

LF TIME AND FREQUENCY BROADCAST SYSTEMS

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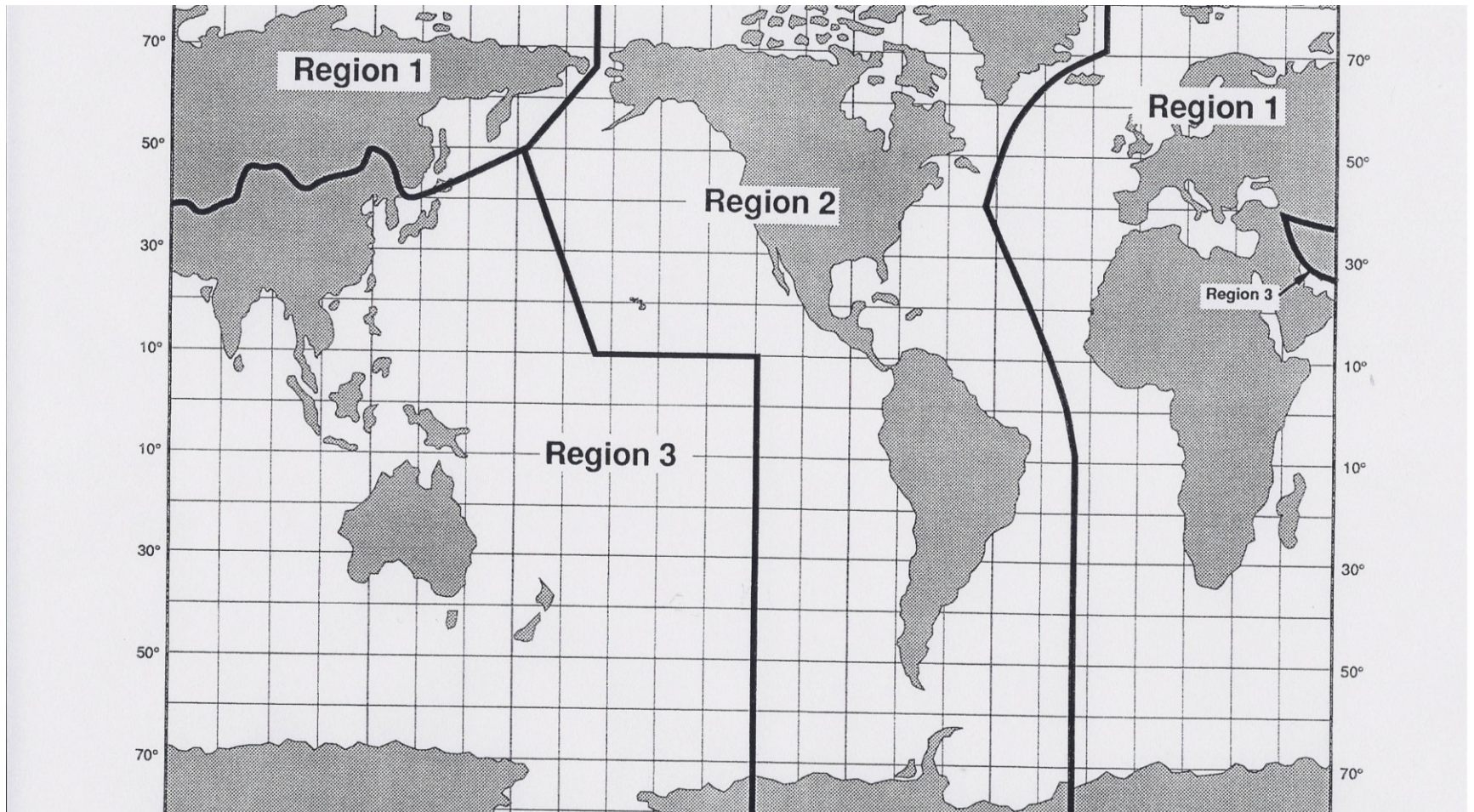
FREQUENCY ALLOCATIONS

- For Standard frequency and time signal (SFTS) service, the LF (and VLF) allocations are:
- 20 kHz
- 14-19.95 kHz, 20.05-70 kHz, 72-84 kHz (Region 1), and 86-90 kHz (Region 1)

WRC-12

- The stations of services to which the bands 14-19.95 kHz and 20.05-70 kHz and in Region 1 also the bands 72-84 kHz and 86-90 kHz are allocated may transmit standard frequency and time signals. Such stations shall be afforded protection from harmful interference. In Armenia, Azerbaijan, Belarus, the Russian Federation, Georgia, Kazakhstan, Kyrgyzstan, Tajikistan and Turkmenistan, the frequencies 25 kHz and 50 kHz will be used for this purpose under the same conditions.

