Global Navigation Satellite Systems (GNSS) data acquisition frequently occurs in a variety of challenging environments, which produce high levels of ambient noise. Tracking the relatively low powered GNSS carrier signals broadcast from space becomes even more challenging in the presence of adjacent band RF noise. The demand for terrestrial RF spectrum use for a variety of non-GNSS applications is ever increasing, which poses potential challenges for GNSS site operators who would like to acquire the highest-quality data possible.

In previous work, we have demonstrated that the performance of GNSS receivers is greatly impacted by RF interference. To better characterize GNSS receiver susceptibility to non-satellite RF interference, we use a source generator to place a continuous wave (CW) signal over the signal from the receiver. We vary the power and frequency of the CW-interference. Changes in the recorded signal-to-noise measurements are then used to characterize each receiver’s susceptibility to a CW noise source.

Antennas Antennas were not tested in this experiment because the noise was introduced between the antenna and the test receiver. Antennas also play an important role in a given site’s susceptibility to RF interference. If the interference is within the amplified range of the antenna’s LNA and of sufficient strength, the amplifier can saturate. Antennas LNA saturation can cause degradation of receiver tracking performance. Some new antenna models include LNAs with wider amplification bandwidths (with no gain) to increase the range of interference which can be accommodated (Bottom). UNAVCO has seen an increase in observation noise at certain sites where GNSS compatible antennas have replaced older GPS only designs.

Testing the Susceptibility of GNSS Receivers to Radio Frequency Interference

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AGU FALL MEETING 2015