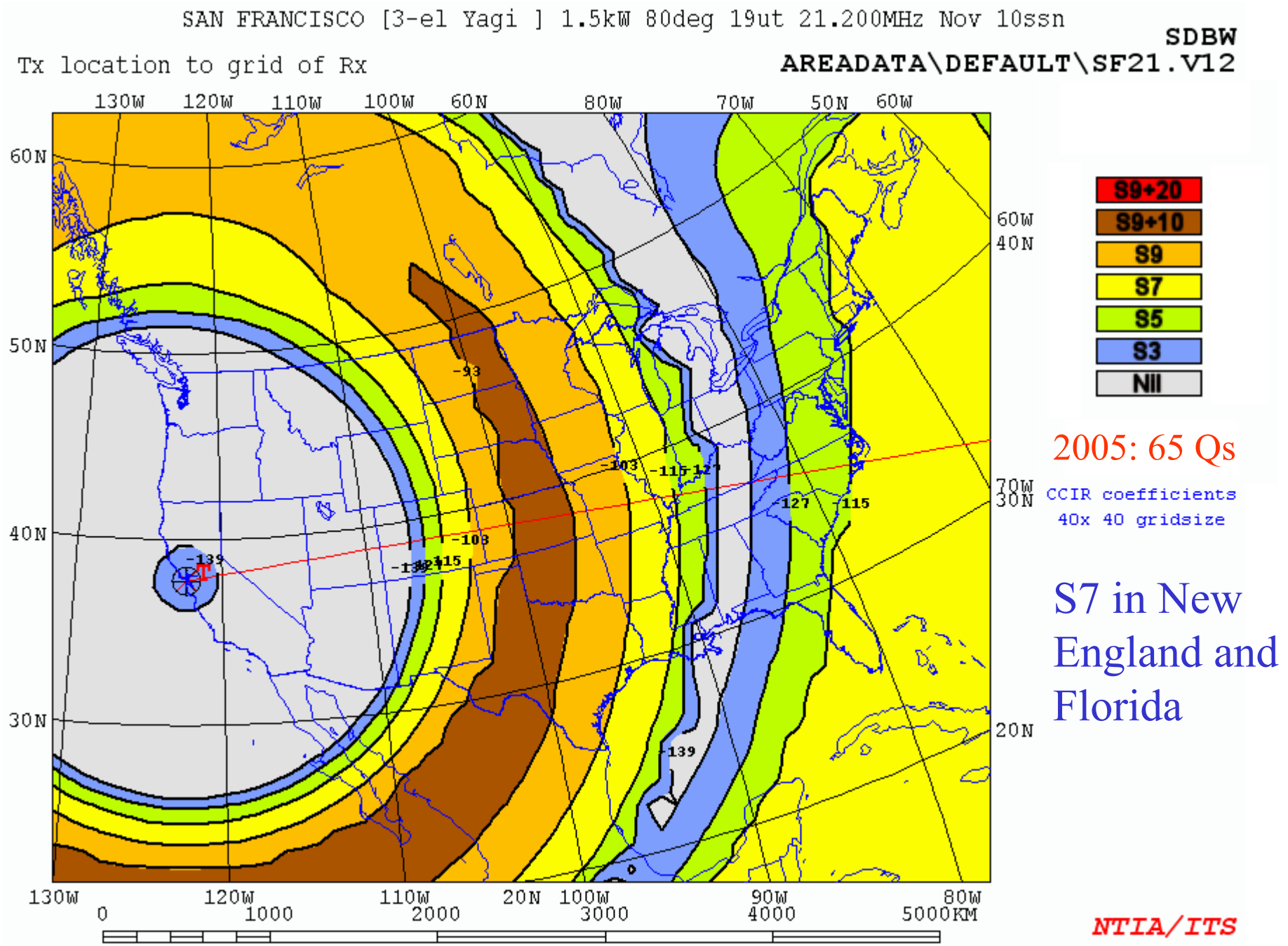
- 14 to 01 UTC (W6 sunrise at at 1443 UTC to sunset at 0103 UTC).
- Assumes 3-element 15-meter Yagis at each end at 55 feet.
- Assumes 1500 W.

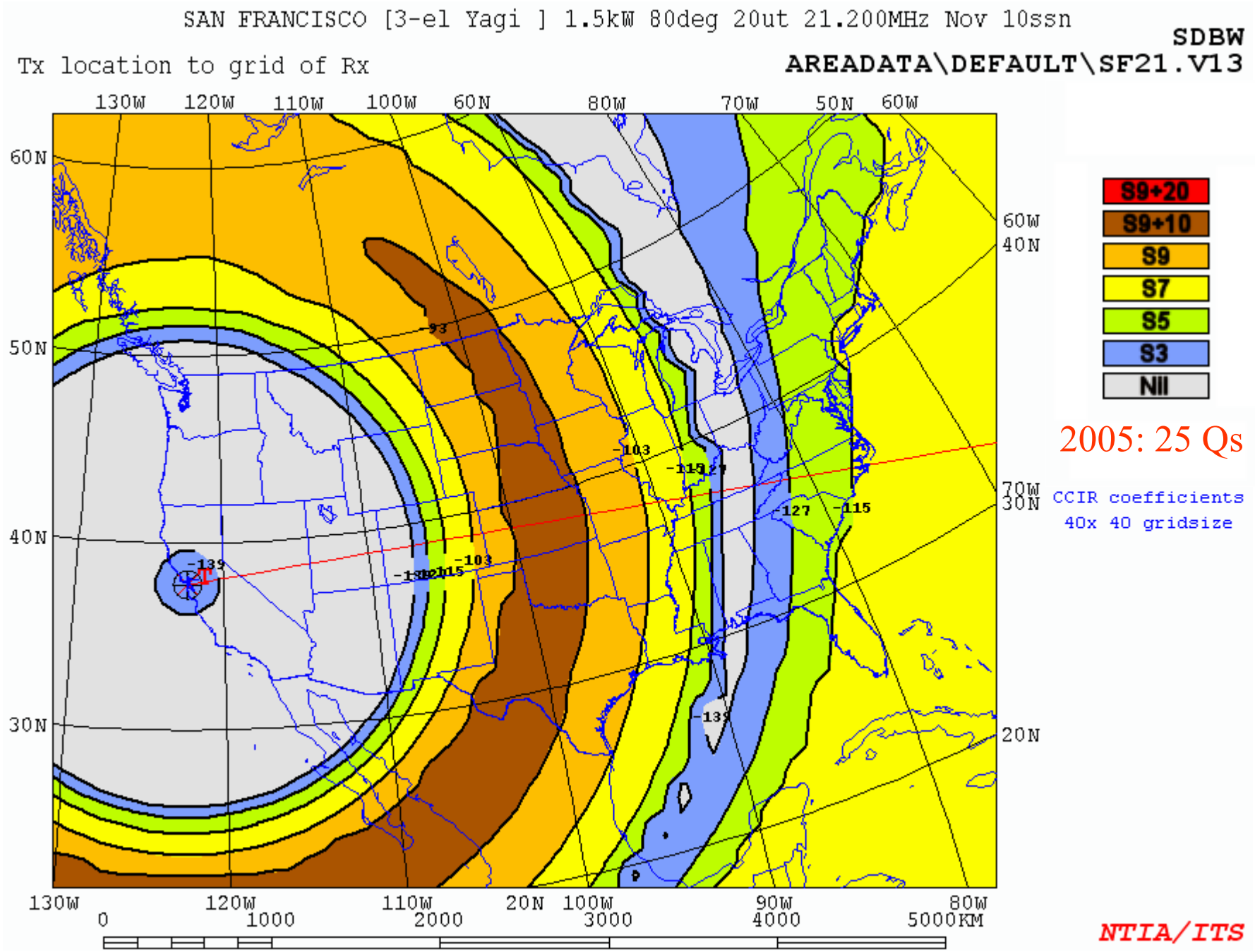

SAN FRANCISCO [3-el Yagi] 1.5kW 80deg 15ut 21.200MHz Nov 10ssn
SDBW
Tx location to grid of Rx
AREADATA\DEFAULT\SF21A.V11
130W 120W 110W 100W 60N 80W 70W 50N 60W
60N
50N
40N
30N
60W
40N
70W
30N
20N
S9+20
S9+10
S9
S7
S5
S3
Nil
-139
-127
-115
-103
T
N6BV 2005: 1 Q
CCIR coefficients
40x 40 gridsize
Band opens to the SE into Texas
130W 120W 110W 20N 100W 90W 80W
0 1000 2000 3000 4000 5000KM
NTIA/ITS

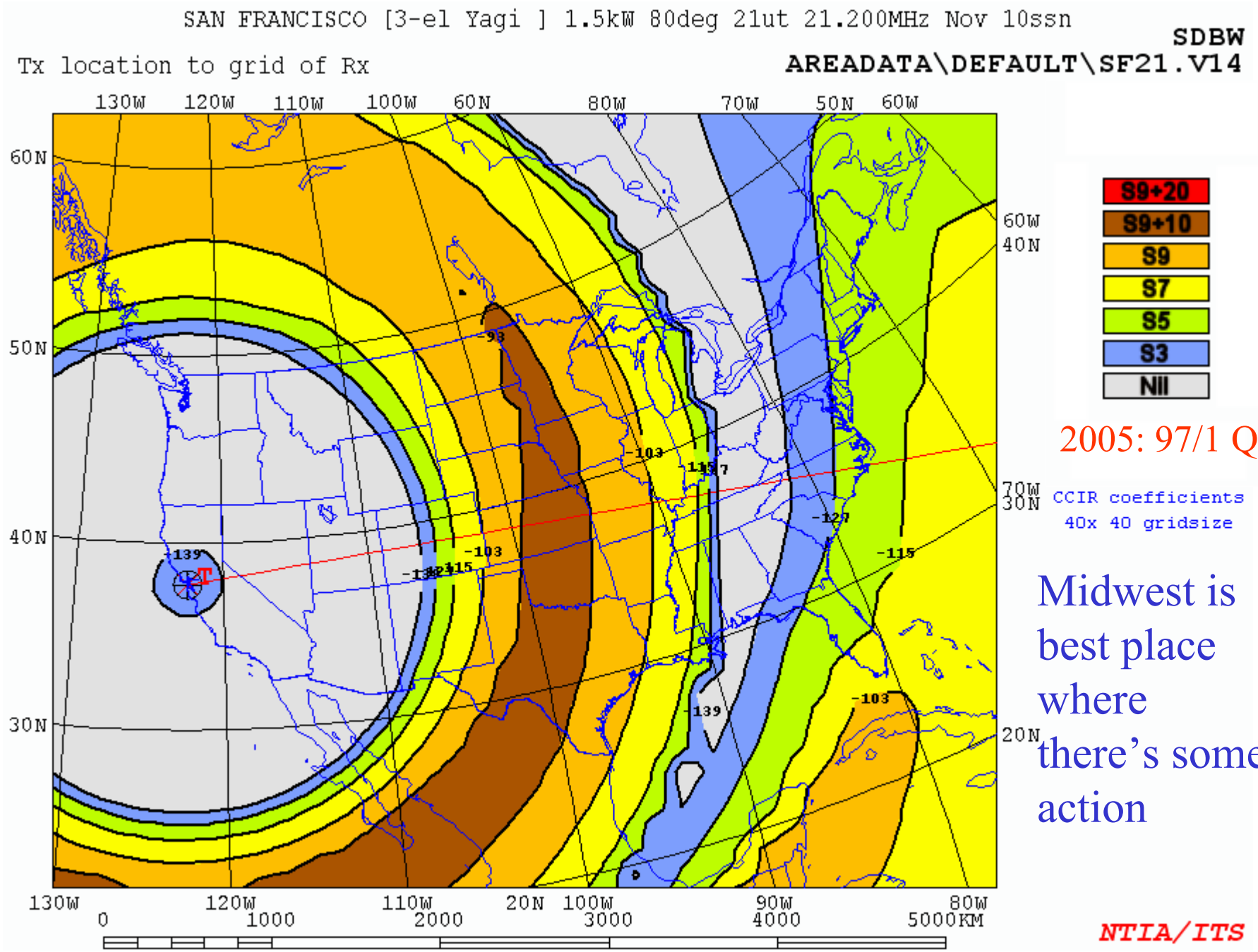

SAN FRANCISCO [3-el Yagi] 1.5kW 80deg 16ut 21.200MHz Nov 10ssn
SDBW
Tx location to grid of Rx
AREADATA\DEFAULT\SF21A.V12
130W 120W 110W 100W 60N 80W 70W 50N 60W
60N
50N
40N
30N
20N
60W
40N
70W
30N
-127
-115
-103
-139
-91
S9+20
S9+10
S9
S7
S5
S3
Nil
2005: 4 Qs
CCIR coefficients
40x 40 gridsize
Opening to Midwest
130W 120W 110W 20N 100W 90W 80W
0 1000 2000 3000 4000 5000KM
NTIA/ITS


