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ROHP-PAZ is a mission of opportunity aboard the Spanish Earth Observation PAZ satellite. This spacecraft was initially designed to carry a Synthetic Radar Aperture (SAR) as primary and sole payload. It included an IGOR+ advanced Global Navigation Satellite System (GNSS) receiver for precise orbit determination. The design of this particular GNSS receiver allows the tracking of radio occultation (RO) signals, although the RO capabilities were not initially considered in the original PAZ set up. The Spanish Ministry for Science and Innovation (MICINN) approved a proposal aimed to modify the original plans of PAZ, by including a polarimetric GNSS Radio-Occultation (PRO) payload. For geopolitical reasons, the launch of PAZ has been in stand-by for several years. A new agreement between the company who owns PAZ (HISDESAT) and SpaceX should permit the launch of PAZ by the end of 2017 or early 2018.

ROHP-PAZ is a proof-of-concept experiment: for the first time ever, GNSS RO measurements will be taken at two polarizations, to exploit the potential capabilities of polarimetric radio occultation for detecting and quantifying heavy precipitation events. If the concept is proved, PAZ will mean a new application of the GNSS Radio-Occultation observations, by providing coincident thermodynamic and precipitation information with high vertical resolution within regions with thick clouds.

While waiting for the launch window, a series of studies have been conducted to understand the systematic effects which will contribute to the polarimetric signatures. Based on the full transmission equation, we have seen that impurities of the transmitted polarization state, the ionosphere and instrumental receiver effects will alter the measured polarimetric observables. Algorithms to separate the contribution of the hydrometeors from the rest of contributions have been created and the range of validity assessed. The retrieval algorithms to invert the polarimetric GNSS RO signatures induced by hydrometeors into vertically distributed information of these same hydrometeors have also been developed and tested in end-to-end simulations. These studies have relied on massive collocations between the COSMIC RO events and measurements taken by TRMM and GPM precipitation missions.

This presentation will summarize the polarimetric RO experiment aboard PAZ and its status. It will also describe the studies to determine the systematic effects on polarimetric signatures; the algorithms to separate the hydrometeor contribution; its inversion retrieval approach together with the validation and error assessment work conducted on end-to-end synthetic data. The expected PAZ PRO products (vertical profiles of both rain probabilities and thermodynamic parameters) will be presented, based on synthetic data.
OSTS session
Regional and Global CAL/VAL for Assembling a Climate Data Record
Meeting name
Joint COSMIC Tenth Data Users' Workshop and IROWG-6 Meeting
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