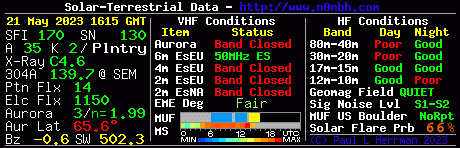
**PREDICTING HF RADIO PROPAGATION**

This document provides a simple explanation of the most commonly used solar-terrestrial propagation predicting data. Many amateur radio websites provide this information in the format shown in the image below. You may also go to https://www.hamqsl.com/solar101vhf.php to down load this table.



This document is intended to be used to understand and make use of the most important solar data on this table. It should only be used as a guide. Just using a single reading of the A and K numbers cannot provide an accurate estimate of the current signal propagation. The experts use computer programs to take many samples of some propagation data over a single day, and other samples over several days to determine trends. From these trends, real time predictions are made. Making our own predictions, based upon these charts, may not be as accurate as the professional predictions, but can be an enjoyable part of Amateur radio.

SOLAR TERRESTRIAL DATA INTERPITATION

The following table entries have been proven to be the key elements for predicting radio propagation on the HF Amateur bands. Even though the table include date for the VHF and UHF bands, this document does not address propagations on those bands.

**Time and Date:** The data contained on the solar terrestrial table is time sensitive. Check the data and time shown on the top of the table to verify that it is current.

**Solar Flux Index** (SFI - 30 to 300): A measure of the number of solar particles and the magnetic fields reaching the earth’s atmosphere. The value represents how well the F layer can support radio communications. It has the greatest effect on 10 through 20 meters, and very little effect on 30 through 160 meters.

<70: propagation potentially bad.

80-90: propagation potentially is somewhat low

90-100: propagation tend to be average

100-150: propagation will tend to be good

>150: propagation will tend to be ideal

**Sunspot Number** (SN – 0 to 250): The number of sunspots visible on the surface of the sun. High numbers indicate high electromagnetic activity, and good propagation. When sunspots turn into solar flares, their effect may significantly diminish propagation. The SFI and SN needs to be high, and stay high, for several days before their effect on propagation will affect the earth’s ionosphere.

< 50: propagation conditions potentially very bad

50-75: propagation conditions attenuated

75-100: propagation conditions might be good

100-150: propagation conditions should be ideal

>150: propagation conditions possibly exceptional

**A Index**  (A – 0 to 400): The geomagnetic activity index, derived from the average of the last 24 hour period of the K index.

1 to 5: Best conditions on 10,12,15,17 and 20 meter bands.

6 to 9: Average conditions on 10,12,15,1 and 20 meter bands.

10 and above: Very Bad conditions on 10,12,15,17 and 20 meter bands

**K/Planetary Index** (Kp – 0 to 9): The solar geomagnetic activity effecting the whole earth, relative to a quiet day. Dropping numbers indicate improving propagation, primarily in the northern latitudes. This is especially true for where aurora activity is occurring. A value greater than 8 indicate a high intensity solar storm is affecting the earth’s atmosphere.

0 to 1: Best conditions for 30,40,80 and 160 meter bands.

2 to 4: Good conditions for 30,40,80 and 160 meter bands.

5 to 9: Very bad conditions for 30,40,80 and 160 meter bands.

**304A** (304A – 0 to ?): Relative strength of solar radiation, or solar brightness at 304 angstroms. This wavelength causes approximately half of the ionization of the F1 and F2 layer. High levels indicate more ionization of the F layer, causing improved propagation.

80: Poor propagation.

150: Good propagation.

240: Excellent propagation.

**X-Ray** (X-Ray – A through X): 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)

A1.1: Good skywave propagation.

C5.0: Fair skywave propagation.

X2.3: No skywave propagation.

**HF Conditions:**  General description of propagation conditions using SFI, SN, 304A, Ap Index, and the Kp Index. These parameter values, and their rates of change, are processed to provide general propagation predictions for daylight and nighttime predictions.

Good: DX propagation by multiple hops possible.

Fair: Propagation by single or double hops possible.

Poor: No skywave propagation possible.

**Signal Noise Level** (S0 to S9 S meter units): The noise generated by solar wind interacting with the earth’s magnetic field.

S0: No noise.

S4: Fair level of noise.

S0: High Level of noise.

**Solar Flare Probability** (0% to 100%): The probability of a solar flare during the next 24 hours. During a solar flare, electrons, ions, and high energy electromagnetic radiation are emitted by the sun. If they strike the earth, the ionospheric D layer is strengthened, resulting in that layer absorbing HF radio waves. The effects of a flare striking earth can last several days.

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