SAN FRANCISCO [3-el Yagi] 1.5kW 80deg 17ut 21.200MHz Nov 10ssn
SDBW
AREADATA\DEFAULT\SF21A.V13
Tx location to grid of Rx
130W 120W 110W 100W 60N 80W 70W 50N 60W
60N
50N
40N
30N
60W
40N
70W
30N
20N
-115
-103
-127
-139
-93
S9+20
S9+10
S9
S7
S5
S3
Nil
2005: 46 Qs
CCIR coefficients
40x 40 gridsize
130W 120W 110W 20N 100W 90W 80W
0 1000 2000 3000 4000 5000KM
NTIA/ITS


SAN FRANCISCO [3-el Yagi] 1.5kW 80deg 18ut 21.200MHz Nov 10ssn
SDBW
Tx location to grid of Rx
AREADATA\DEFAULT\SF21.V11
130W 120W 110W 100W 60N 80W 70W 50N 60W
60N
50N
40N
30N
60W
40N
70W
30N
20N
-103
-93
-115
-127
-139
S9+20
S9+10
S9
S7
S5
S3
Nil
2005: 53 Qs
CCIR coefficients
40x 40 gridsize
S5 to East Coast
130W 120W 110W 20N 100W 90W 80W
0 1000 2000 3000 4000 5000KM
NTIA/ITS


SAN FRANCISCO [3-el Yagi] 1.5kW 80deg 19ut 21.200MHz Nov 10ssn
SDBW
Tx location to grid of Rx
AREADATA\DEFAULT\SF21.V12
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
-93
-103
-115
-127
-139
-103
-115
-127
-139
2005: 65 Qs
CCIR coefficients
40x 40 gridsize
S7 in New England and Florida
130W 120W 110W 20N 100W 90W 80W
0 1000 2000 3000 4000 5000KM
NTIA/ITS


SAN FRANCISCO [3-el Yagi] 1.5kW 80deg 20ut 21.200MHz Nov 10ssn
SDBW
Tx location to grid of Rx
AREADATA\DEFAULT\SF21.V13
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
2005: 25 Qs
CCIR coefficients
40x 40 gridsize
-139
-103
-115
-127
130W 120W 110W 20N 100W 90W 80W
0 1000 2000 3000 4000 5000KM
NTIA/ITS

