Propagation TP Slopes  R.S. Flagg,  February 2018

Propagation TPs have been observed for several years by SUG spectrograph stations in the 16 to 32 MHz frequency range. These events occur during daytime hours and appear as increases and decreases in band noise. Typically the band noise increase begins at a low frequency, ascending in frequency over the course of a couple of hours and then decreasing in frequency. The band noise, bounded by the leading and trailing edges of the band noise enhancement, looks like an Indian TeePee (pick a spelling – TeePee, Tepee, Tipi, Tepe). For the sake of laziness I will stick with TP.

A previous discussion of this phenomenon by Typinski may be found at:

The source of the band noise is suspected to be predominantly distant lightning. Due to reflections by the ionosphere the lightning noise associated with different geographic locations can reach the receiving site by skip propagation. Different propagation paths and different geographic source regions will dominate during the day due to changes in ionospheric density.

A good example (meaning one of the best ones I could find) of TPs is seen below. In this 1 May 2016 record the band noise enhancement is evident in the 3 TPs occurring between 1700 and 2400 UTC at the Florida station. At the peak of each TP we see stations that are most likely due to long distance propagation of CB signals near 27 MHz. Between the nighttime hours of 0600 and 1300 we see a peak in the galactic background – which corresponds to about a 3 dB rise in antenna temperature.

Using the slope measuring utility in Jim Sky’s RSS software I have measured the leading and trailing edge slopes of TPs occurring on AJ4CO records for 9 days between January and July 2016. The average of 24 leading (ascending) edge slope measurements was 2.1 kHz / sec with a sigma of 1. The average of 19 trailing (descending) edge slope measurements was -1.7 kHz / sec with a sigma of 0.7. A slope of 2kHz / sec equates to 7.2 MHz / hr.

The daily spectrograms which were read for TP slopes are seen below.
January 15, 2016; Measured slopes (kHz/sec): 2.3, 3.6, 5.2

February 1, 2016; Measured slopes (kHz/sec): 1.2,-1.2, 2.3, 3.1, 3.1,-2.
March 2, 2016; Measured slopes (kHz/sec): -2.1, 2.2, -1.4, 1.4

March 15, 2016; Measured slopes (kHz/sec): -2.1, 1.1, -0.8, 1.3, -2.2
April 1, 2016; Measured slopes (kHz/sec): -3.6, 0.9, -1.3, 2.8, -1.4, 0.8

April 15, 2016; Measured slopes (kHz/sec): -2.5, 2.1, -1.3
May 1, 2016; Measured slopes (kHz/sec): -1.3, 2.0, -2.1, -1.6, 1.8, -1.5, 1.8

June 1, 2016; Measured slopes (kHz/sec): -1.3, 2.0, -2.1, -1.6, 1.8, -1.5, 1.8
July 1, 2016; Measured slopes (kHz/sec): 1.6, 3.2, -1.1, 1.8