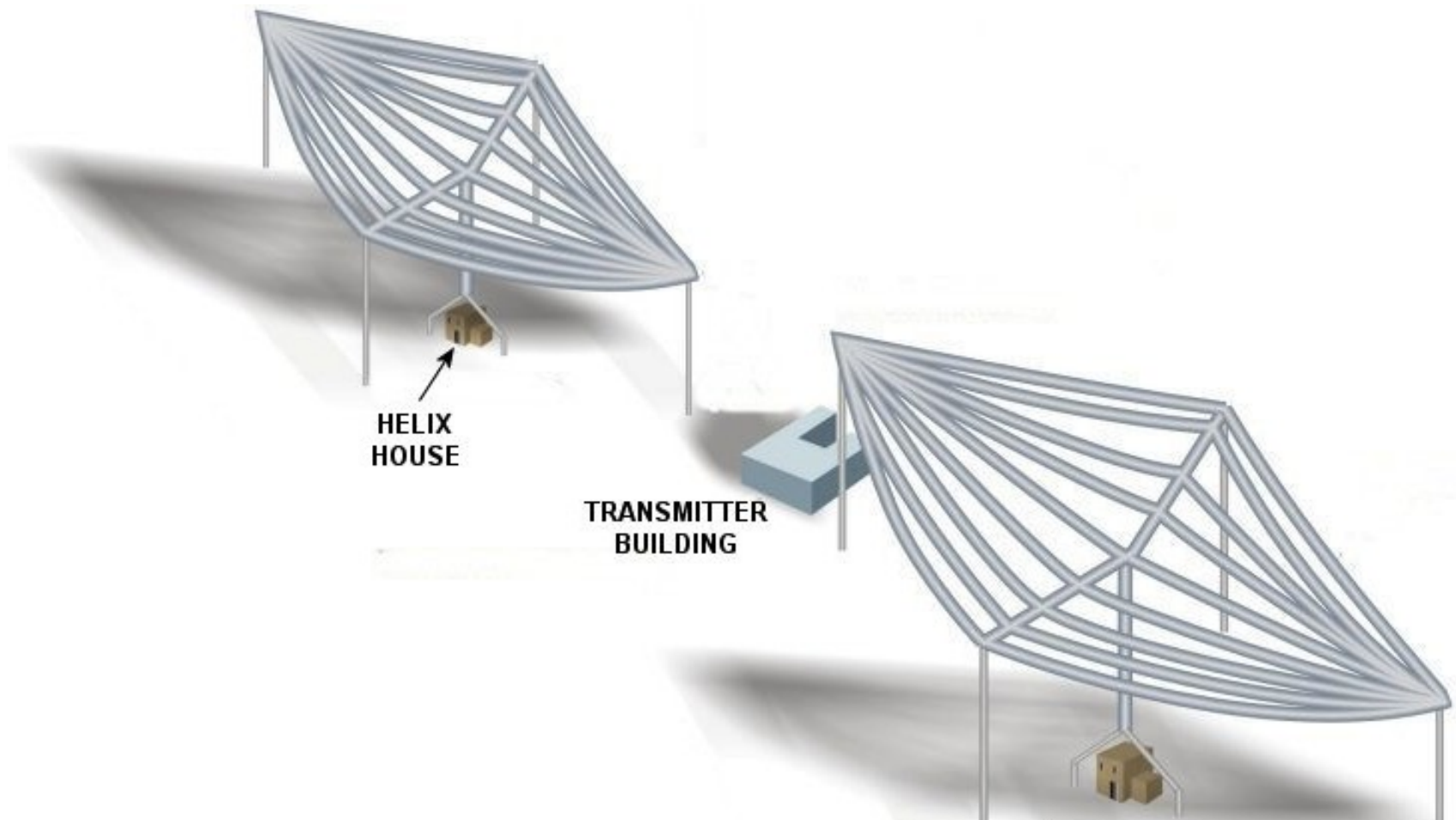
ITU Regions



SFTS LF STATIONS

<u>Country</u>	<u>Call sign</u>	<u>Frequency</u>
• USA	WWVB	60kHz
• JAPAN	JJY	40 kHz
• JAPAN	JJY	60 kHz
• GERMANY	DCF77	77.5 kHz
• UNITED KINGDOM	MSF	60 kHz
• CHINA	BPC	68.5 kHz