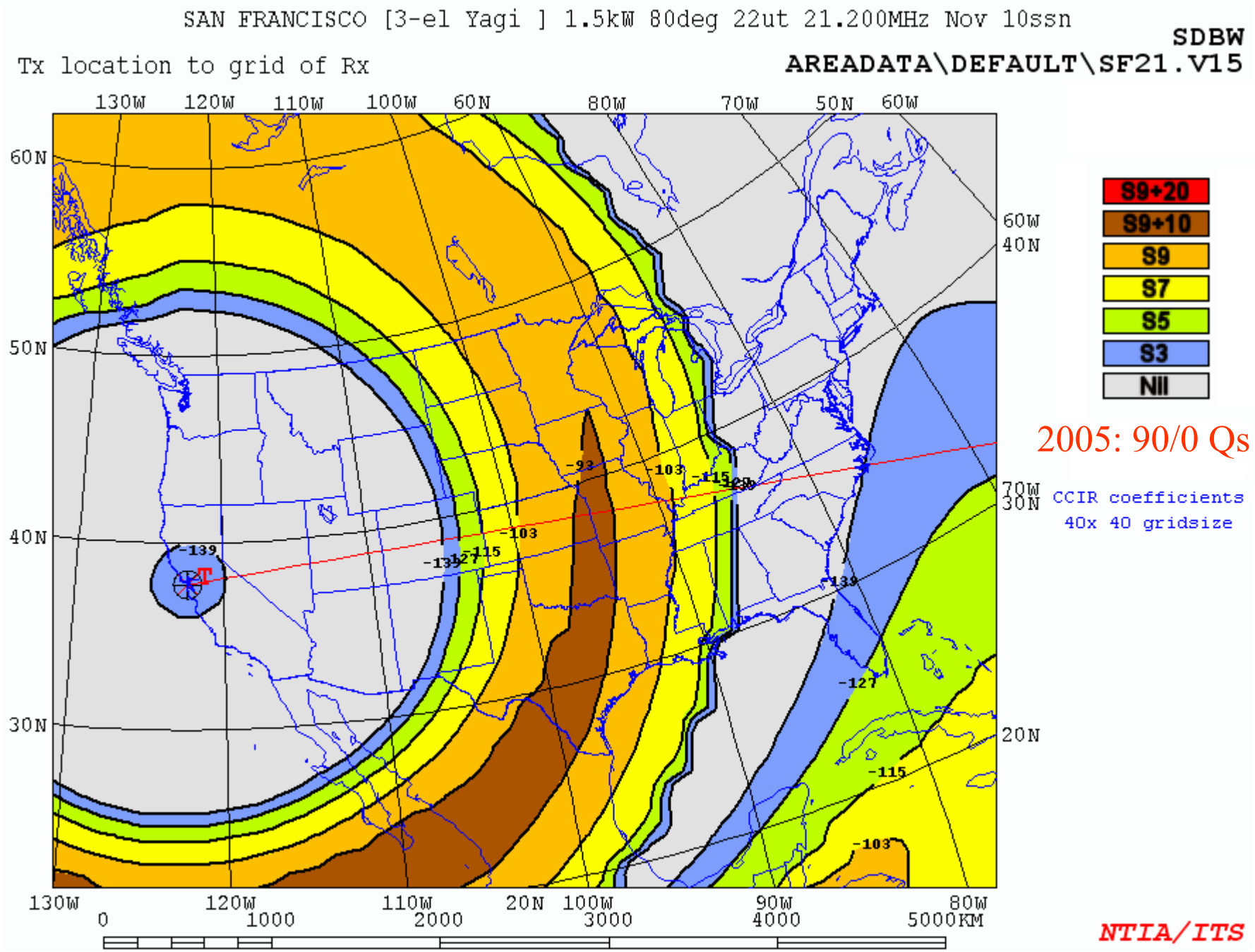


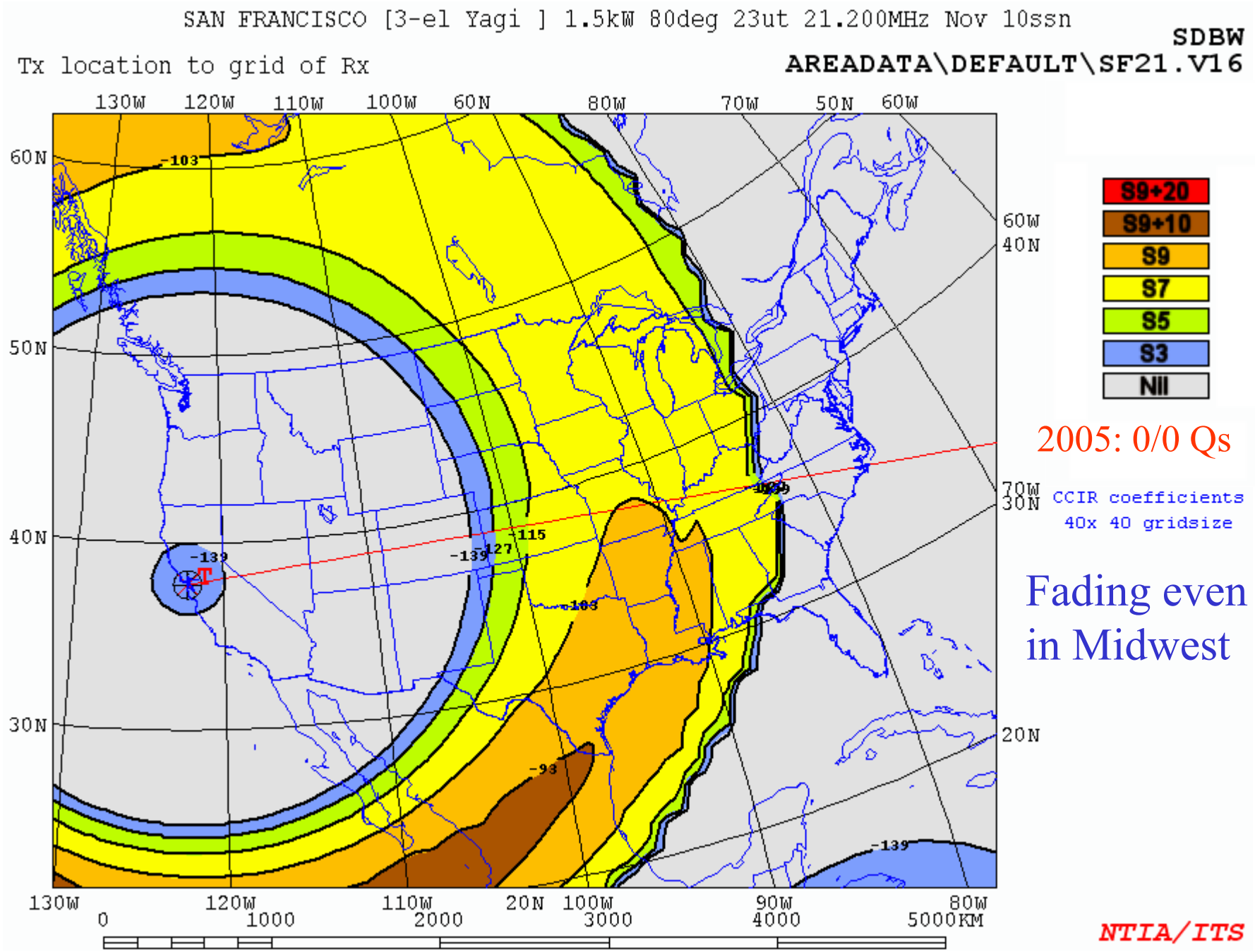
2005: 97/1 Qs

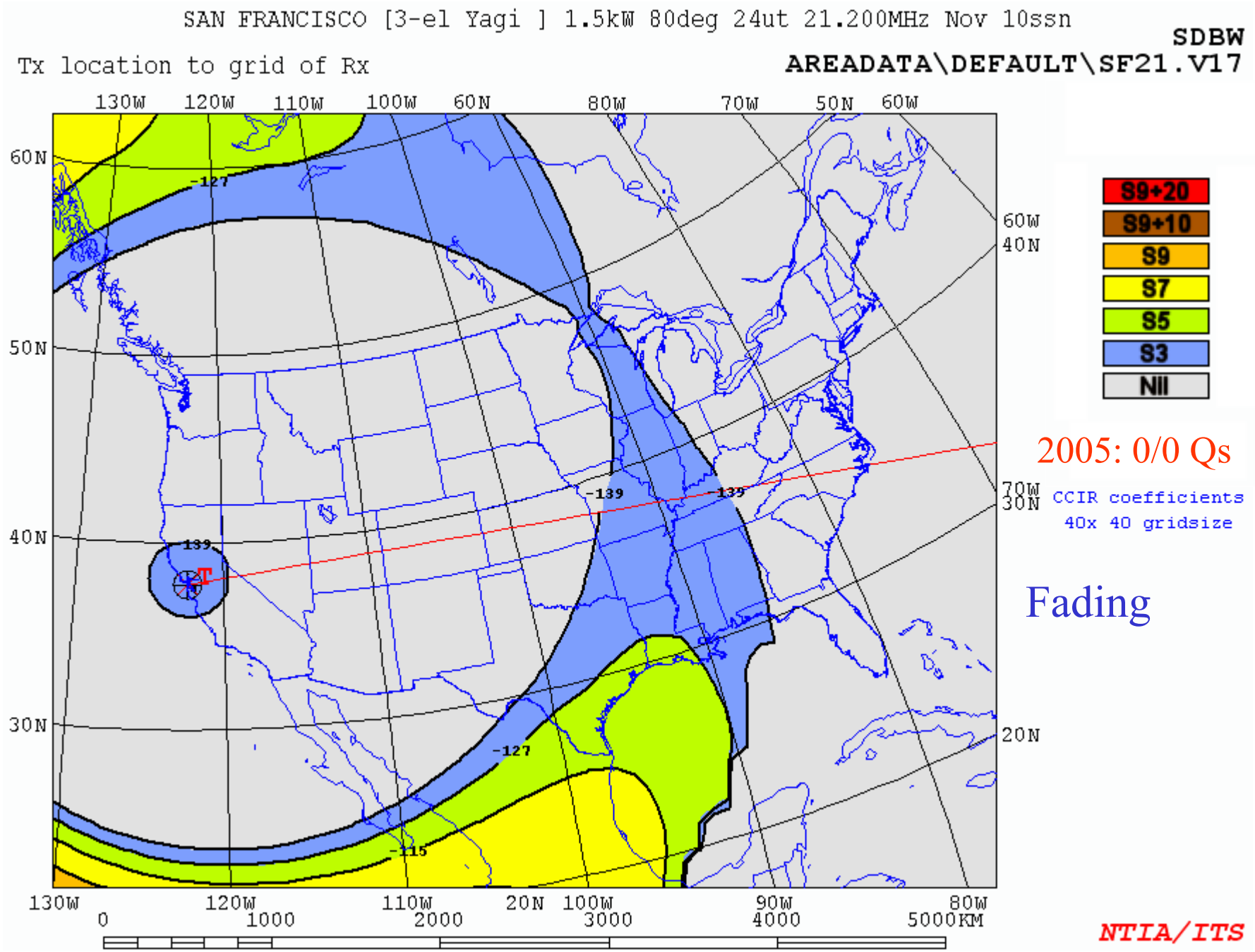
CCIR coefficients
40x 40 gridsize

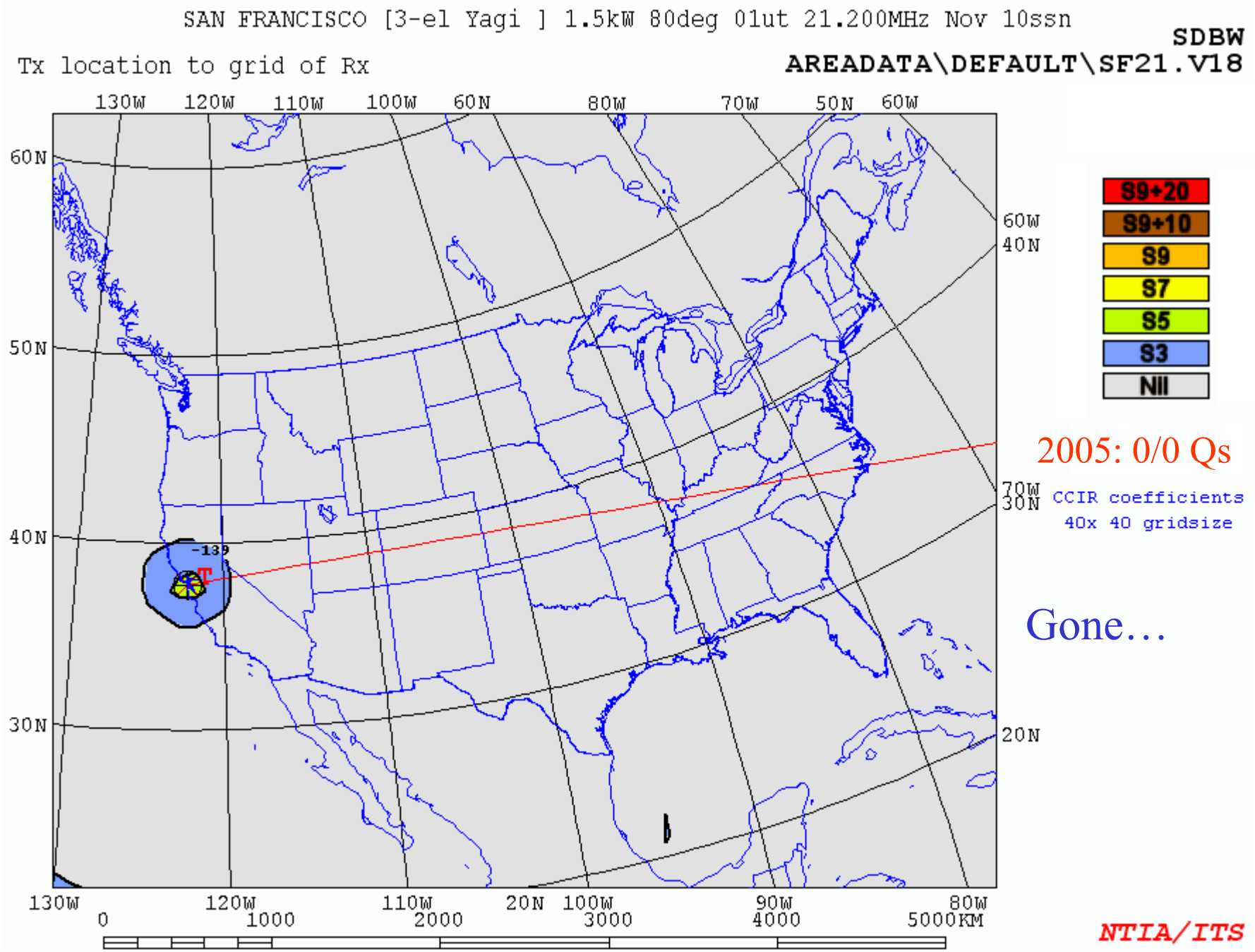
Midwest is best place where there's some action

NTIA/ITS


SAN FRANCISCO [3-el Yagi] 1.5kW 80deg 22ut 21.200MHz Nov 10ssn
SDBW
AREADATA\DEFAULT\SF21.V15
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
2005: 90/0 Qs
CCIR coefficients
40x 40 gridsize
-93
-103
-115
-120
-139
-127
130W 120W 110W 20N 100W 90W 80W
0 1000 2000 3000 4000 5000KM
NTIA/ITS

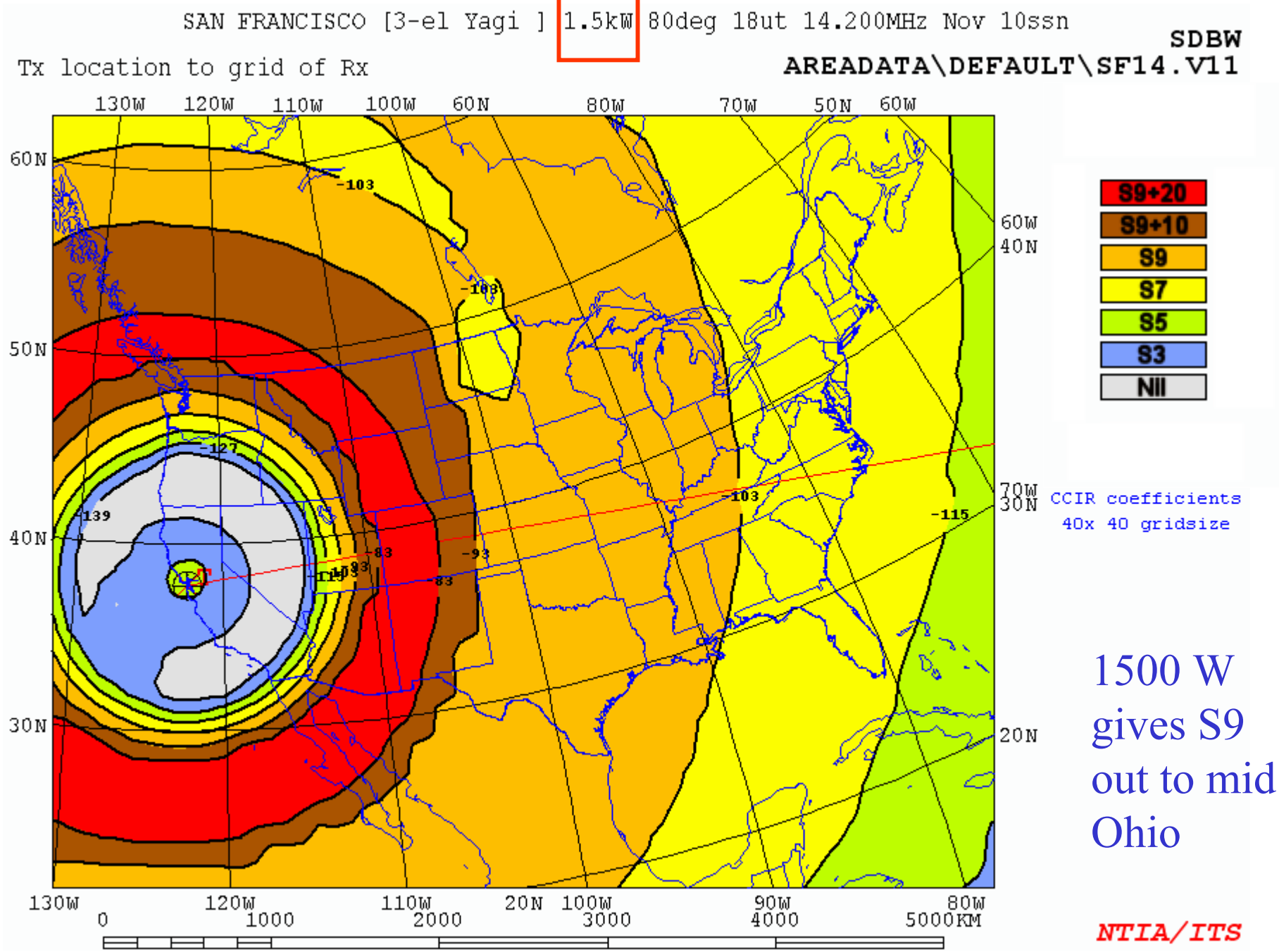

SAN FRANCISCO [3-el Yagi] 1.5kW 80deg 23ut 21.200MHz Nov 10ssn
SDBW
Tx location to grid of Rx
AREADATA\DEFAULT\SF21.V16
130W 120W 110W 100W 60N 80W 70W 50N 60W
60N
50N
40N
30N
60W
40N
70W
30N
20N
-103
-139
-127
-115
-93
S9+20
S9+10
S9
S7
S5
S3
Nil
2005: 0/0 Qs
CCIR coefficients
40x 40 gridsize
Fading even in Midwest
130W 120W 110W 20N 100W 90W 80W
0 1000 2000 3000 4000 5000KM
NTIA/ITS

