Geophysical Research Abstracts
Vol. 18, EGU2016-13102, 2016
EGU General Assembly 2016

Precipitation measurements with GNSS polarimetric Radio Occultations: Status of the ROHP-PAZ mission and anticipated retrievals

Ramon Padullés (1), Estel Cardellach (1), Manuel de la Torre Juárez (2), Sergio Tomás (1), F. Joseph Turk (2), Chi O. Ao (2), Toni Rius (1), and Santi Oliveras (1)

(1) Institut de Ciències de l'Espai CSIC/IEEC, Cerdanyola del Valles (Barcelona), Spain (padulles@ice.cat), (2) NASA Jet Propulsion Laboratory, California Institute of Technology, Pasadena (CA), USA

The upcoming ROHP-PAZ (Radio Occultations and Heavy Precipitation experiment aboard the spanish PAZ satellite) mission aims to detect, for the first time, precipitation using Global Navigation Satellite System Radio Occultations (GNSS-RO). The electromagnetic signals coming from the GNSS satellites travel tangentially through the atmosphere and will be collected in the PAZ Low Earth Orbiter at two polarizations (vertical and horizontal). This sounding-like technique of the atmosphere will measure all the atmospheric phenomena that are inducing depolarization effects, in addition to all the thermodynamic profiles that standard RO are nowadays providing.

The main contributors to depolarization in the troposphere are known to be the hydrometeors, both rain drops from heavy precipitation events and horizontally oriented ice particles in the top of clouds. Their effects on the GNSS signals were predicted in Cardellach et. al. 2015 (IEEE Trans. Geosci. Remote Sens.), and measured in the ROHP-PAZ field campaign Padullés et. al. 2016 (Atmos. Chem. Phys.).

Prior to the launch, a complete characterization of all the possible effects, including hydrometeors but also taking into account other elements was needed. To do so, actual data from the COSMIC – FORMOSAT 3 mission (Radio Occultation events) have been collocated with the TRMM, GPM and CloudSat missions (precipitation and clouds missions). Thousands of events have been analyzed, in terms of SNR and phase delays. For the same events, the effect of hydrometeors has been simulated as well as the most known ionospheric effects, such as Faraday Rotation and Cotton-Mouton effects. And finally, the predicted noise, actual measurements of the antenna pattern and some tolerance in the purity of the emitted signal have been included. This has resulted in an extensive data base that is key in the understanding of the upcoming actual data, as well as for the characterization of all the unpredicted effects.

We will discuss here the status of the mission, the previous studies of sensitivity, the measurements and the conclusions of the field campaign, and the anticipated products obtained with the described accurate collocations and the end to end simulation.