WWVB ANTENNA





Helix House



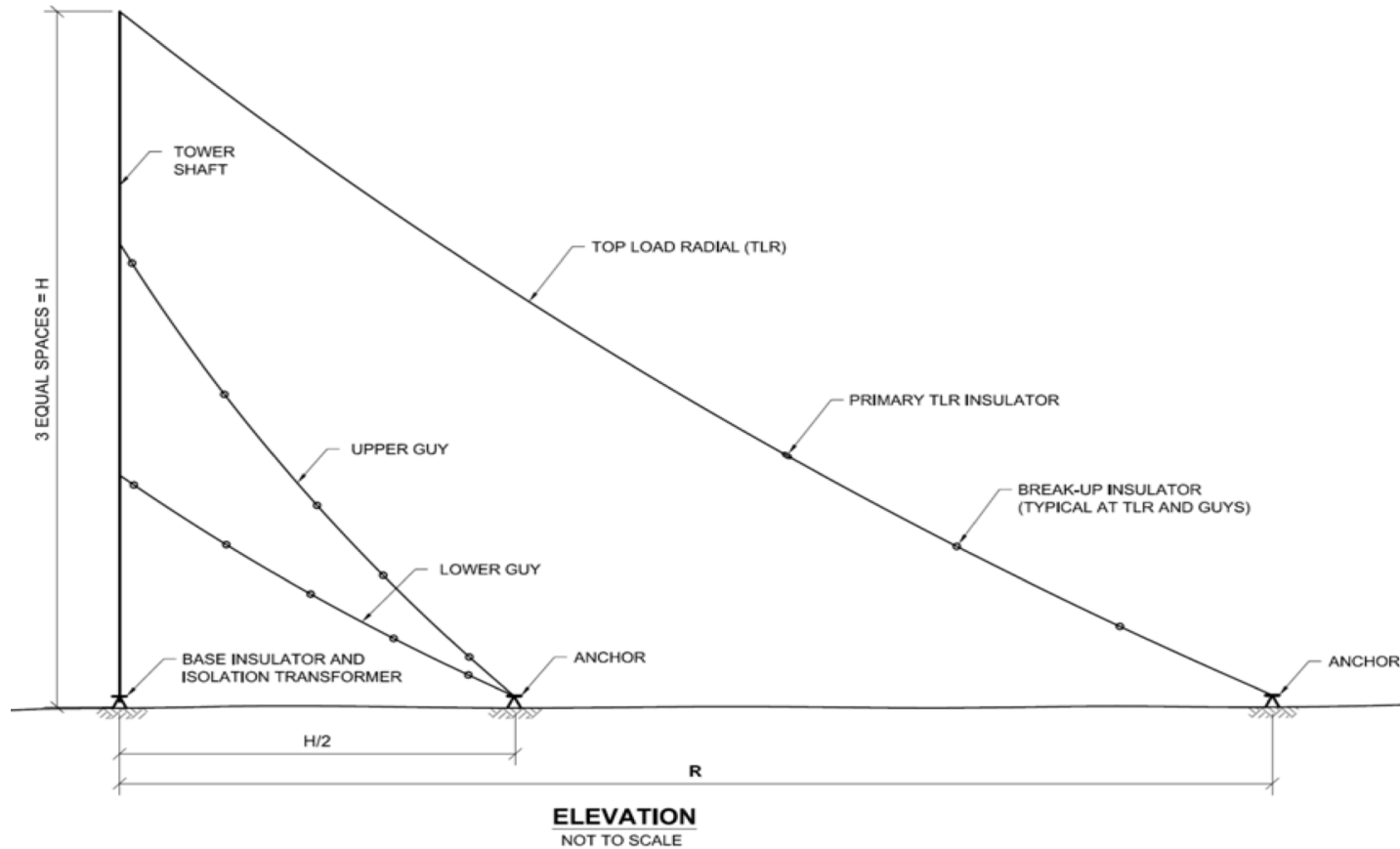
LF Transmitters



JJY ANTENNA



Umbrella Top Loaded Monopole



Radio controlled clocks available in hardware store



Wall clock



Multiband radio controlled watch

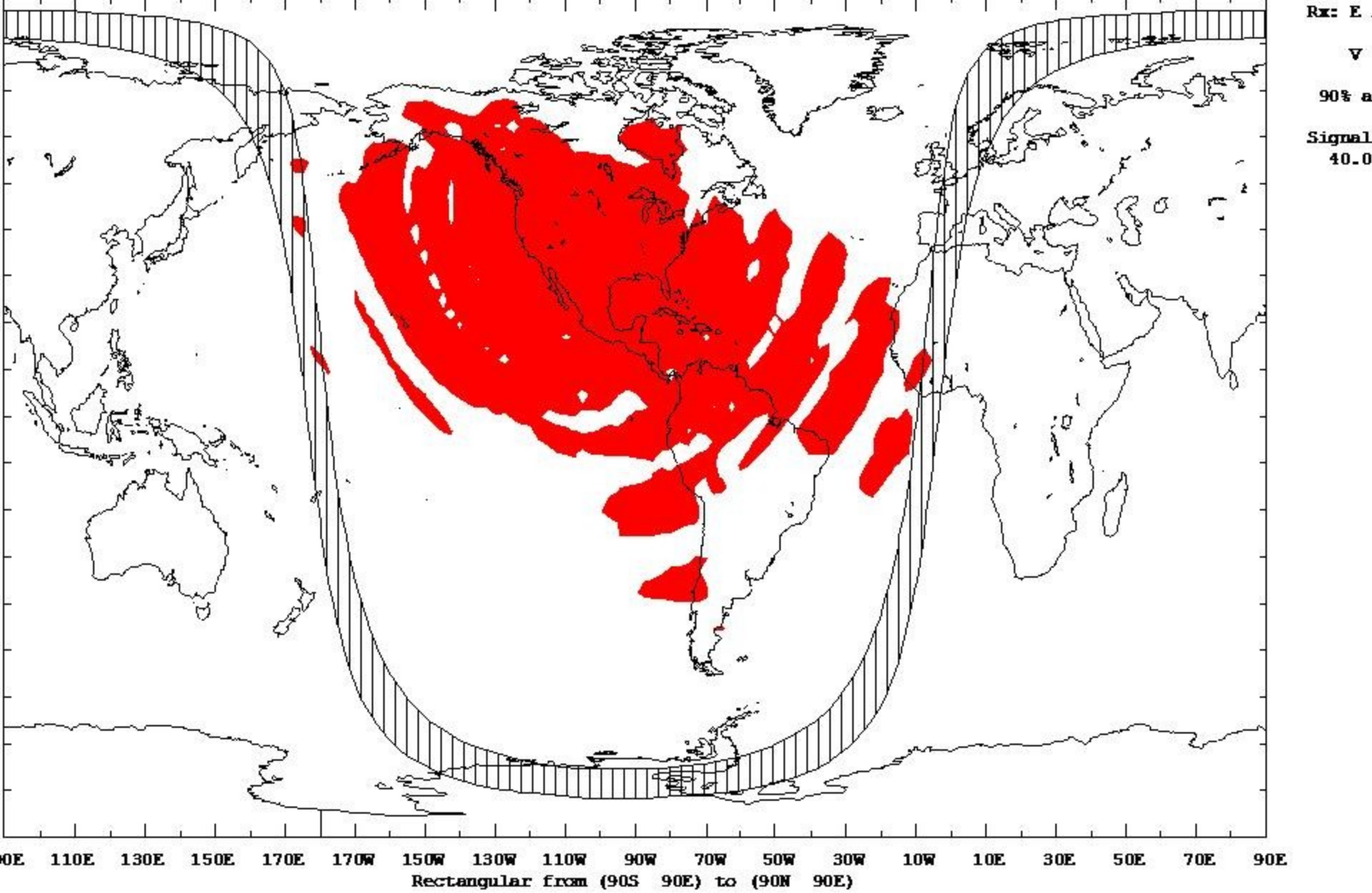


Desk clocks with date



Wall clock with date

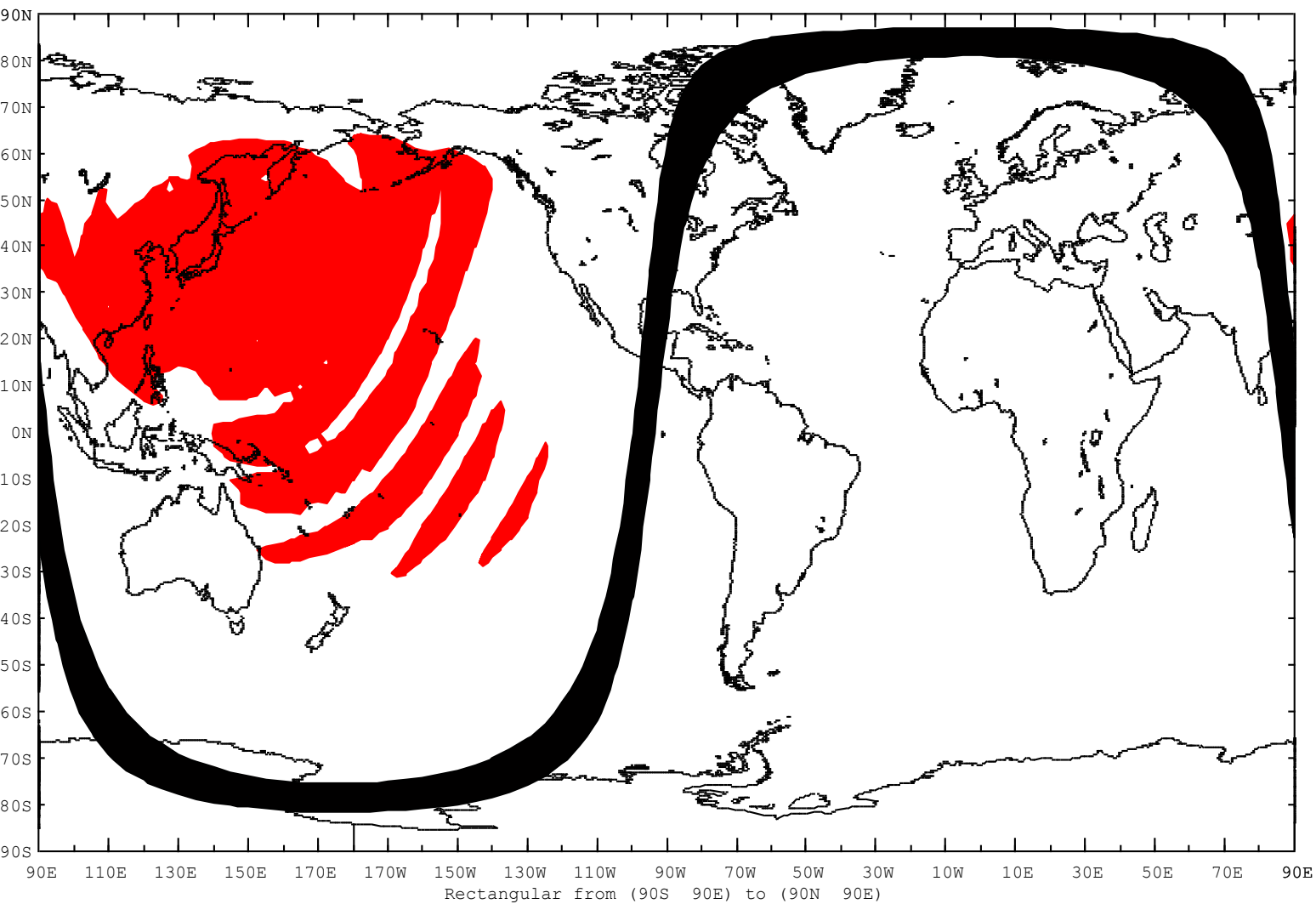




Freq Lat Lon Prad In Hdg Alt Ionosphere File

Tx 1: jjy4 kHz dg:mn dg:mn kW dg dg km

