

Tech corner – Band conditions

Those of us who chase DX and are interested in making DX contacts are often interested in **band conditions**, because that's one of the most important factors that can determine a successful skywave contact.

The graphic of Solar-Terrestrial Data shown below is a quick glance of the current solar and geomagnetic conditions, which can determine ionospheric and other radio propagation, also known as band conditions. Created and produced by **Paul Herrman, NØNBH**, I refer to it as the **Band Conditions Banner**. Many of us have seen this on websites and Facebook group pages.

But it occurs to me that most of us find much of the information presented on the banner a little cryptic. While not all of the banner information is immediately relevant, this might help you to decipher some of the content, based on the field names it presents, grouped here more by function than appearance in the banner.

SFI (70 = poor / 160 = good / 280 = fabulous)

Solar Flux Index The SFI (62.5 to 300) is the amount of solar radio noise measured at 2800 MHz (10.7 cm). The SFI gives us an idea of how well the ionospheric F-Layer can support radio communication on HF, and more especially on 20 meters through 10 meters.

SN (2 = poor / 90 = good / 220 = fabulous)

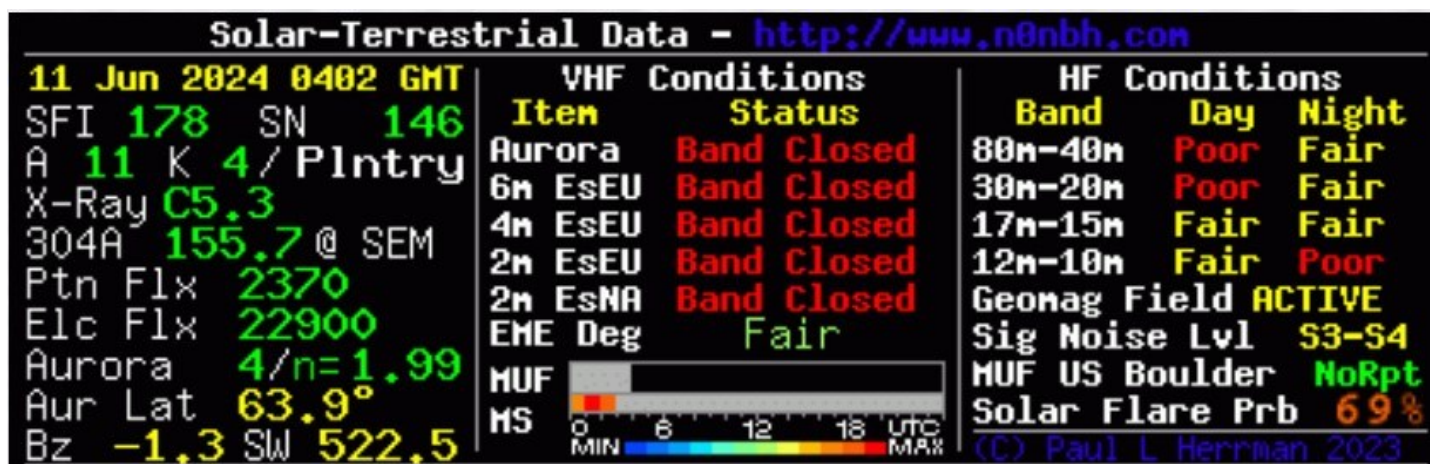
Sunspot Number The SN (0 to 250) is a calculation that is roughly 10 X the number of *sunspot groups facing us* + the number of *individual sunspots facing us*. The SN typically follows the SFI, and offers another indicator of F-Layer ionization.

304A (80 = poor / 150 = good / 240 = fabulous)

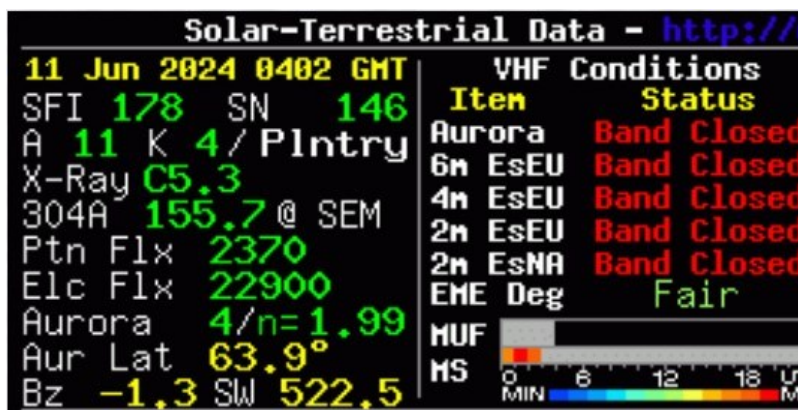
304 Angstroms The 304A is the relative strength of total solar radiation in the UV (ultraviolet) range, originating primarily from ionized Helium in the Sun's photosphere, and often follows the SFI value. The designation following the 304A value (@ EVE, @ SOHO, @ SEM) indicates the measuring instrument.

A Pntry (4 = calm / 40 = minor storm / 80 = severe storm)

A, planetary The Ap index is the daily average long-term stability of Earth's magnetic field, the subscript 'P' meaning planetary, or averaged from several locations around the earth. The value ranges from 0 to 400, with anything over 100 indicating unfavorable conditions for radio propagation.



Tech corner – Band conditions, cont'd



K Plntry (1 = calm / 5 = minor storm / 7 = severe)

K, planetary The Kp index is the daily average short-term stability of Earth's magnetic field, the subscript 'P' meaning planetary, or averaged from several locations around the earth. The value ranges from 0 to 9, with anything over 5 indicating unfavorable conditions for radio propagation.