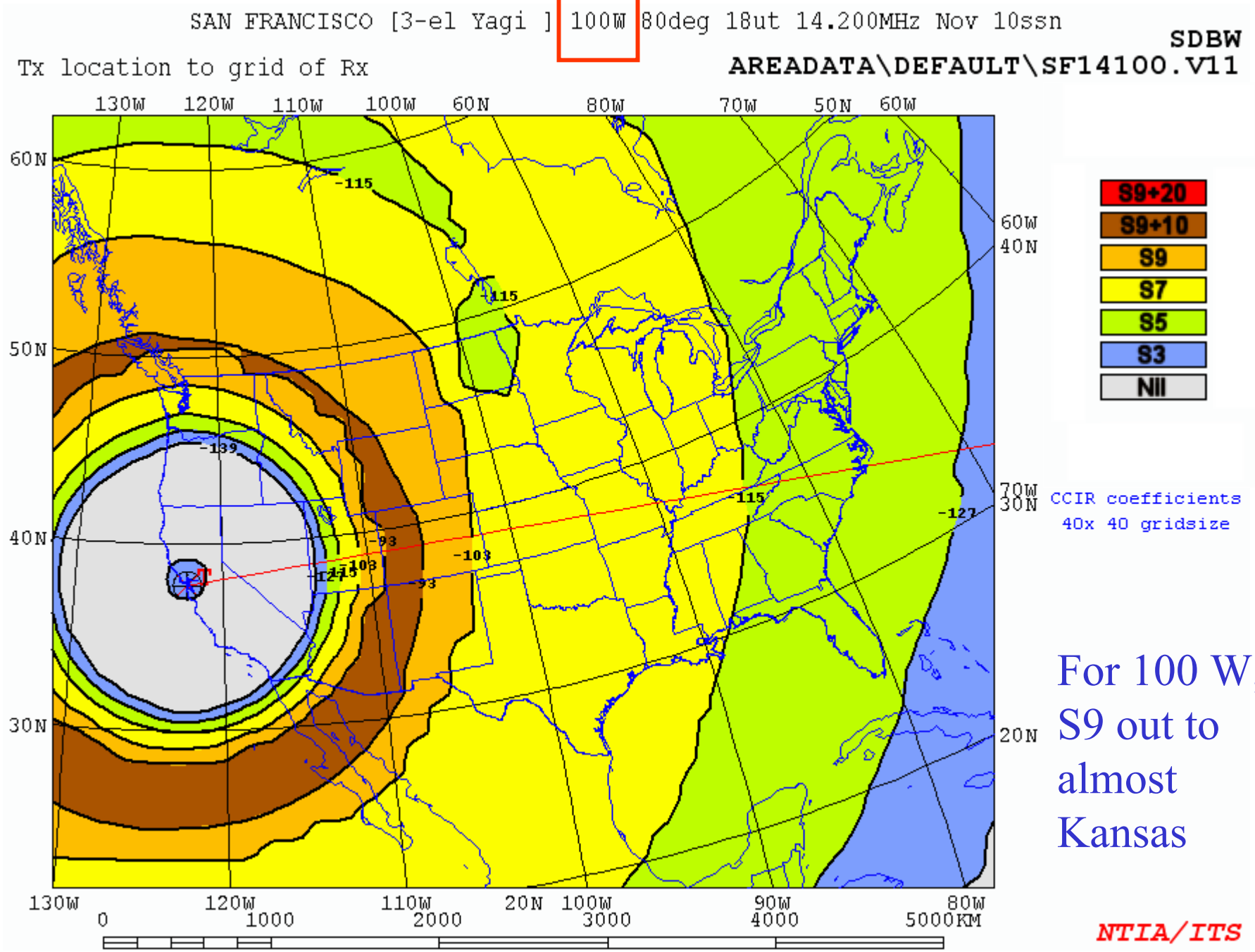

SAN FRANCISCO [3-el Yagi] 1.5kW 80deg 24ut 21.200MHz Nov 10ssn
SDBW
Tx location to grid of Rx
AREADATA\DEFAULT\SF21.V17
130W 120W 110W 100W 60N 80W 70W 50N 60W
60N
50N
40N
30N
60W
40N
70W
30N
20N
-127
-139
139
139
-127
-115
T
S9+20
S9+10
S9
S7
S5
S3
Nil
2005: 0/0 Qs
CCIR coefficients
40x 40 gridsize
Fading
130W 120W 110W 20N 100W 90W 80W
0 1000 2000 3000 4000 5000KM
NTIA/ITS


SAN FRANCISCO [3-el Yagi] 1.5kW 80deg 01ut 21.200MHz Nov 10ssn
SDBW
Tx location to grid of Rx
AREADATA\DEFAULT\SF21.V18
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
2005: 0/0 Qs
CCIR coefficients
40x 40 gridsize
-139
T
Gone…
130W 120W 110W 20N 100W 90W 80W
0 1000 2000 3000 4000 5000KM
NTIA/ITS

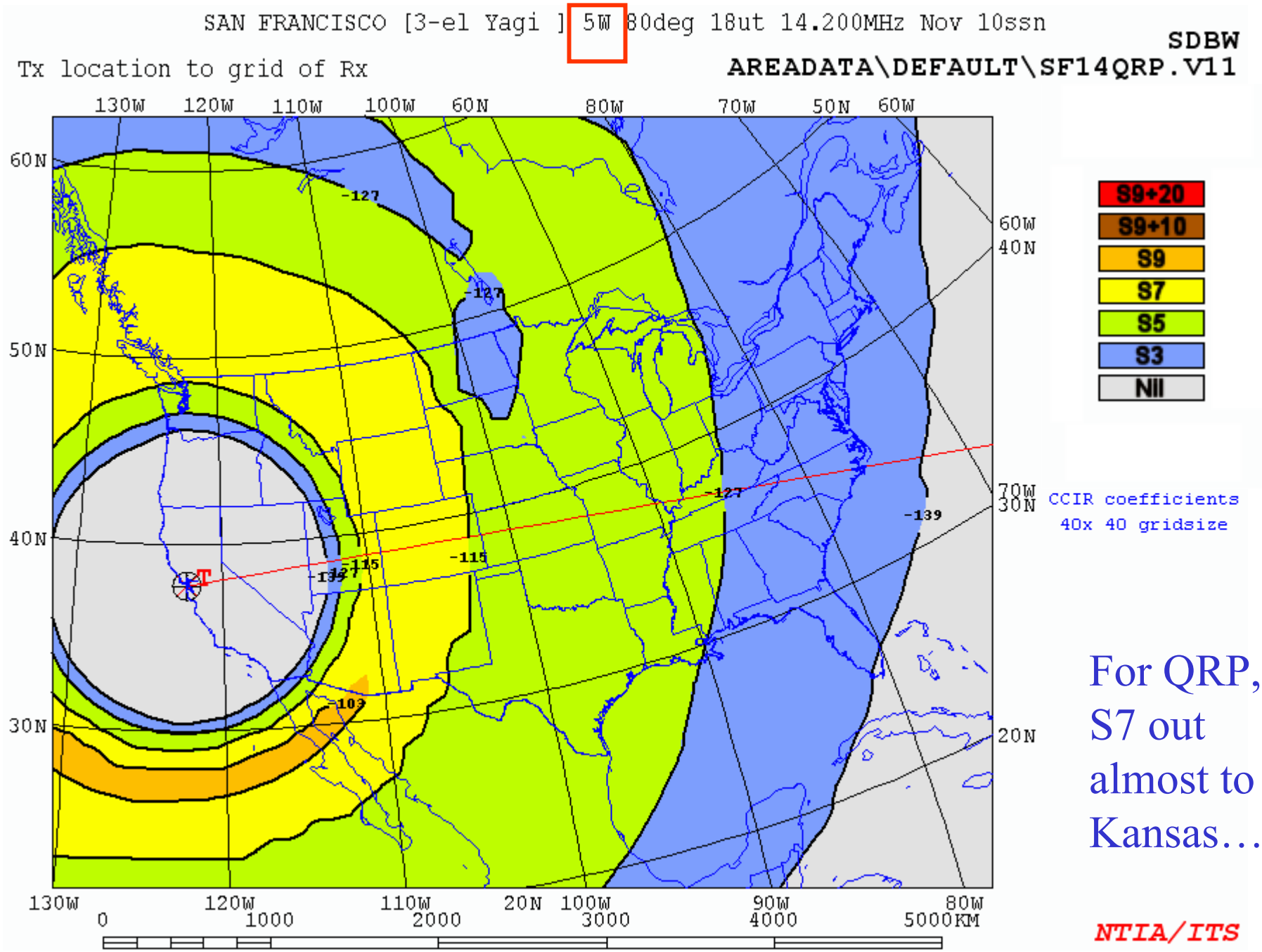
What About Power?

- Compare area-coverage plots for 20 meters at 18 UTC for 100 W and for 1500 W.
- And what about QRP ?


SAN FRANCISCO [3-el Yagi] 1.5kW 80deg 18ut 14.200MHz Nov 10ssn
SDBW
Tx location to grid of Rx
AREADATA\DEFAULT\SF14.V11
130W 120W 110W 100W 60N 80W 70W 50N 60W
60N
50N
40N
30N
60W 40N
70W 30N
20N
-103
-127
139
-83
-93
-115
S9+20
S9+10
S9
S7
S5
S3
Nil
CCIR coefficients
40x 40 gridsize
130W 120W 110W 20N 100W 90W 80W
0 1000 2000 3000 4000 5000KM
1500 W gives S9 out to mid Ohio
NTIA/ITS



For 100 W, S9 out to almost Kansas



For QRP, S7 out almost to Kansas…

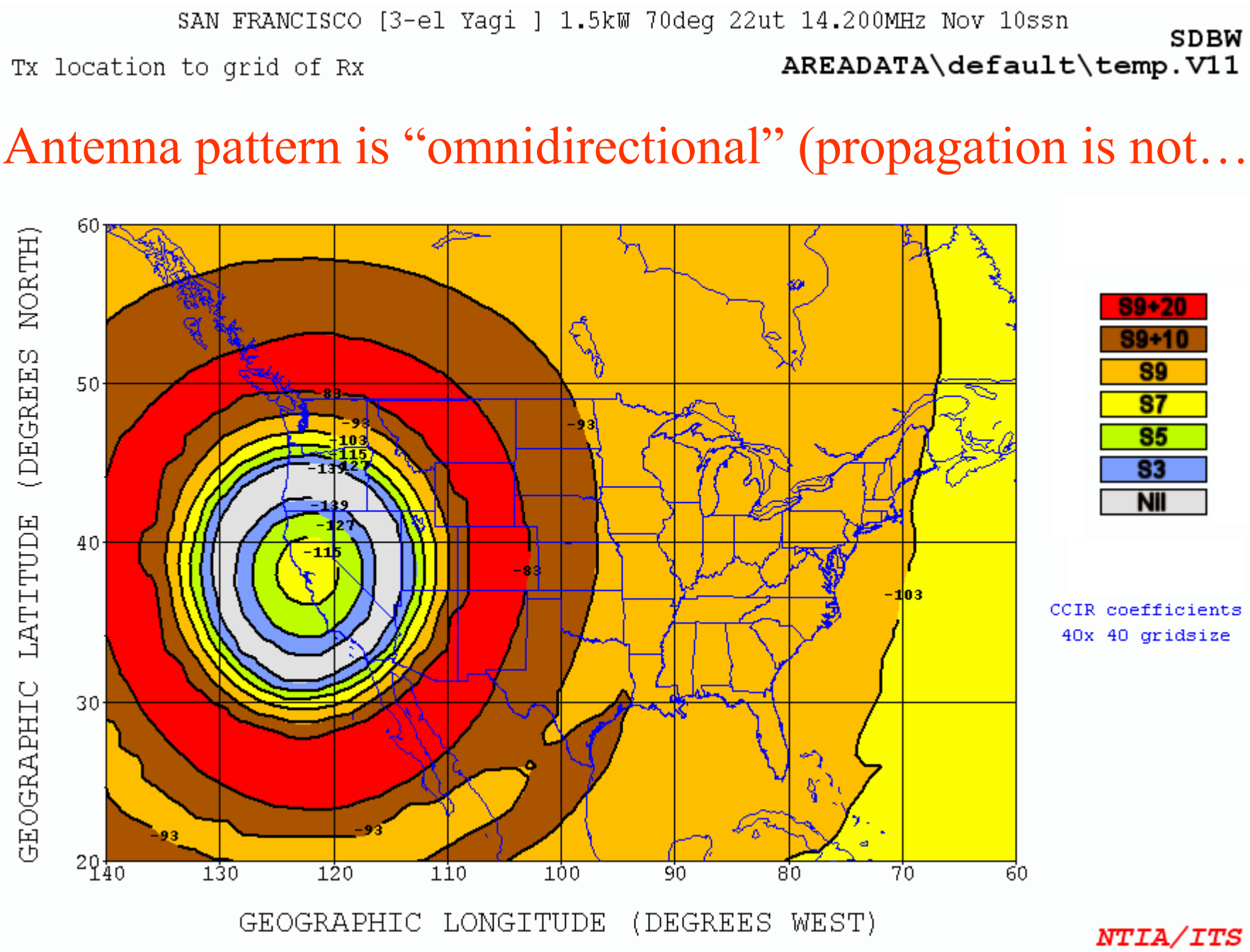
NTIA/ITS

"Omnidirectional" Antennas

- The plots here have assumed "omnidirectional" antennas, a misnomer. This assumes that a directional antenna can actually be turned towards azimuth angles of interest.