07Feb12 3T3 LWPM 3.x c:\pclwv30\programs\lwpm\output\jjy4\jjy4_world_oct_1200world.grd



Rx: E Alt Bandw Depth
km Hz ft
V 0 1 0

90% availability

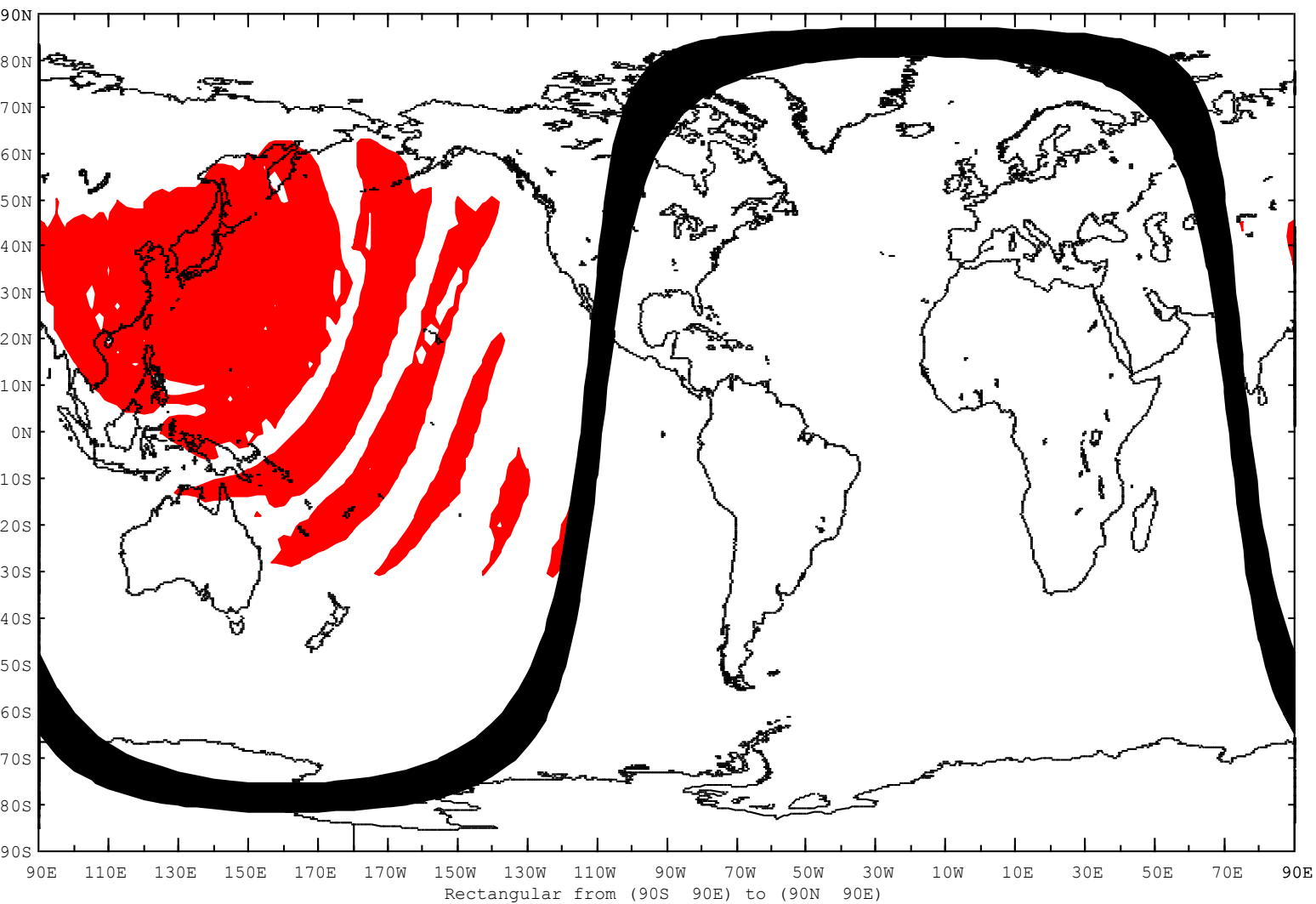
Signal (dB/uV/m) %0
40.0 to 80.0 0

jjy4 10kW Oct 1200 40kHz

Freq Lat Lon Prad In Hdg Alt Ionosphere File

Tx 1: jjy6 kHz dg:mn dg:mn kW dg dg km

07Feb12 G4S LWPM 3.x c:\pclwv30\programs\lwpm\output\jjy6\jjy6_world_oct_1300world.grd



