Tomographic Estimation of Ionosphere for the HF Single Site Location

The knowledge of ionospheric electron density distribution and its equivalent total electron content (TEC) is very important due to its broad application in communication and navigation areas which is obtained by knowing the combined effect of production by solar EUV flux, loss exchange between O₂ and N₂ and transport process by means of \( \mathbf{E} \times \mathbf{B} \) plasma drift. The low latitude ionosphere is highly dynamic due to several phenomena such as equatorial ionospheric anomaly (EIA), scintillation caused by plasma bubbles/spread-F. This dynamic nature of low latitude/EIA ionosphere affects the navigation and communication to a great extent and also makes it a challenging problem to model the ionosphere.

Our project makes use of COSMIC (constellation observing system for meteorology, ionosphere, and climate) RO (radio occultation) based measurements to estimate ionospheric tomography. The COSMIC trajectory available within 1 hour interval over Asia Pacific has been selected to perform 3D interpolation to estimate the profiles at each latitude and longitude grid over the region. These profiles will be used in HF-communication for single site location (SSL).