- For flat terrain, I model antennas with *EZNEC* and then convert to 2D *VOAAREA* type *.11 files using *MultiNEC* by AC6LA.

- For complex terrains, I use *HFTA* and convert to a 2D *VOAAREA* *.11 file using *MAKEVOA*.



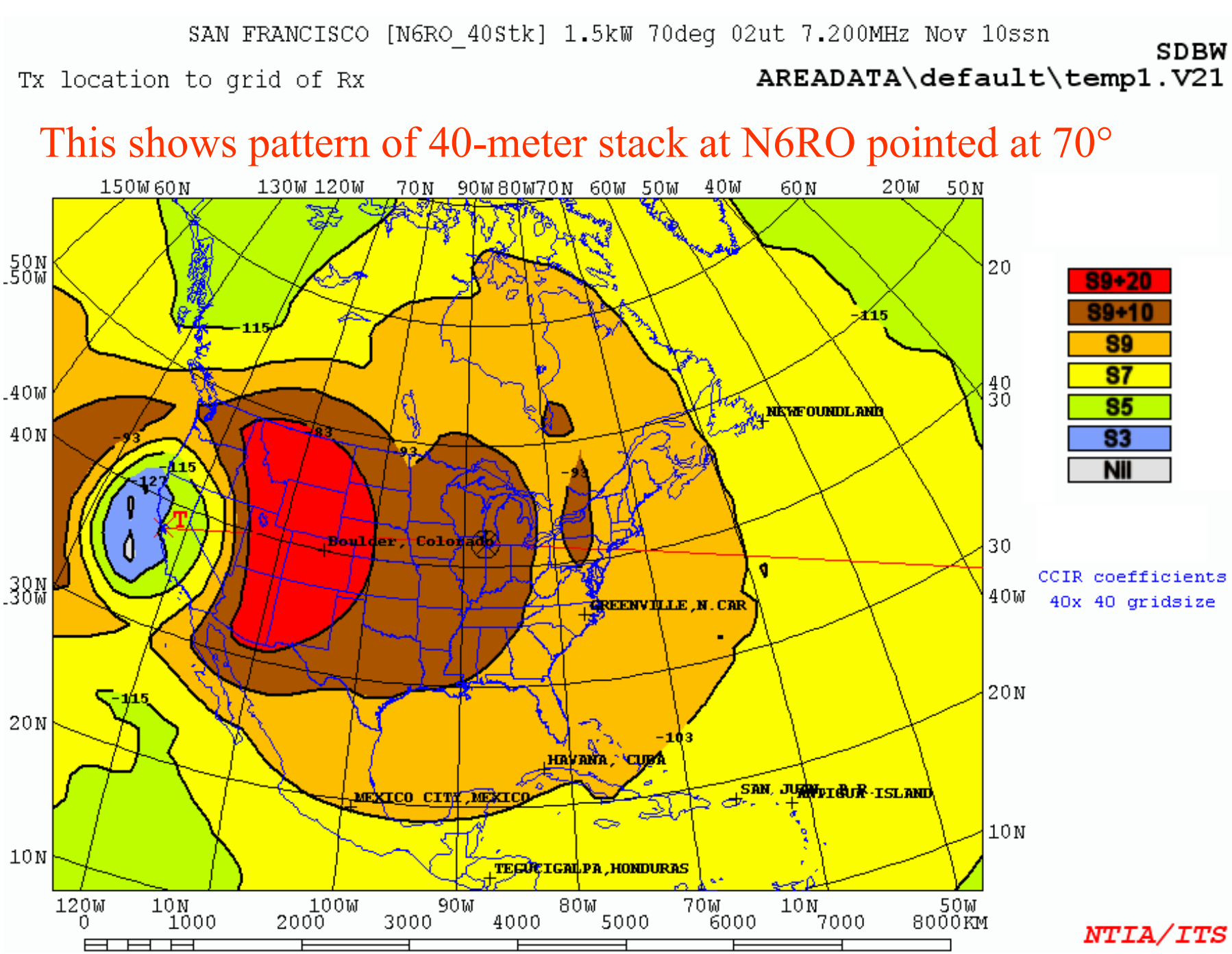
Antenna pattern is “omnidirectional” (propagation is not…)

Customizing for Your Antennas

- What kind of area coverage do you get for your own antennas?
- I am very fortunate to use the super station at N6RO for Sweepstakes Phone.
- N6RO has Yagi stacks on 10, 15, 20 and 40 meters. These have significantly more gain than the 3-element Yagis in the previous plots.

Customizing for Your Antennas

- Directional patterns only work for flat-ground terrain presently.
- Again, I model type *.13 3D patterns using *MultiNEC* by AC6LA using with *EZNEC* core.


SAN FRANCISCO [N6RO_40Stk] 1.5kW 70deg 02ut 7.200MHz Nov 10ssn
SDBW
Tx location to grid of Rx
AREADATA\default\temp1.V21
This shows pattern of 40-meter stack at N6RO pointed at 70°
150W 60N 130W 120W 70N 90W 80W 70N 60W 50W 40W 60N 20W 50N
50N 50W 40W 40N 30N 30W 20N 10N
20 40 30 30 40W 20N 10N
-115 -93 -127 -103
T
Boulder, Colorado
NEWFOUNDLAND
GREENVILLE,N.CAR
HAVANA, CUBA
MEXICO CITY,MEXICO
SAN JUAN, P.R.
ANTIGUA ISLAND
TEGUCIGALPA,HONDURAS
S9+20
S9+10
S9
S7
S5
S3
Nil
CCIR coefficients
40x 40 gridsize
120W 10N 100W 90W 80W 70W 10N 50W
0 1000 2000 3000 4000 5000 6000 7000 8000KM
NTIA/ITS

40-Meter Stack at N6RO

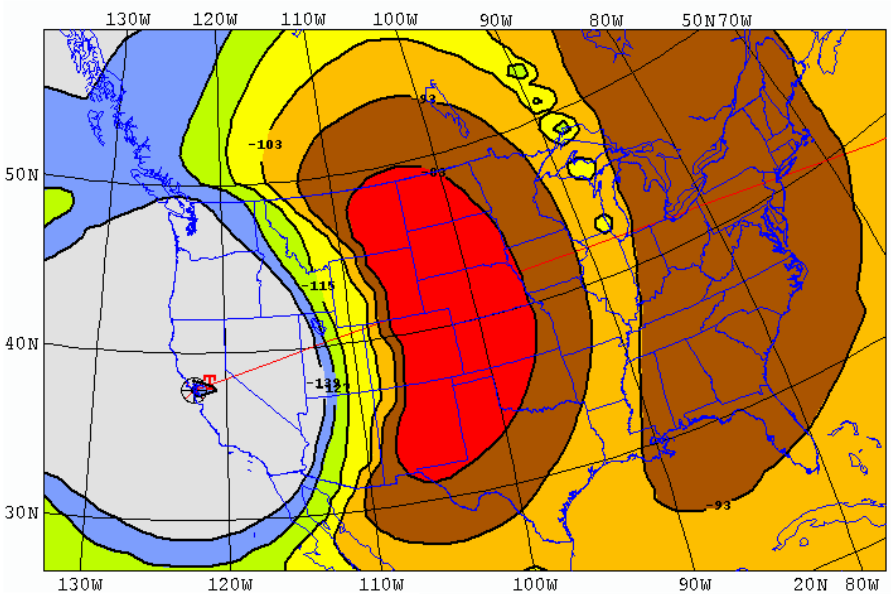
This is the *only* way to take down two old KLM 4L40 Yagis and replace them with two new M^2 ones in one day!

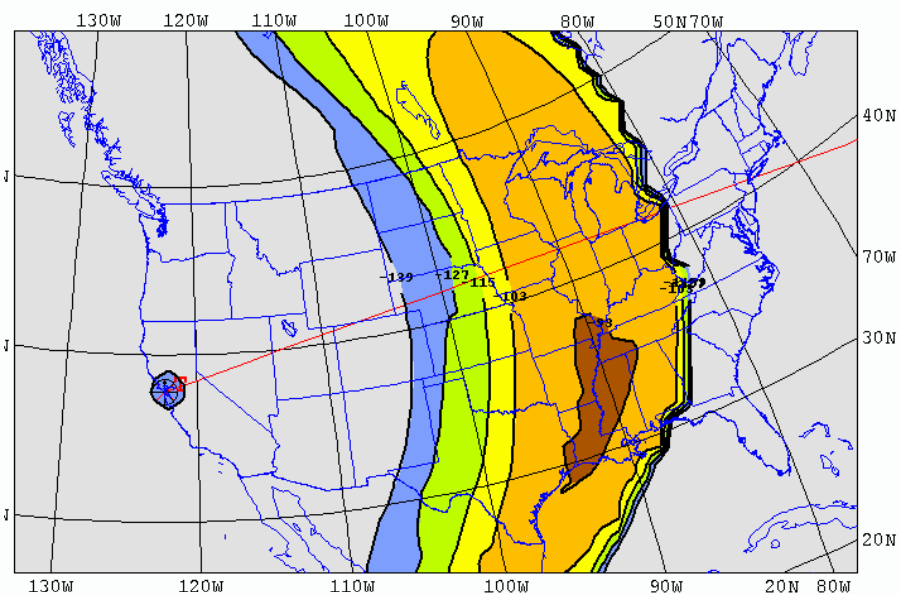
35 ton crane with 145' reach –

N6RO, Oct 3, 2005

Planning for a Contest

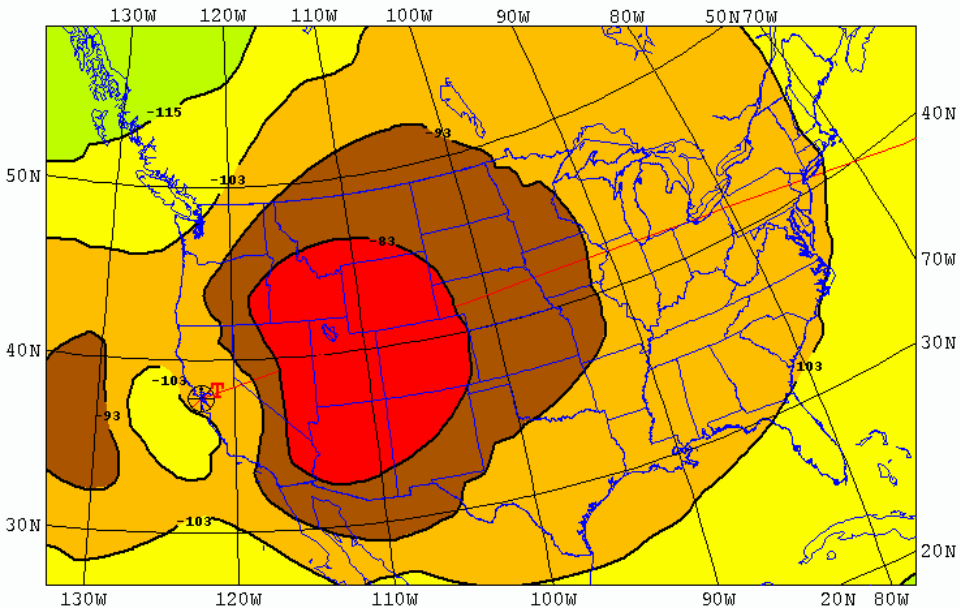
- The following shows a few slides from a slideshow I made for myself to guide my band-changing decisions for the 2005 ARRL Sweepstakes phone contest.
- The number of QSOs made in the 2005 SS Phone contest are listed on each.