Rx: E Alt Bandw Depth
km Hz ft
V 0 1 0

90% availability

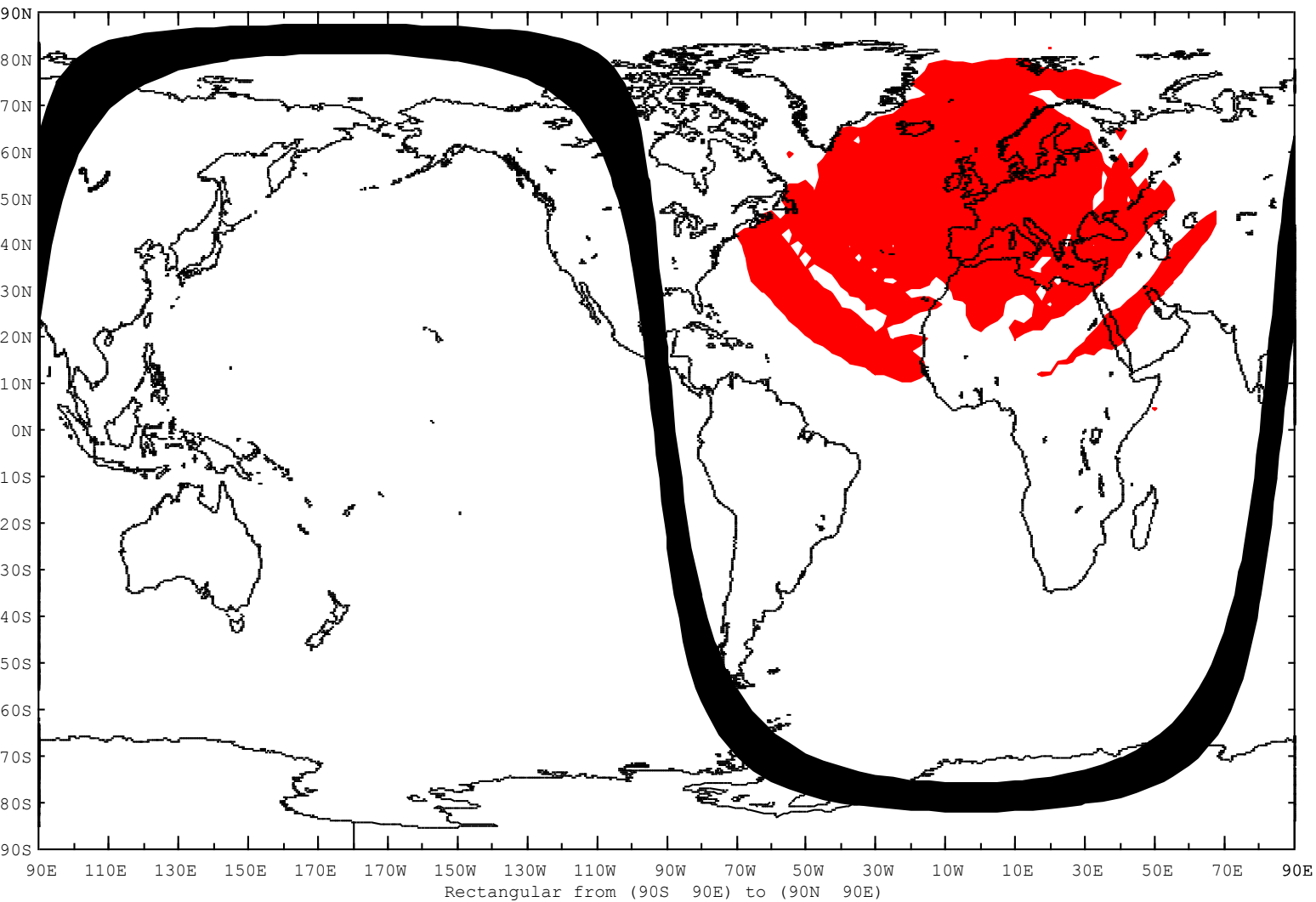
Signal (dB/uV/m) %0
40.0 to 80.0 0

jjy6 10kW Oct 1300 60kHz

Freq Lat Lon Prad In Hdg Alt Ionosphere File

Tx 1: MSF kHz dg:mn dg:mn kW dg dg km

07Feb12 BCR LWPM 3.x c:\pclwv30\programs\lwpm\output\msf\msf_world_oct_0000world.grd



