

## ***Interactive comment on “Calibration and Validation of the Polarimetric Radio Occultation and Heavy Precipitation experiment Aboard the PAZ Satellite” by R. Padullés et al.***

### **Anonymous Referee #2**

Received and published: 22 October 2019

The manuscript presents the calibration and validation studies for the Radio Occultations and Heavy Precipitation experiment aboard the PAZ satellite. I find the study interesting and well presented. I only have a few minor points:

Abstract: please write in words what the 'dphi observable' is.

Page 4, L1: "The JPL designed IGOR+ receiver installed in PAZ collects RO data at a rate of 50Hz. Each RO is tracked independently in the two ports dedicated to the H and V polarized antennas. Therefore, each port output is processed independently. Raw phase data ..." please write Integrated GPS Occultation Receiver (IGOR) and provide some more details. Tracking modes, setting and rising occultations, etc.?

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Page 4, L27: "For each port, data are processed to obtain N(h). To assign a height to each time measurement (e.g. excess phase or SNR) is complicated, specially when atmospheric multipath is present. To do so we rely on the inverse Abel transform and we assign a tangent height (the height of the tangent point of each ray) to each phase and SNR measurement, (ht) and SNR(ht). As a convention, the height that is assigned to each time is the mean of the heights obtained in the H and V ports at that time..." Are the heights obtained from the H and V ports very different? Are the BA (N) profiles very different? Can you provide an example (maybe in Fig.2 to the right).

Page 5, L3: "The whole processing is applied to 59,704 occultations, of which a total of 42,209 pass through the JPL quality control. The quality control is passed if the retrieved refractivity profiles between 0 and 30 km (for both H and V) are within 10% of the co-located NCEP Global Forecast System (GFS). Those that do not pass the quality control are discarded." I understand that the focus of this paper is not N profiles, but maybe you could add some N statistics here or later. Also see comment regarding Fig.10 below.

Page 5, L10: "The ray tracing uses the actual retrieved refractivity profile to account for the bending of the rays." I suggest to remove the word 'actual'.

Page 13, L8: "We take two heights, 10 and 50 km, at which we evaluate the Faraday rotation using the co-located values of ne and B from IRI and IGRF" I suggest to add in brackets the corresponding year. whenever the ionosphere comes into play at least the year (2018/2019) should be mentioned. Maybe you could also mention here or later if you expect some impact during high solar activity.

Page 14, L12: "...which implies that the measured is reduced by a 1.34 %." remove 'a' here and i suggest to write 1.3% instead of 1.34%.

Page 18, Fig10.: I am curious to see some N statistics. In a recent study Padullés, R., Cardellach, E., Wang, K.-N., Ao, C. O., Turk, F. J., and de la Torre-

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Juárez, M.: Assessment of global navigation satellite system (GNSS) radio occultation refractivity under heavy precipitation, *Atmos. Chem. Phys.*, 18, 11697–11708, <https://doi.org/10.5194/acp-18-11697-2018>, 2018.

you presented interesting results and concluded:

'...This is the aim of polarimetric radio occultations, which will provide joint products of temperature, pressure, and moisture and an indication of the amount of precipitation (mostly sensitive to the heaviest) at each vertical level (Cardellach et al., 2017) with the objective of advancing the understanding of heavy precipitation events, closely linked with high specific-humidities conditions...'

Would it be too much of an effort to add to the right the corresponding N statistics (w.r.t. say the NCEP GFS) ? I would like to see if the positive mean deviation correlates with the positive N bias.

Page 19, L1: "as we can see in Table 1, 81% of the cases exceed" write 1.8% instead of 1.81%.

Conclusion, L31: "It is important here to emphasize the fact that we are evaluating the performance in detecting rain rather than quantifying its rate, and the validation in the context of this paper confirms that capability" but this can be also done with the IMERG product? Can you write something about the potential benefit of your product here or in the introduction.

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Interactive comment on *Atmos. Meas. Tech. Discuss.*, doi:10.5194/amt-2019-237, 2019.