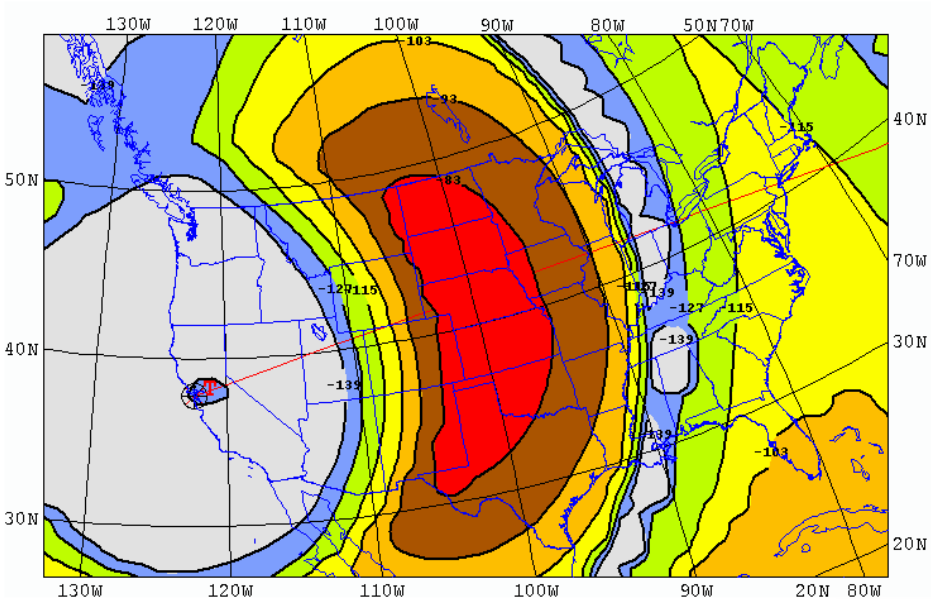
20 m = 150 Qs

15 m

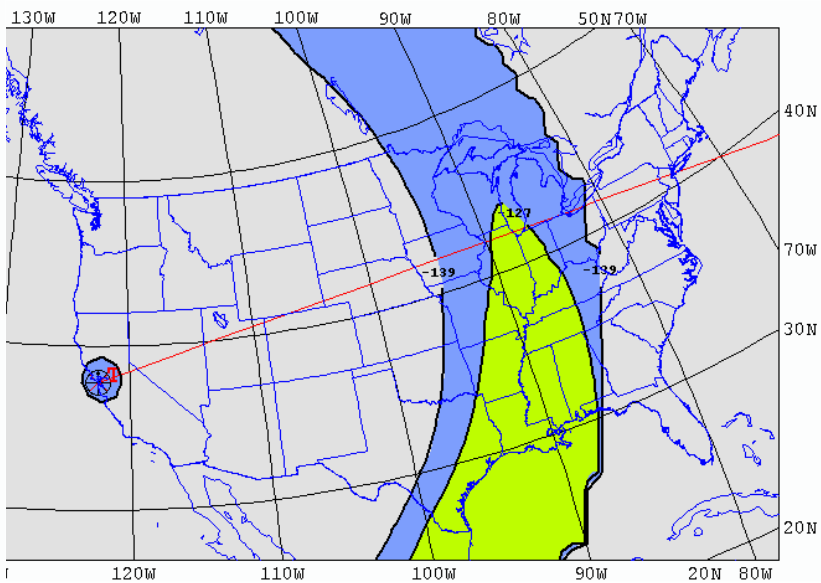


23 UTC

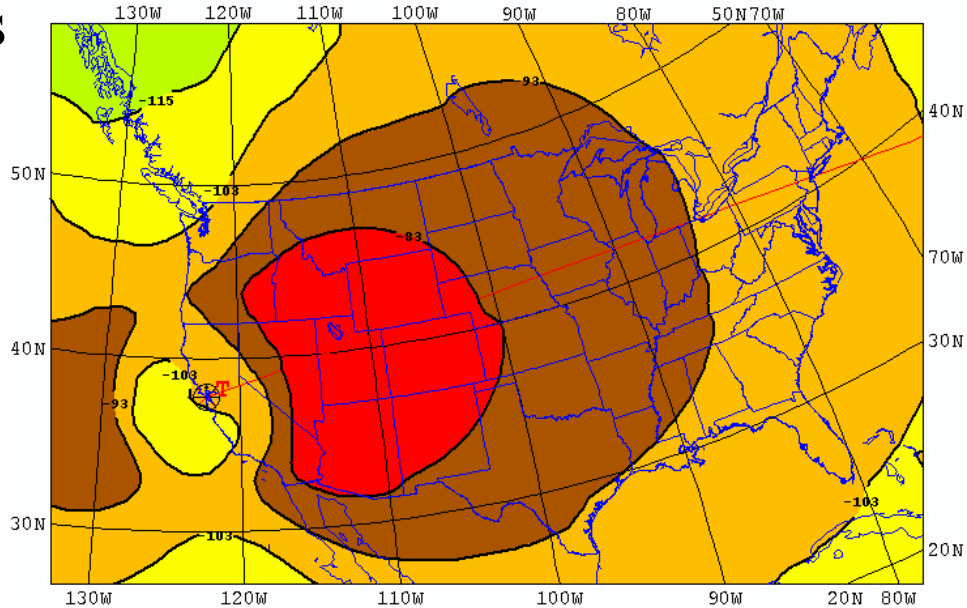
40 m



20 m = 124 Qs

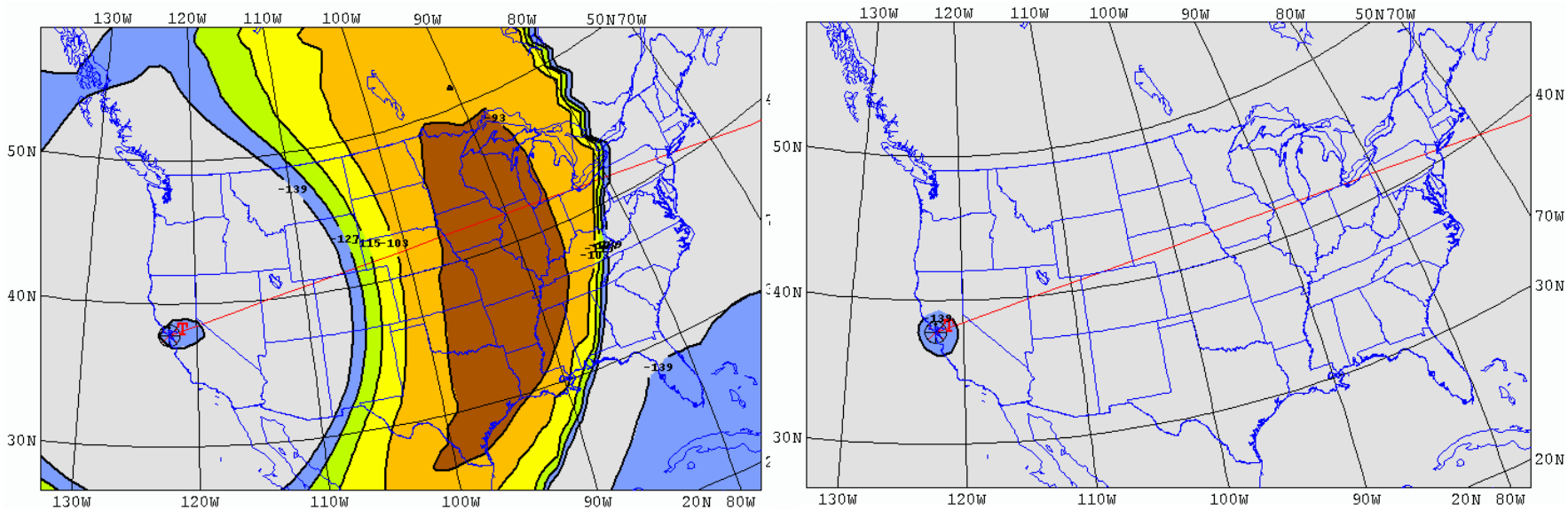


15 m



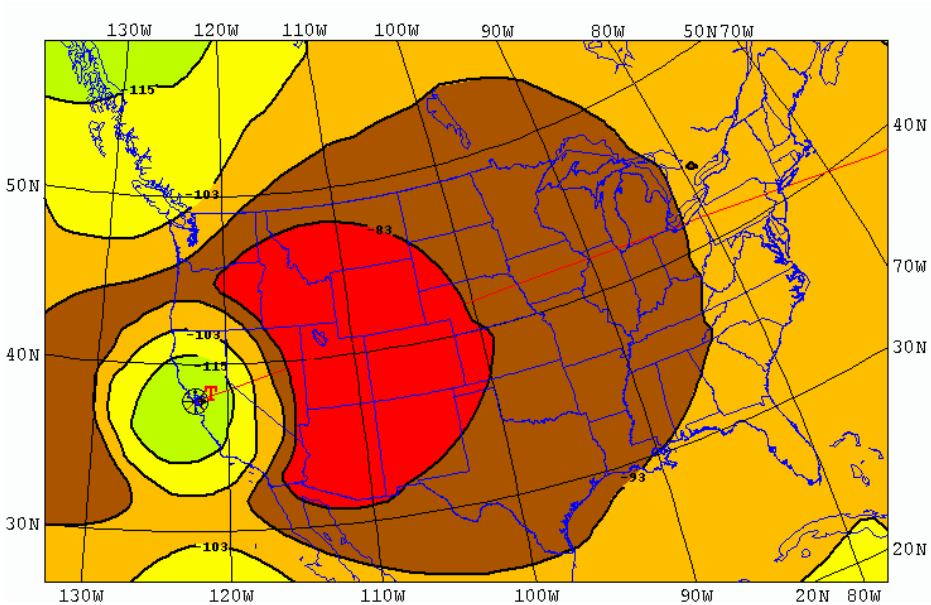
00 UTC

40 m



20 m = 24 Qs

15 m

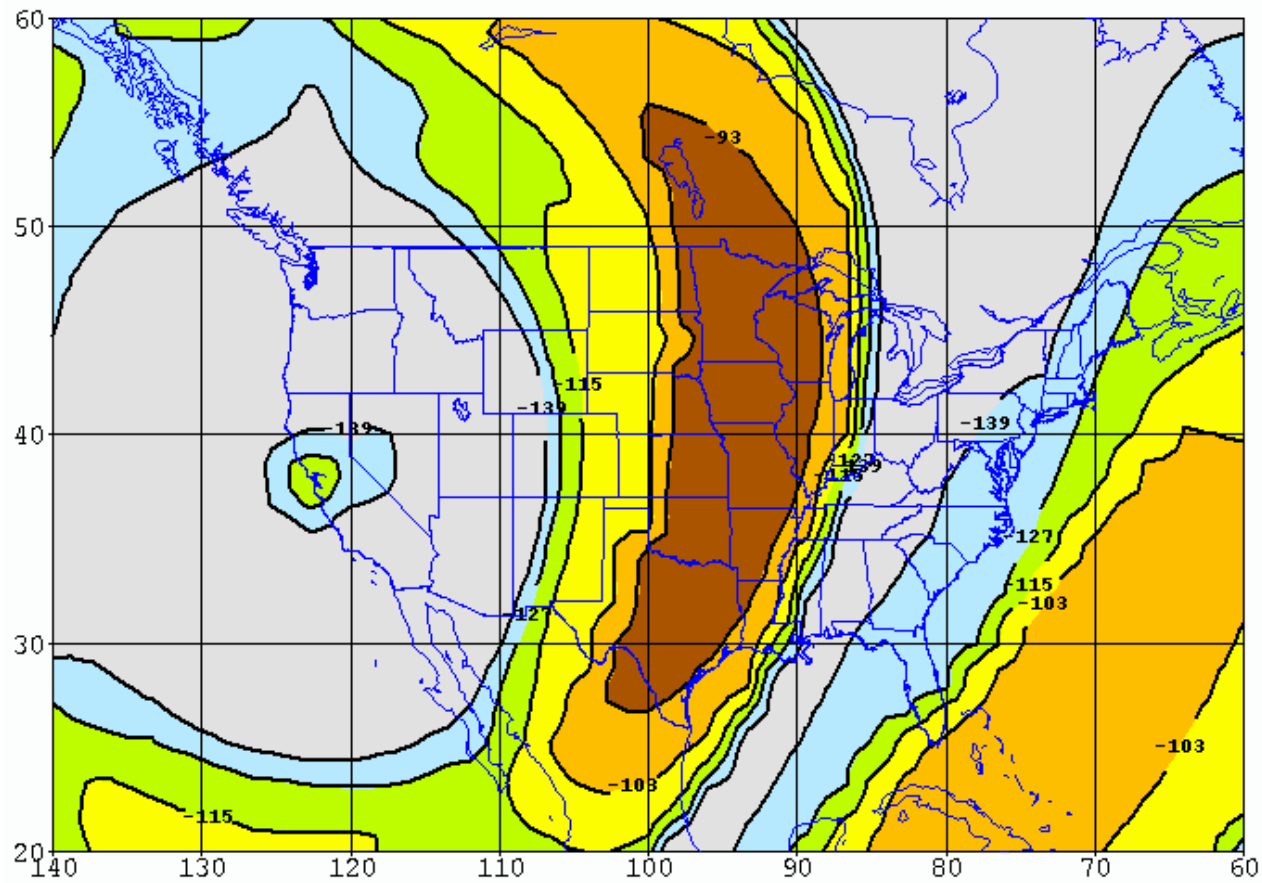


40 m = 59 Qs

01 UTC

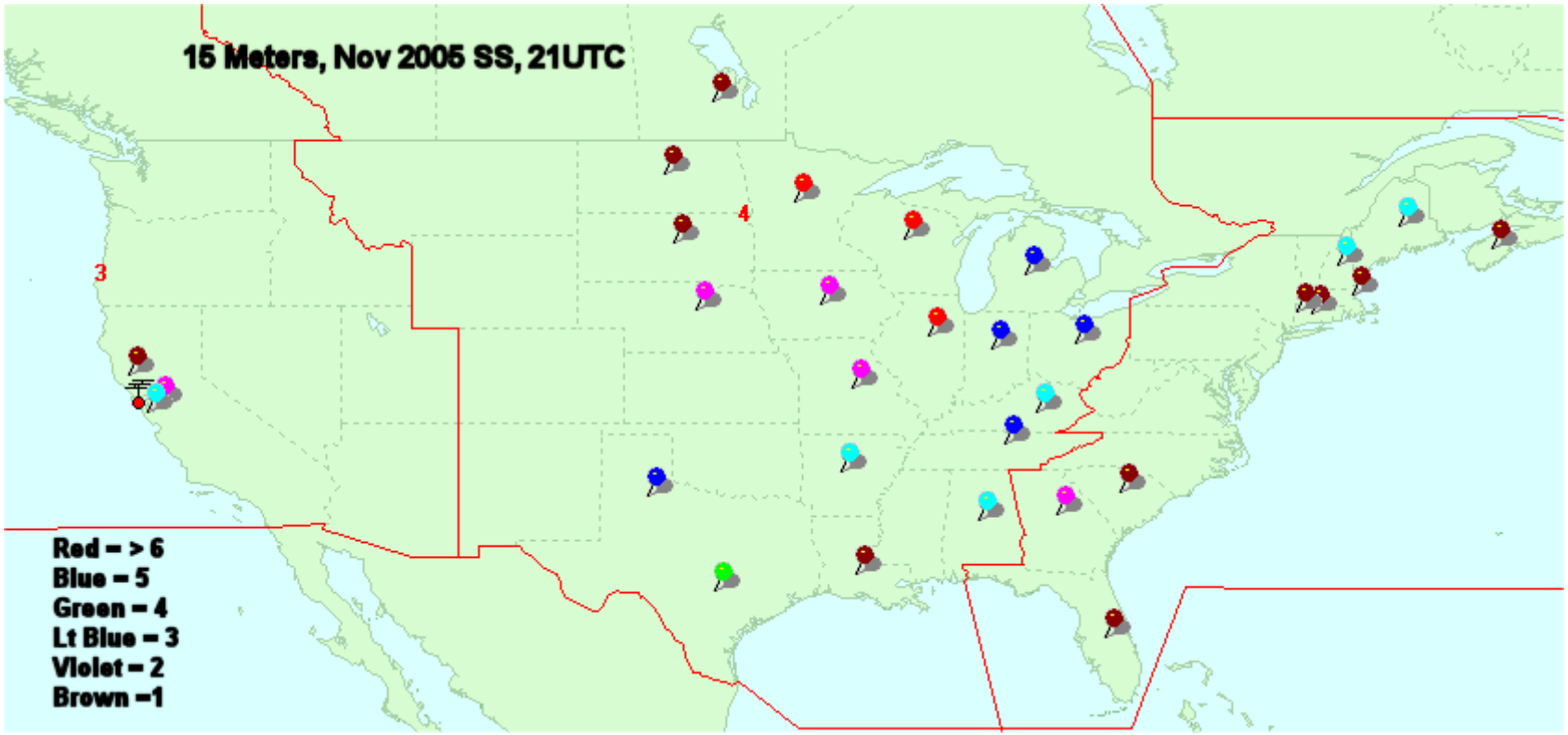
