

The Importance of Radio Occultation Measurements for Ionosphere modeling

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The availability of unprecedented amounts of Global Navigation Satellite Systems (GNSS) ground receiver data over the last decade has been driving a new wave of ionosphere research. Data of unprecedented time and spatial resolution have contributed to a renaissance of ionosphere science and have open new ways of specifying and forecasting the state of the ionosphere. Global ionosphere monitoring and forecasting schemes are already emerging on operational stages. However, ground GNSS data alone do not contain enough information about the vertical distribution of electron density and must be supplemented by other measurements. Ionosonds provide vertical electron density profiles but only below the F2 peak and at much lower spatial resolution. The best complement to global ground GNSS measurements is provided by GNSS Radio Occultations from a Low Earth Orbit (LEO). Ground based together with Occultation GNSS measurements and the present ionosonde network can form a necessary and sufficient set of observations to constrain physics based models used in data assimilation schemes. LEO measurements of GNSS signals can also offer a way toward specification and possibly short term prediction of ionosphere irregularities and scintillation. In this paper measurement requirements in terms of cadence, spatial resolution, and latency for Radio Occultation will be discussed. Possible tradeoffs between quality and quantity of data and the background models used in data assimilation schemes and scintillation products will be mentioned.