Rx: E Alt Bandw Depth
km Hz ft
V 0 1 0

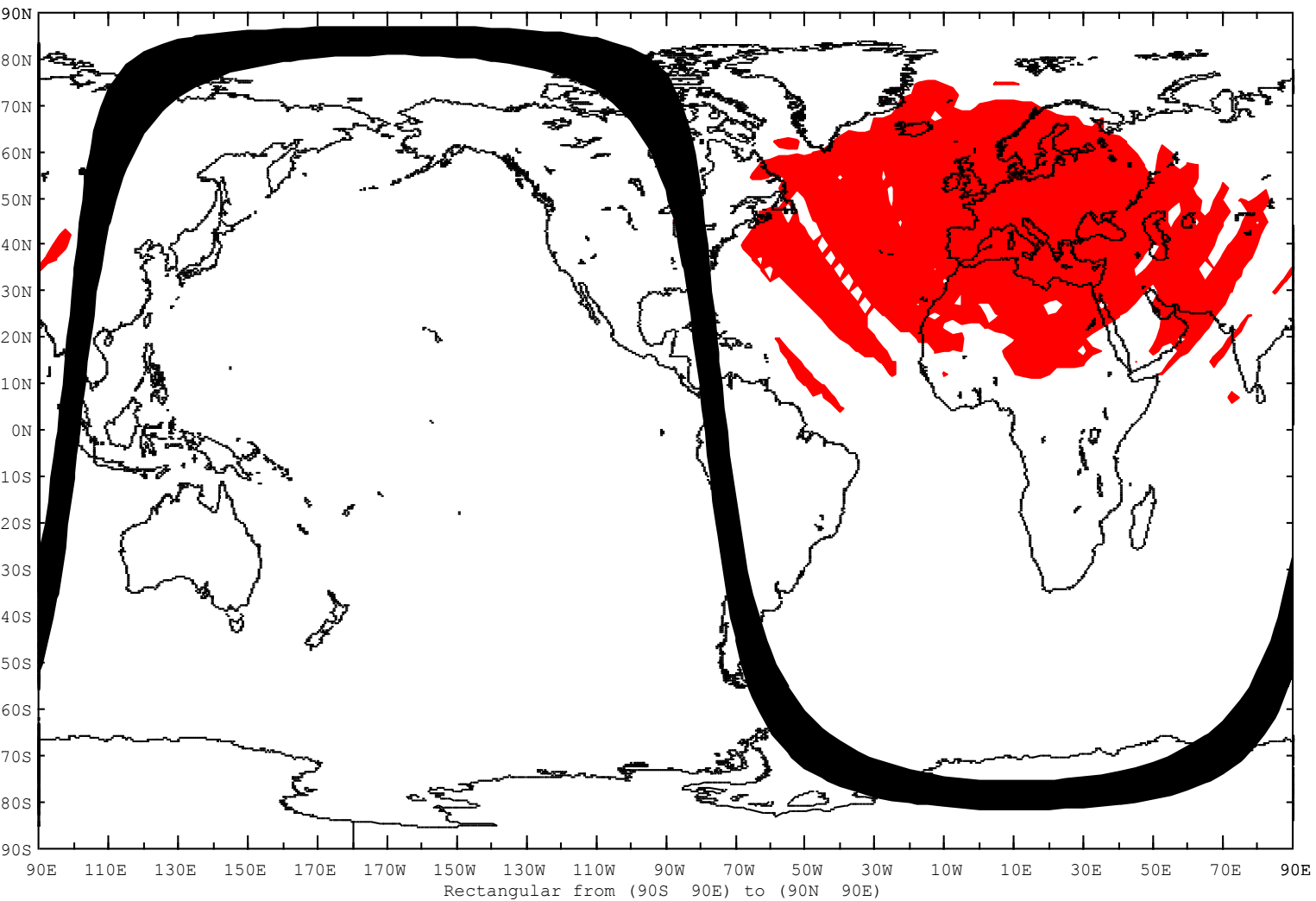
90% availability

Signal (dB/uV/m) %0
40.0 to 84.0 0

MSF 17kW OCT 0000 60kHz

Freq Lat Lon Prad In Hdg Alt Ionosphere File

Tx 1: dcf775 kHz dg:mn dg:mn kW dg dg km 17Feb12 T6C LWPM 3.x c:\pclwv30\programs\lwpm\output\dcf77\dcf77_world_oct_2300world.grd