How Did Predictions Compare With Reality?

21 UTC on 15 Meters, N6RO Antennas



November 2005 Sweepstakes

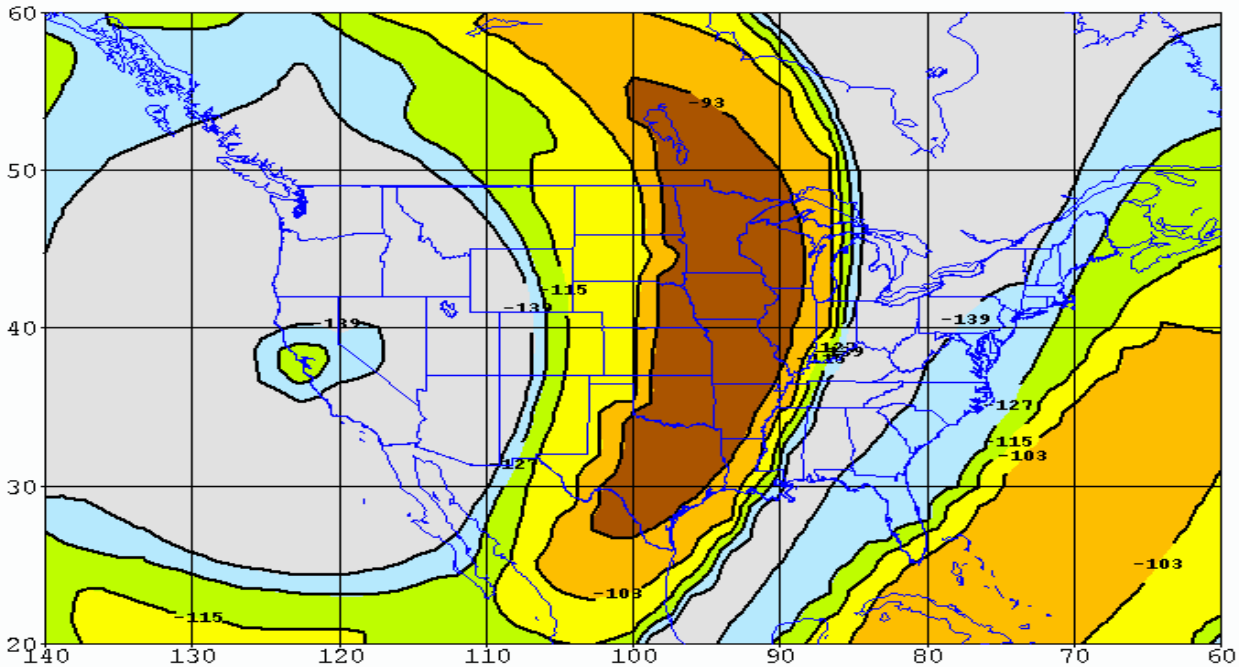
Actual QSOs by N6BV in 2005
SS Phone, 21 UTC on 15 Meters



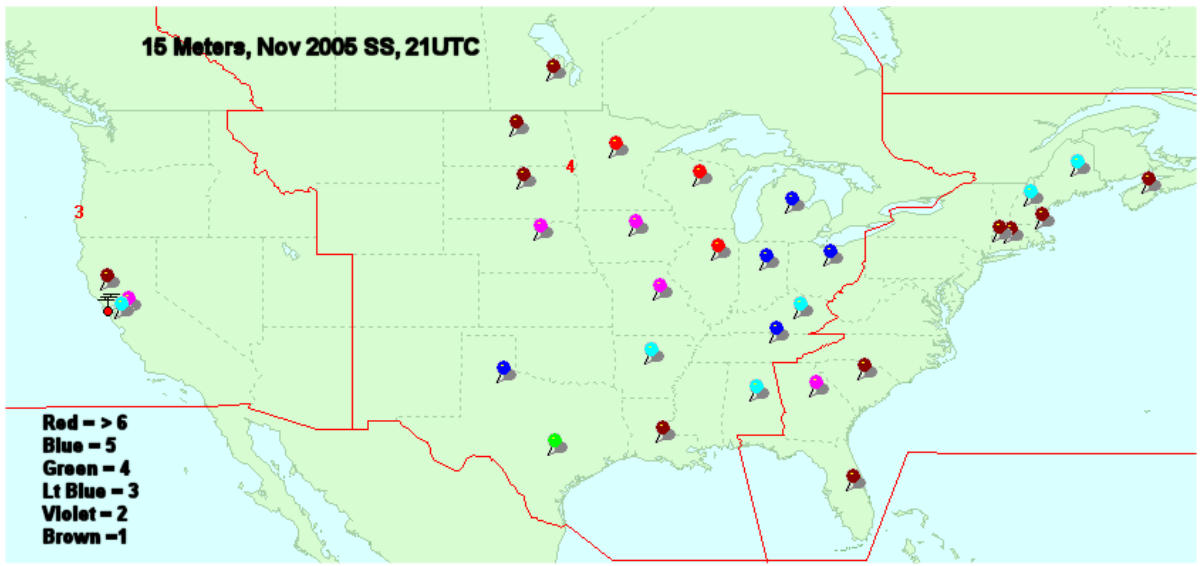
This format was generated using *DX Atlas;* courtesy K6TA/K6KO.
Note skip zone and the blank swath from Western NY down to NC.

