Ionospheric imaging using radio occultation and topside TEC data from commercial low Earth orbit satellites

Victoriya Forsythe [(1)] and Donald Hampton* [(1)]
(1) University of Alaska Fairbanks, Geophysical Institute

The integral of the electron concentration, known as the Total Electron Content (TEC) along radio-occultation (RO) and precise orbit determination (POD) links between low-orbit commercial satellites and GPS satellites can significantly improve the spatial resolution of the global electron density maps, improving the coverage over the oceans where the GPS receivers are not available. We are developing a model that will ingest both satellite-based RO as well as ground-based slant TEC, where available. This study discusses the inversion algorithm for the imaging of the ionospheric electron concentration and presents the first results. An improvement to the existing imagine techniques is in the use of a routinely modified basis functions to match the data in the test-points connected to the ionosondes and ISR data. In addition, the electron density imaging over Alaska is validated by the comparison with Poker Flat Incoherent Scatter Radar (PFISR) data.