Bz (20 = good / 2 = ok / -2 = not ok / -20 = disruptive)

B sub Z Interplanetary magnetic field vector (strength and direction) perpendicular to the plane of Earth's orbit, with positive values enhancing Earth's magnetic field and negative values canceling it.

X-Ray (A1.1 = good / C5.0 = moderate / X2.3 = severe)

X-Rays X-ray emissions most heavily impact the ionospheric D-Layer, such that the stronger the radiation, the lower the ability of radio waves to propagate by skywave refraction. The intensity of X-ray radiation striking the atmosphere, ranging from A0.0 to X9.9, is defined by a class (A, B, C, M, and X), followed by a logarithmic quantity (0.0 to 9.9) that defines the intensity within the class.

Ptn Flx (0.10 = good / 2.0 = moderate / 20.0 = heavy)

Proton Flux Density of protons in the solar wind, such that the higher the value, the greater the impact on the ionospheric E-Layer.

Elc Flx (<1000 = little impact / >1000 = heavy impact)

Electron Flux Density of electrons in the solar wind, such that the higher the value, the greater the impact on the ionospheric E-Layer.

SW (100 = good / 500 = moderate / 700 = disruptive)

Solar Wind Average speed of solar wind particles in km/s.

Aurora (1/n=1.99 : weak ... 6/n=0.8 : moderate)

Aurora Possibility Relative strength in GW of ionospheric F-Layer, affecting DX over polar regions, such that the stronger the ionization, the greater chance of aurora at lower latitudes.

Aur Lat (70 = weak / 60 = moderate / 50 = strong)

Aurora Latitude Lowest estimated latitude impacted by an aurora, in degrees N Latitude.

Tech corner – Band conditions, cont'd



VHF Conditions

The **VHF Conditions** column provides an idea of favorability for SSB operation in frequencies between roughly 50 MHz and 150 MHz. Except for Auroral Activity, the status for each applicable band reports how well Sporadic-E (Es) conditions over the particular continent support the band, and **Band Closed** for low or no activity. (EU = over Europe and NA = North America).

Aurora

Auroral Activity General report of the current Auroral activity, displayed as MID LAT AUR to indicate activity extended to between 30 and 60 degrees N Latitude, High LAT AUR to indicate activity confined to higher 60 degrees N Latitude, and Band Closed to indicate little or no Auroral activity.

MUF

Maximum Usable Frequency, Es The MUF, relative to Sporadic-E (Es), is the highest frequency that can be reliably used for skywave communication by Sporadic-E propagation. In this column, the banner displays the MUF as a colored bar for each VHF band: 6 m = blue, 4 m = green, 2 m EU = yellow, 2 m NA = red, and gray for no activity. The **SEASON BREAK** label indicates that Sporadic-E is not normally active this time of year.

MS

Meteor Scatter The Meteor Scatter activity bar shows relative meteor scatter activity for the times of the day listed in UTC, using the MIN...MAX color scale below it. The bar displays colors for the active times, and gray for no activity.

HF Conditions

The **HF Conditions** column is often where people glance first, to get an idea of the general propagation conditions across the HF bands, and is fairly self-explanatory. Each pair of bands is listed with a separate general condition report for daytime operation and nighttime operation, as **Poor**, **Fair**, and **Good**, compiled from other banner data. The subjective conclusions are based on the combined contributions of the Solar Flux Index, Sunspot Number, the 304A value, the Ap index, and the Kp index.

Geomag Field

Geomagnetic Field Relative label of the Earth's magnetic field activity, reflecting the Kp index. Labels include INACTIVE, VR QUIET, QUIET, UNSETTLED, ACTIVE, MIN STORM, MAJ STORM, SEV STORM, and EX STORM, in order of disruptive impact on radio propagation.

Tech corner – Band conditions, cont'd

Data - <http://www.n0nbh.com>

Conditions	HF Conditions
Status	Band Day Night
Band Closed	80n-40n Poor Fair
Band Closed	30n-20n Poor Fair
Band Closed	17n-15n Fair Fair
Band Closed	12n-10n Fair Poor
Band Closed	Geonag Field ACTIVE
Fair	Sig Noise Lvl S3-S4
	MUF US Boulder NoRpt
	Solar Flare Prb 69%

6 12 18 UTC MAX
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Sig Noise Lvl (S0 = great / S4 = fair / S7 = horrible)

Signal Noise Level The signal noise level is a logarithmic measurement (in 6 dB-increments, like you see on an S-meter) of the noise generated as a result of the solar wind, compared with the noise floor. The greater the disturbance in the solar wind, mostly due to interaction with Earth's magnetic field, the higher the S-value.

MUF US Boulder (14 = 20 to 10 no-go / 29 = 20 to 10 ok)

Maximum Usable Frequency From one of eleven locations worldwide, the highest frequency that can be reliably used for communication by skywave propagation. Normally listed in MHz, but also showing **NoRpt** if no info is available.

Solar Flare Prb

Solar Flare Probability A solar flare is a sudden burst of radiation, consisting of electrons, ions, and high energy electromagnetic radiation, over the surface of the Sun. This huge emission can reach Earth and strengthen ionization of the ionospheric D-Layer, absorbing radio signals and disrupting HF communication. The chance of a flare erupting on the solar surface gives you an idea of how much your HF communication might get disturbed by a solar storm in the next 24 hours.

Finally

Now you can impress your ham friends with your knowledge of the info presented on this cryptic banner. But maybe more importantly, you can glance at the info and get some idea of what to expect when you get on the radio, hoping the heavens will be in your favor.

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