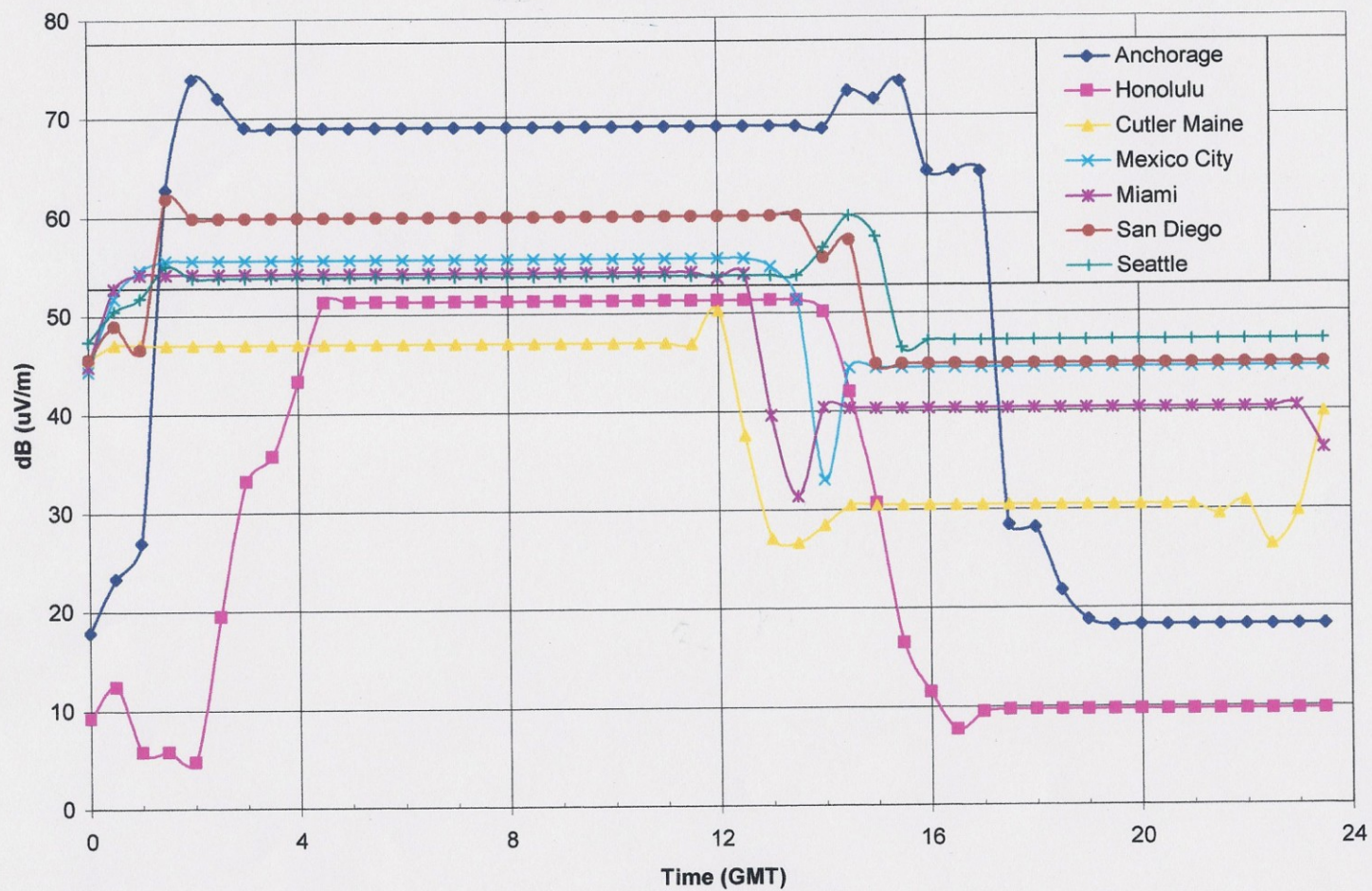


Rx: E Alt Bandw Depth
km Hz ft
V 0 1 0

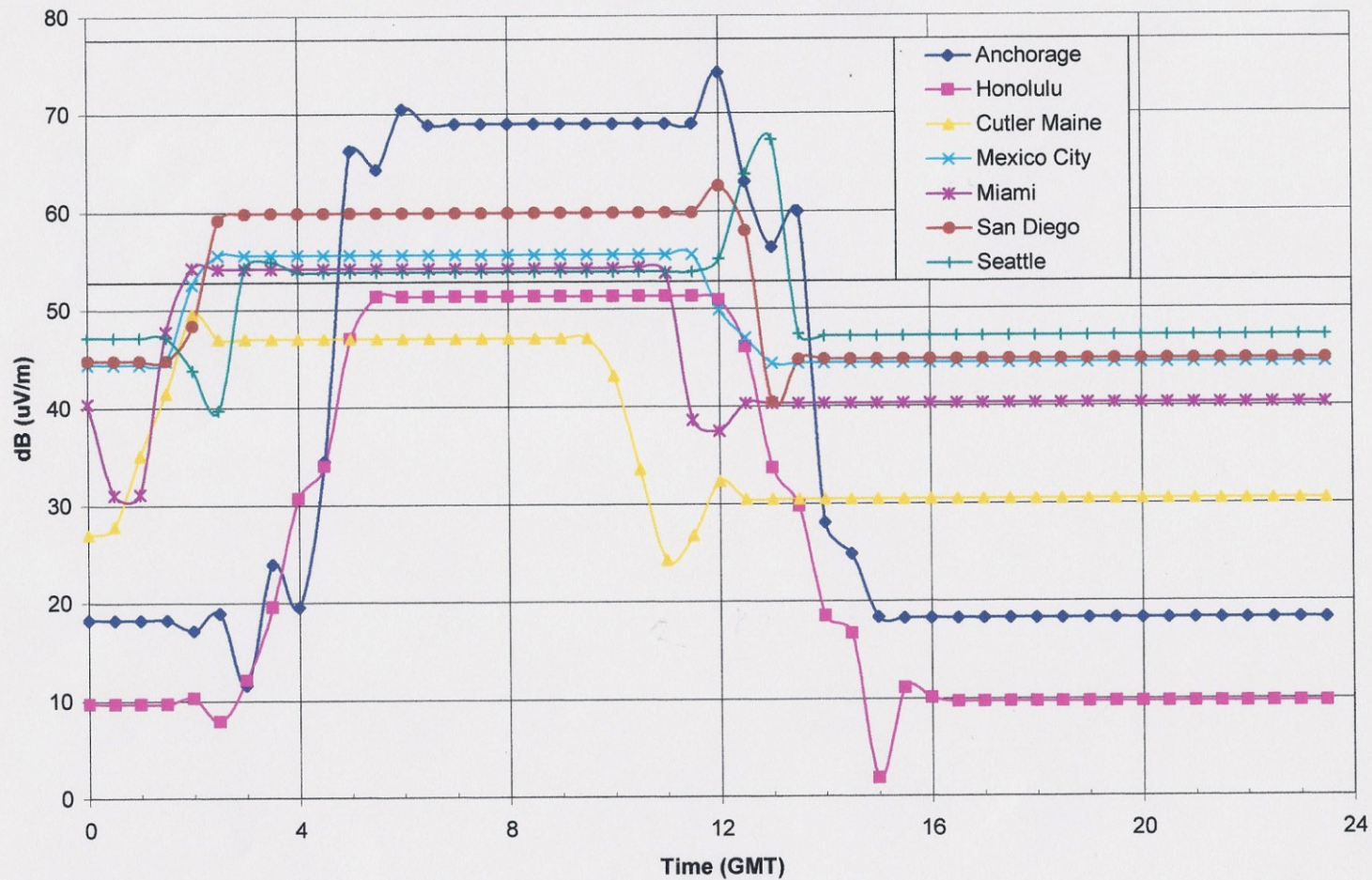
90% availability

Signal (dB/uV/m) %0
40.0 to 82.0 0

WWVB 50 kW radiated
Signal Only - Dec/Jan/Feb

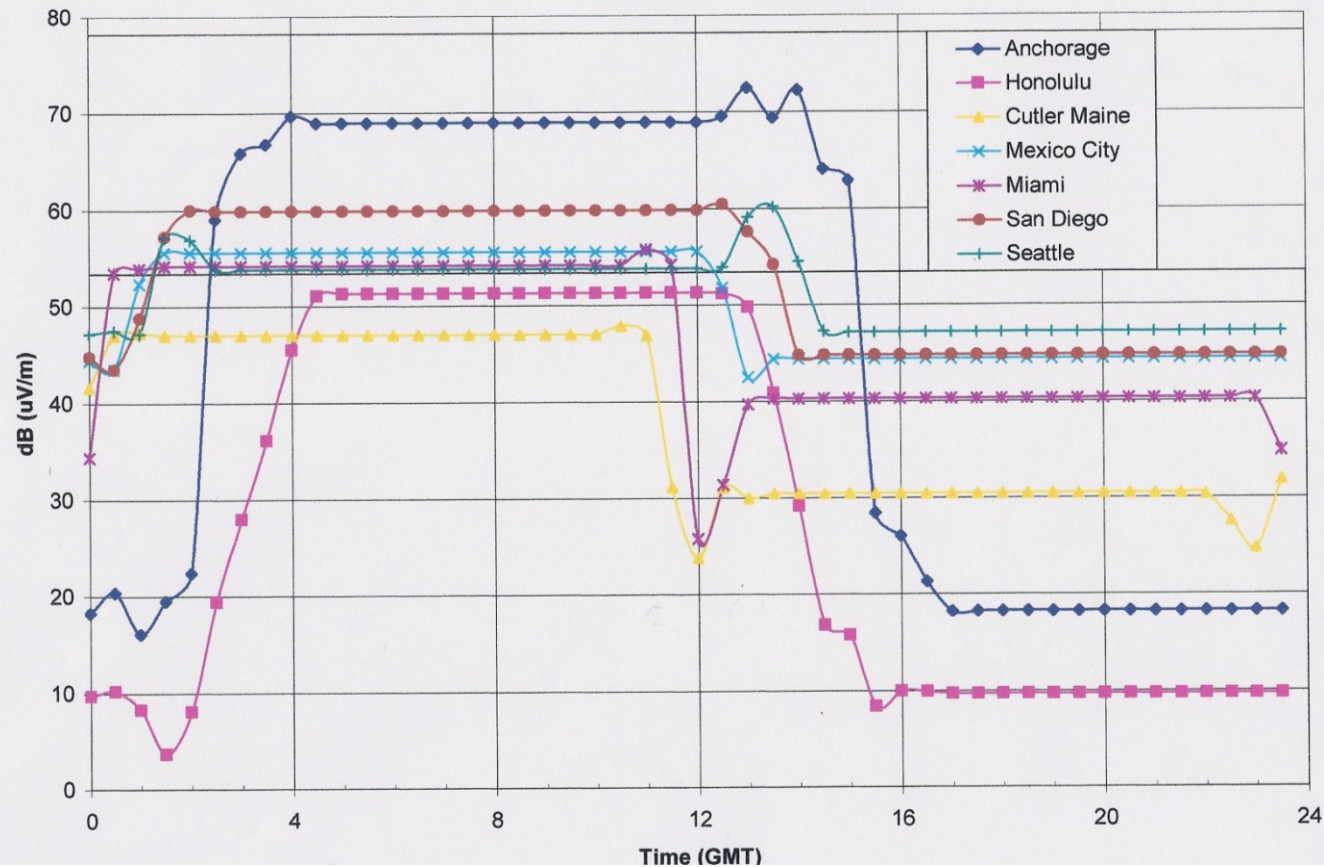


WWVB 50 kW radiated
Signal Only - Mar/Apr/May

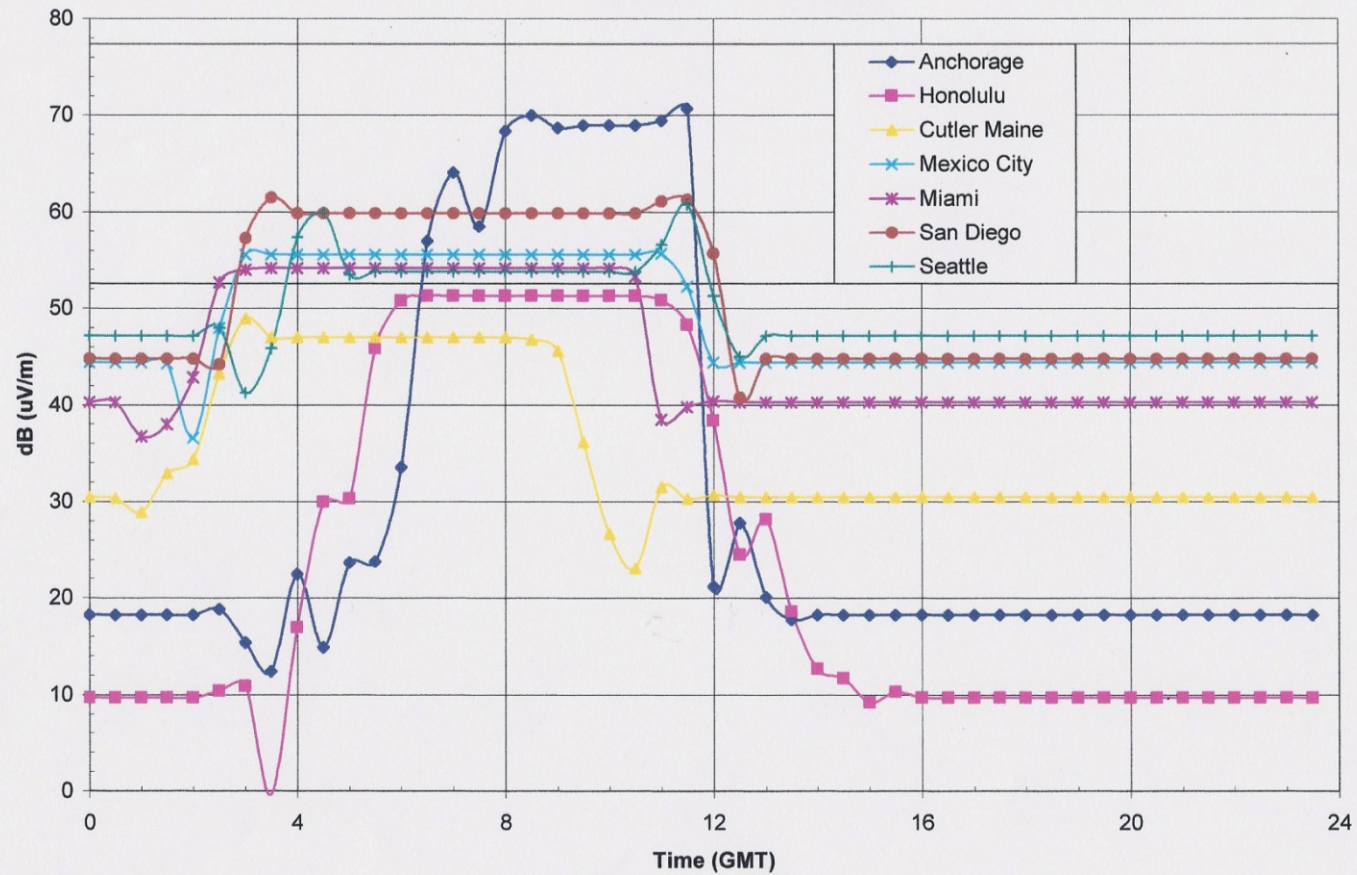


WWVB signal strength in cities

WWVB 50 kW radiated
Signal Only - Sep/Oct/Nov



WWVB 50 kW radiated
Signal Only - Jun/Jul/Aug



WP7A

- Development of New ITU-R Recommendation
 - Define harmful co-channel interference
 - Methods for measurement and/or prediction
 - Propagation programs: wave hop versus waveguide
 - Mediation