Prediction

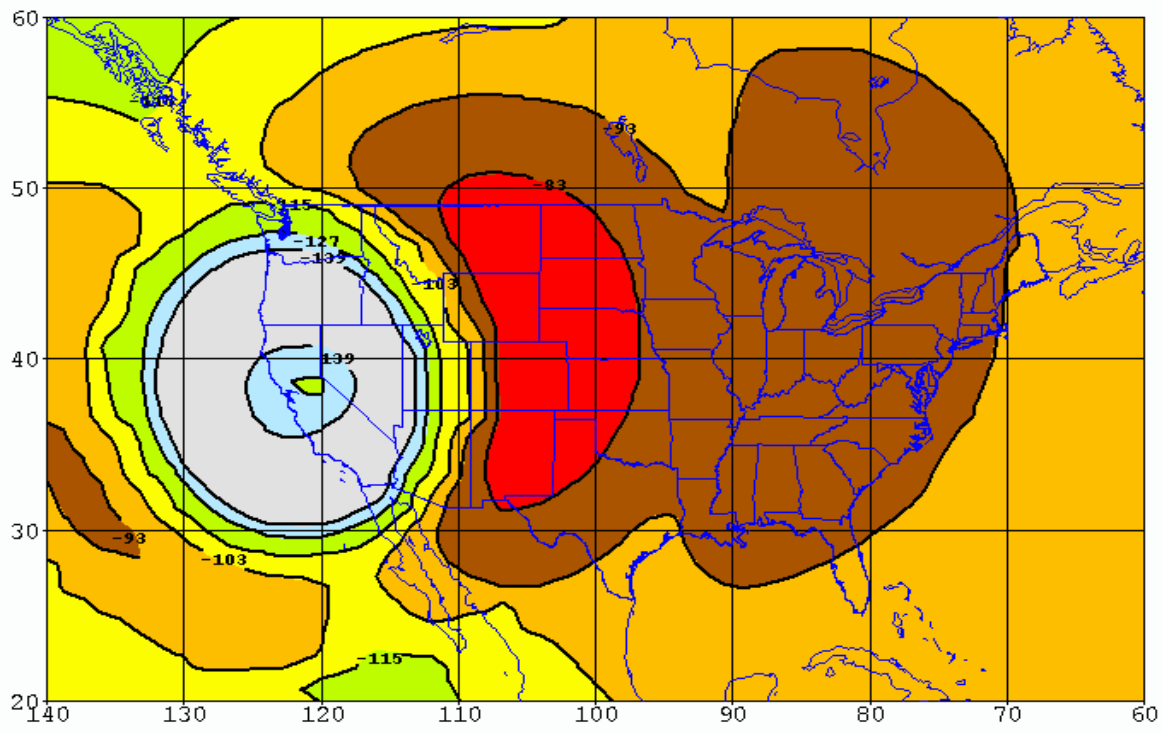
15 m
21 UTC

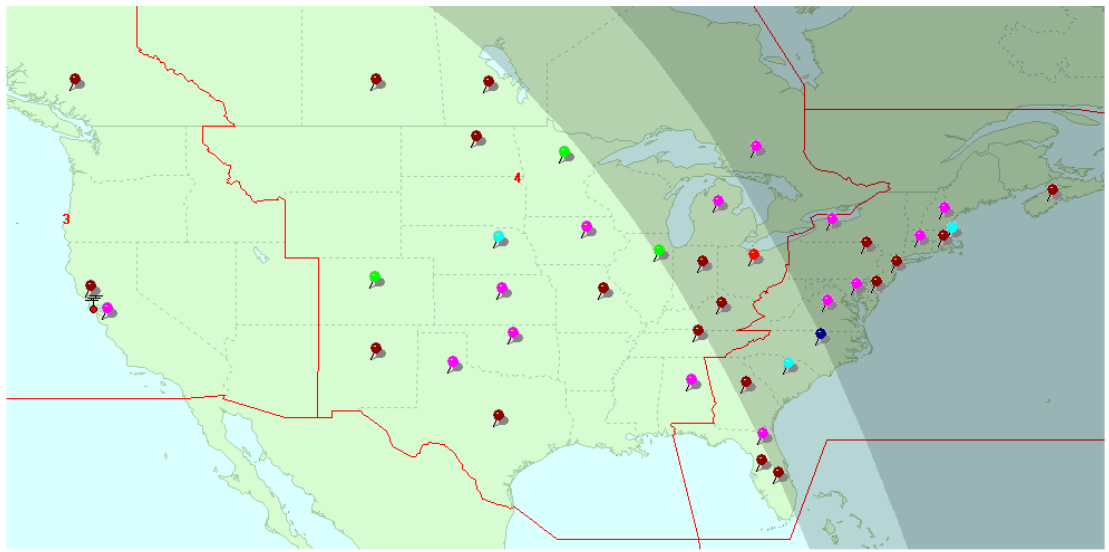


Actual



20 m
22 UTC


60
50
40
30
20
140
130
120
110
100
90
80
70
60
-93
-83
-115
-127
-139
-103
-139
-93
-103
-115



Low-Freq. Problems in *VOACAP*

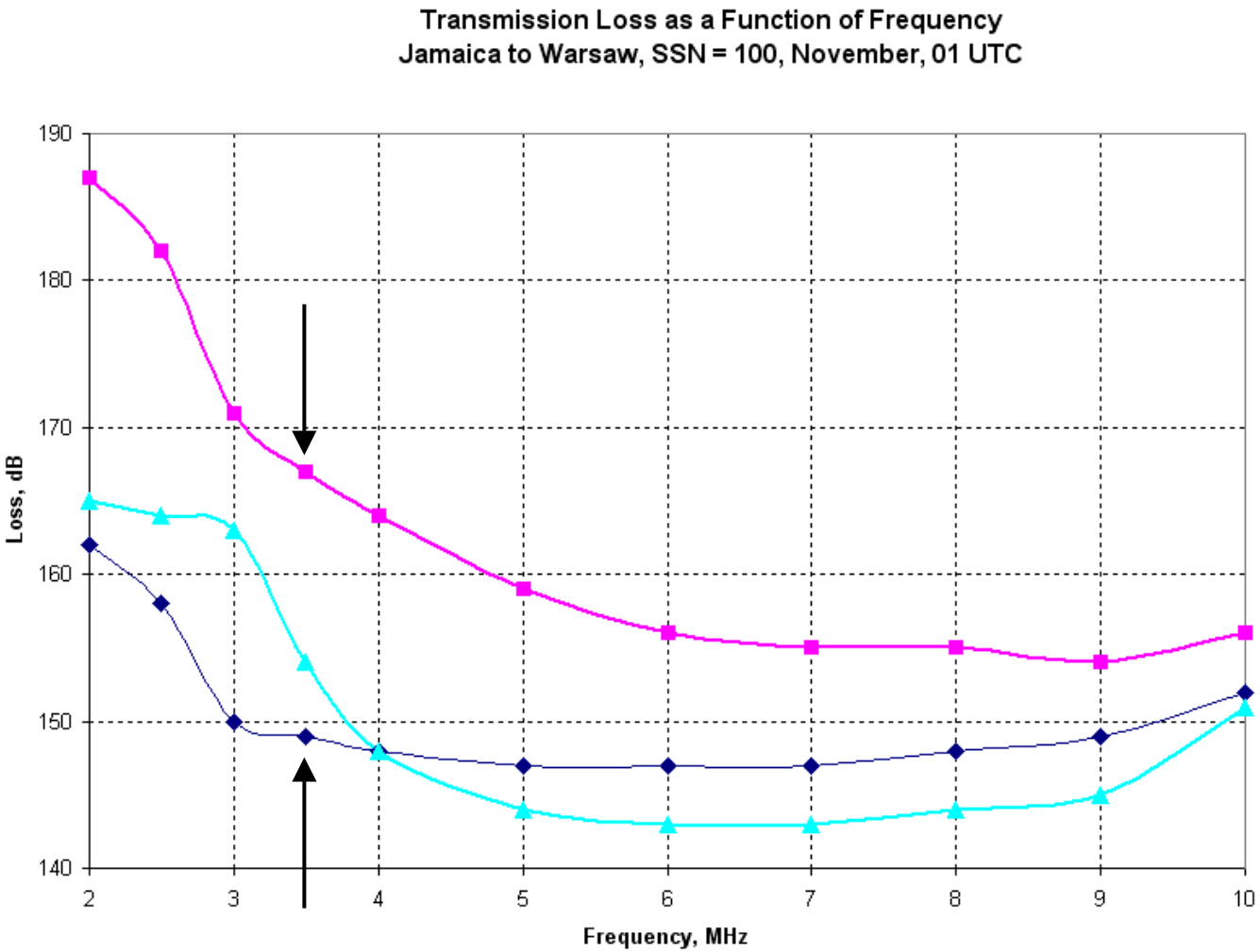
- Since 6/2/1999 *VOACAP* has produced signal predictions lower than its predecessor *IONCAP* on bands lower than 40 meters.

- The problem lies in a change in calculations made for the loss through the E layer.

- VOA has no validation data below 5 MHz because they had no stations there.

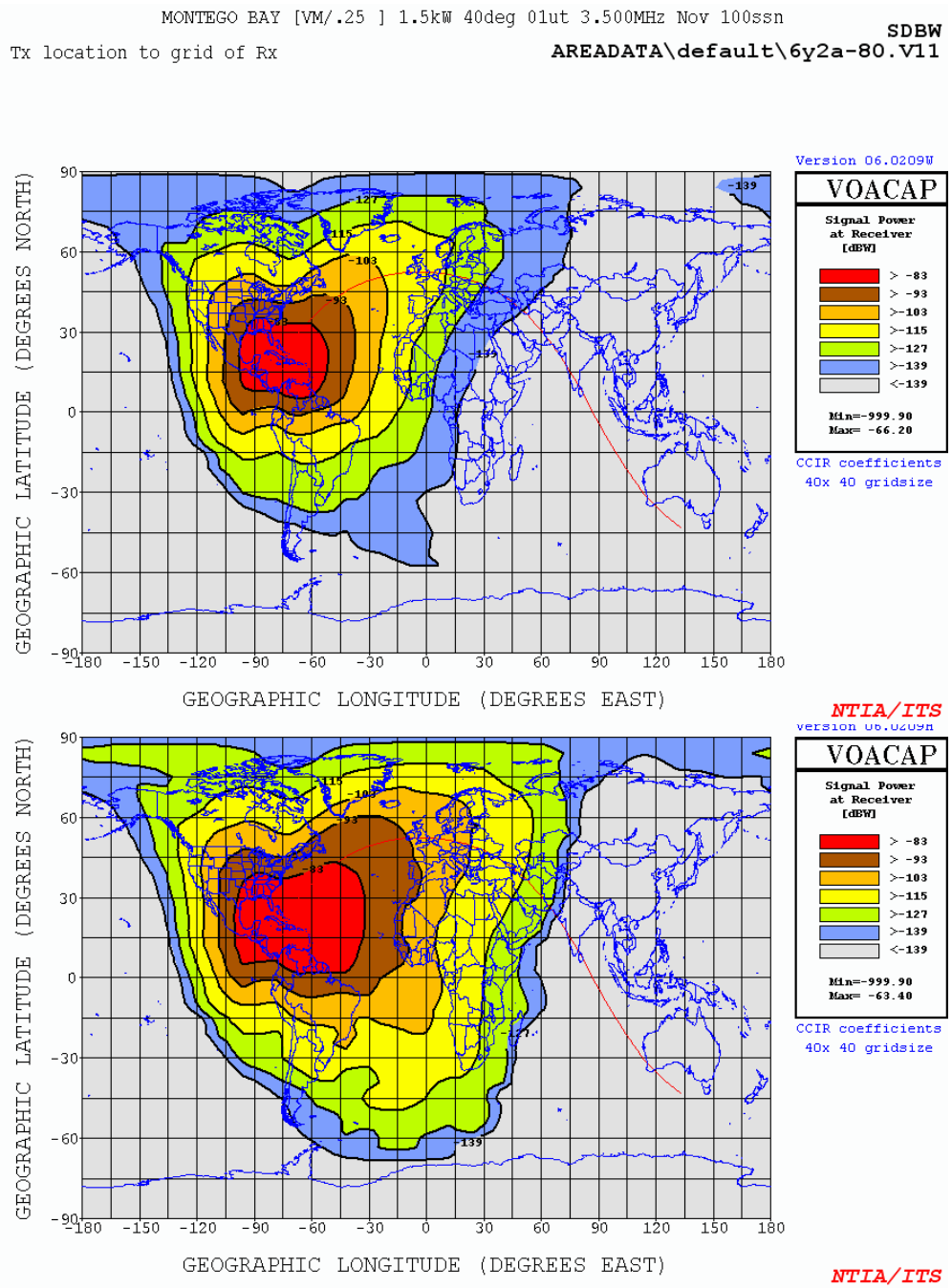
- *CAPMan* does produce more believable low-frequency computations, but source code is gone.

Comparing Versions of *VOACAP*



I use *CAPMAN* for my propagation tables

About 18 dB difference on 80 meters for "I" version (standing for *IONCAP*).



80 meters, after 6/2/99

Pre 6/2/99

Stronger signals into Europe are more believable from experience, ("I" version).

Low-Freq. Problems in *VOACAP*

- Even after retiring from government service, Greg Hand and George Lane, the people who helped develop *VOACAP*, have continued its development. Bless them!

- Greg has posted a version of a new *VOACAP*/*VOAAREA* that includes the "I" option on the "System" page. Thanks, Greg!

In Conclusion

- I've demonstrated some intuitive area-coverage predictions using *VOAAREA*.
- I have also touched on how to make customized antennas for *VOAAREA*.
- And by the way, the plots shown here involve a great deal of graphical manipulation by hand!