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GNSS signals collected from Spire’s radio occultation satellite constellation carry a wealth of information about the ionosphere. Each Spire satellite currently tracks 1 Hz, dual-frequency GNSS phase measurements through zenith and limb pointing antennas that are processed to produce slant total electron content (TEC) estimates with low latency. Low-elevation GNSS links passing through the ionospheric portion below the satellite orbit are also used for electron density profile inversions. Additional high-rate 50 Hz phase data, primarily used for lower neutral atmospheric RO processing, are utilized to resolve finer scale features of the ionosphere, such as gravity waves, sporadic E-layers and other irregularities.

Spire’s ionospheric observational capabilities are highlighted in this talk by providing a current update of the measurement data and processing algorithms. Some recent updates include the continuous collection of GNSS signal links spanning from near-zenith to the E-region to enable processing of longer TEC arcs and electron density profiles, receiver upgrades for potentially more accurate estimation of differential code biases, and the collection of high-rate 50 Hz data during detected scintillation events (similar to the operation of COSMIC-2). In addition to the latest measurement updates, we will discuss the current coverage, quality, and potential applications of Spire’s ionospheric data products.
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