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The Radio Occultation and Heavy Precipitation (ROHP) experiment aboard the Spanish PAZ satellite was activated in May 2018 with the objective to demonstrate the Polarimetric Radio Occultation (PRO) concept for rain detection. This technique enhances standard RO by measuring GNSS signals at two orthogonal linear polarizations (H and V). Owing to hydrometeor asymmetry, electromagnetic signals propagating through regions of heavy precipitation would experience a differential phase delay (??_H-V) expected to be measurable by the ROHP experiment. After 2+ years of operations, the initial hypothesis has been verified and the main scientific goals have been achieved. After a thorough on-orbit calibration, it has been demonstrated that the PAZ polarimetric observable can be used as a proxy for heavy precipitation. Furthermore, PRO measurements were shown to be sensitive to the horizontally oriented frozen hydrometeors present throughout the vertical cloud extent.

In this presentation we will show the attempts to retrieve the frozen and liquid water content that induce the measured ??. We first combine empirical relationships and simulations to obtain the frozen (ice/snow) water content in the upper layers of the cloud, above the freezing level. The retrievals in the upper layers are then used to correct the observations where the lower portions of the rays reach below the freezing level. After removing the ice contribution, what remains is assumed to be the precipitation induced ??. Statistically-based look up tables are then used to link ?? to liquid water content or rain rate.

The retrieved products are compared against existing observations in a climatology-based study, and validated using collocated water content products from space-based radars and MW radiometers. Here we will show the challenges that these attempts pose and the potential level 2 products we can expect from PAZ.
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