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New precipitation and cloud ice observations with polarimetric GNSS RO aboard the PAZ satellite

The GNSS Polarimetric Radio Occultations (GNSS PRO) is a new measurement concept being proved aboard the PAZ satellite, operating since May 2018. The technique is based on the 'traditional' GNSS Radio Occultations (GNSS RO), widely used for atmospheric profiling of thermodynamic parameters and assimilated in operational NWP. Adding polarimetric capabilities to the RO system enables to sense hydrometeors, especially big rain droplets in heavy rain, and some frozen particles. The system, thus, is the first technique with joint and synchronous sensitivity to both types of parameters: thermodynamic and hydrometeor profiling. Whereas the geophysical content of the GNSS RO signals to infer the 'traditional' products lays on the bending of the signal propagation (atmosphere acting as a lens because of its vertical gradients in T, p and q), the physical principle to sense hydrometeors is the excess propagation delay of the horizontally polarized signal with respect to the vertically polarized one. These are two independent sensing principles obtained from a single set of data.

This poster will present the technique, the facts demonstrated during the PAZ mission so far, the current identified limitations, and potential areas of interest and opportunities for scientists working on precipitation, micro-physics modeling and large scale convective systems, elements towards improved understanding, monitoring and prediction of some extreme events.

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