Estimating E-region density profiles using COSMIC occultation and IDA4D

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The off-equatorial E-region conductivity is an important parameter in the growth rate of equatorial spread F irregularities. Enhanced E-region conductivities can short out F-region electric fields and inhibit the development of equatorial spread F.

E-region measurements, however, are known to be scarce and difficult to be made. On the hand, radio-occultation measurements, which have become more numerous in the past few years, can provide a useful, global source of E-region density measurements. These new measurements would allow us to better understand the E-region variability and to study the effects of the E-region conductivities in the development of spread-F irregularities.

In this talk, we present results of our investigation on the estimation of E-region density profiles using radio occultation measurements. The profiles have been obtained by a) direct inversion of radio-occultation measurements, b) by assimilation of radio occultation data into the Ionospheric Data Assimilation Four-Dimensional (IDA4D) and c) by using IDA4D F-region density results to assist the inversion of E-region profiles from occultation measurements. Comparisons of our results with independent measurements of E-region density profiles made by the bistatic coherent scatter radar experiment in Peru and by incoherent scatter radar measurements in Arecibo are presented.