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Characterization of Low-Latitude Ionospheric Scintillation of GPS Signals: An E-POP Experiment

Ionospheric irregularities are a major error source in GNSS positioning and navigation as they affect trans-ionospheric signal propagation. They cause random, rapid fluctuations in the intensity and phase of the received signal, referred to as ionospheric scintillations. From a global point of view, GNSS signal scintillations are more severe and frequent in the equatorial region and during post-sunset hours. Characterizing irregularities that interfere most with navigation signals requires high-temporal resolution of measurements. In this work we utilize high-rate upward-looking measurements accomplished by the GAP RO receiver on CASSIOPE (Swarm Echo) satellite to study GPS signal scintillations and irregularities associated with them. This was done by reorienting CASSIOPE by approximately 90 degrees for short periods during November and December, 2019 while it passed through low-latitude region during post-sunset hours local time. High-rate GAP RO measurements provide a unique opportunity to investigate small-scale irregularities that are responsible for signal scintillations.

GPS Signal Scintillation, E-POP, Low-Latitude Ionosphere