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GPS Radio Occultation: COSMIC Profile Comparisons with European Digisondes Data

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Electron density profiles retrieved from the Formosat-3/COSMIC radio occultation (RO) measurements were compared with ground-based measurements in European region. We used the ionospheric data recorded by European ionospheric stations (Chilton, Rome, Ebro, Arenosillo, Athens, Pruhonice and Juliusruh) for temporal interval of 2007-2009 and compare these ground measured data with the GPS COSMIC RO ionospheric profiles. To avoid the evident risks related with using of the autoscaled data we have done manual verification of all involved autoscaled values (foF2, traces, electron density profiles) with ionograms from DIAS database. It was revealed that in general the form of COSMIC profile in the bottom side is in a good agreement with ionosonde profiles, the heights of the peak density value are also good comparable. Special attention was focused to the question of the topside part of electron density profile. Practically for all analyzed cases there are observed the understated values of electron density in the topside part of the ionosonde profiles in compare with RO profiles. As the topside ionosonde profile is obtained by fitting a model to the peak electron density value, the COSMIC radio occultation measurements can make an important contribution to the investigation of the topside part of the ionosphere. Also it was done statistical analysis of the obtained results to estimate differences in NmF2 and hmF2 values between COSMIC and ground-based measurements. Estimation of found statistical characteristics corresponded to the different seasons of the considered years has revealed rather good conformity of COSMIC RO data. Results of the given comparisons can be important to validate the reliability and further using of the COSMIC ionospheric observations, especially over regions void of ground-based data.

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