

A comparison of precipitable water values from GNSS ground-based, GPS radio occultation and reanalysis above oceanic regions

Y. Burgos Fonseca¹, P. Alexander¹, A. de la Torre², R. Hierro², P. Llamedo², A. Calori³ and T. Schmidt⁴

¹ *Universidad de Buenos Aires, Buenos Aires, Argentina*

² *Universidad Austral, Pilar, Argentina*

³ *Universidad Nacional de Cuyo, Mendoza, Argentina*

⁴ *GFZ German Research Centre for Geosciences, Potsdam, Germany*

Precipitable water (PW) inferred from GPS (Global Positioning System) radio occultation (RO) and ground-based (GB) Global Navigation Satellite System (GNSS) retrievals are compared for years 2007-2014. Previous studies were mainly performed over continental areas, so we now focus over ocean-dominated geographical zones. As RO soundings usually are not able to obtain observations at the lowest heights above the ground, we also assess different methods to complete the lacking data. We found 47 terrestrial stations that lie in islands small and far away from continental areas where the weather might be governed by the sea conditions. From comparisons of almost 5000 collocated samples, PW from RO and GB exhibit a global mean difference around 1 mm, root-mean-square deviation about 5 mm and a correlation above 0.9. The 2007-2014 timeseries and the monthly mean RO and GB PW were also compared to reanalyses per hemisphere, latitude regions and oceans. In each zone it was found that PW from RO, GB and reanalyses all exhibit in general consistent seasonal qualitative behavior. However, quantitative differences exist between reanalyses on one side and RO and GB on the other side. It is shown that PW from reanalyses lacks reliability in areas where the island topography is poorly represented by them. This problem may be clearly extended to continental areas. In addition, we find that RO and GB seem to be more sensitive than reanalyses for the detection of features that depart from the regular annual cycle.