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Refinements of the Inversion Techniques Helpful to Retrieve Atmospheric Parameters from GPS Radio Occultation Data

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The huge amount of GPS Radio Occultation (RO) observations makes feasible a wide variety of experiments in the field of Earth's Observation. Our efforts concern mainly the proposal of alternative methods to retrieve humidity profiles without merging RO data with models as currently performed applying 1DVAR technique. The reconstruction of a new mapping function (MF) based on the atmospheric profiles achieved with RO data is another task of our work. The MF defines indeed the relationship between the thickness of the atmosphere crossed by the GPS signal in function of the elevation angle of the satellite viewed by a ground station.
The Tropospheric Delay (TD) indeed can be expressed in terms of a Zenith component (ZTD) times a slant factor which is provided just by the MF.
Regarding the first topic we have used the CIRA-Q atmospheric dry models to fit the RO bending angles through the stratosphere. The model selected in this way, serves to compute the wet component of the atmosphere through the tropospheric layers subtracting from the observed RO bending angles, the term given the dry CIRA-Q model. This approach has as drawback the unphysical occurrence of negative "humidity". We propose to apply a modulated weighting of the fit residuals just to minimize the effects of the inconvenient. After a proper tuning of the approach, we plan to present the results of the of the validation. Regarding the new MF computed using the RO data we plan to perform its validation working on the repeatability of the coordinates of different GPS ground networks estimated for a time period of one year at least.