Scintillation of GNSS signals at equatorial latitudes

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A particular threat to global navigation satellite systems (GNSS) are small scale ionospheric disturbances. These can lead to fluctuations of the received satellite signal, so called signal scintillations. Strong scintillations can lead to a loss of lock between satellite and receiver. All GNSS signals are affected by this phenomenon. The influence of the short scale disturbances on the different GNSS signals is expected to be different for each signal, since the signals are transmitted by different carrier frequencies and are constructed in different ways.

In this presentation, we show results (N. Hlubek et al, *J. Space Weather Space Clim.* **4**, 2014, A22) comparing the occurrence rate of signal scintillations between the different global navigation satellite systems and their different signal frequencies. In particular, we consider GPS L1, L2 and L5, GLONASS L1 and L2 and Galileo E1 and E5a. This analysis uses data from a high-rate GNSS station of the German Aerospace Center (DLR) placed in Bahir Dar, Ethiopia at 11°36′N 37°23′E for the whole year 2013. We present the aggregated data as daily and seasonal averages and estimate the overall influence of scintillations on the GNSS signals.

Additionally, we show aggregated data from the DLR high-rate GNSS monitoring station located in Tenerife at 28°47′N -16°32′E and compare them to the statistics from the Bahir Dar station. Tenerife is located close enough to the strong scintillation band following the 15° geomagnetic latitude contour that scintillation events are found frequently.