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## Understanding HF & VHF propagation conditions using data from NONBH's HAMQSL Solar Data Panel

Category	Radio Blackouts Use X-Ray	Solar Radiation Storms Use Proton Flux	Geomagnetic Storms Use K-Index/K-nT/ Aurora/Solar Wind/Bz	Band Openings Use Solar Flux (SN)	Electron Alert Use Electron Flux
Extreme	X20 (1 per cycle) Complete HF blackout on entire sunlit side lasting hours	1.0e+06 (1 per cycle) Complete HF blackout in polar regions	K=9 (nT=>500) [Aur=10++] (SW=>800) [Bz=-40 -50] (4 per cycle) HF impossible. Aurora to 40°. Noise S30+.	200-300 (SN=160- 250) Reliable communications all bands up through 6m	>1.0e+03 Alert Partial to complete HF blackout in polar regions
Severe	X10 (8 per cycle) HF blackout on most of sunlit side for 1 to 2 hours	1.0e+05 (3 per cycle) Partial HF blackout in polar regions	K=8 (nT=330-500) [Aur=10+] (SW=700- 800) [Bz=-30 -40] (100 per cycle) HF sporadic. Aurora to 45°. Noise S20-S30.	150-200 (SN=105- 160) Excellent conditions all bands up through 10m w/6m openings	<1.0e+03 Active Degraded HF propagation in polar regions
Strong	X1 (175 per cycle) Wide area HF blackout for about an hour on sunlit side	1.0e+04 (10 per cycle) Degraded HF propagation in polar regions	K=7 (nT=200-330) [Aur=10] (SW=600-700) [Bz=-20 -30] (200 per cycle) HF intermittent. Aurora to 50°. Noise S9-S20.	90-120 (SN=35-70) Fair conditions all bands up through 15m	<1.0e+02 Active Minor impacts on HF in polar regions
Moderate	M5 (350 per cycle) Limited HF blackout on sunlit side for tens of minutes	1.0e+03 (25 per cycle) Small effects on HF in polar regions	K=6 (nT=120-200) [Aur=9] (SW=500-600) [Bz=-10 -20] (600 per cycle) HF fade higher lats. Aurora to 55°. Noise S6- S9.	70-90 (SN=10-35) Poor to fair conditions all bands up through 20m	<1.0e+01 Normal No impacts on HF
Minor	M1 (2000 per cycle) Occasional loss of radio contact on sunlit side	1.0e+02 (50 per cycle) Minor impacts on HF in polar regions	K=5 (nT=70-120) [Aur=8] (SW=400-500) [Bz=0 -10] (1700 per cycle) HF fade higher lats. Aurora to 56°. Noise S4- S6.	64-70 (SN=0-10) Bands above 40m unusable	<1.0e+00 Normal No impacts on HF
Active	C1 Moderate Flare Low absorption of HF signals	1.0e+01 Active Very minor impacts on HF in polar regions	K=3-4 (nT=20-70) [Aur=6-7] (SW=200-400) [Bz=0 +50] Unsettled/Active Minor HF fade higher lats. Aurora 60-58°. Noise S2-S3.		
Normal	A1-B9 No/Small Flare No or very minor impact to HF signals	1.0e+00 Normal No impacts on HF	K=0-2 (nT=0-20) [Aur=<5] (SW=200-400) [Bz=0 +50] Inactive/Quiet No impacts on HF. Aurora 67-62°. Noise S0- S2.		

### VHF Conditions

**Aur Lat (Auroral Latitude):** Indicates lowest latitude from the current Aurora Activity measurement. Text color coded for low activity, hi-latitude, & mid-latitude.

**Aurora (Northern Auroral Activity):** Band Closed = No/Low Auroral activity. High LAT AUR = Auroral activity >60°N. MID LAT AUR = Auroral activity 60° to 30°N.

**EsEU (Sporadic E - Europe):** Band Closed = No Sporadic E (ES) activity. High MUF (2M only) = Cond support 2M ES. 50/70/144MHz ES = Respective band open

**EsNA (Sporadic E - North America):** Band Closed = No Sporadic E activity. High MUF = Cond support 2M ES. 144MHz ES = Sporadic E reported >140 MHz.

**MUF (Sporadic E Max usable Frequency Bar):** Gray Bar = No Sporadic E activity. Green/Yellow/Red Bar = Sporadic E reported 6M/4M/2M respectively.

**MS (Meteor Scatter Bar):** Use color code below bar to determine relative activity.

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