



GNSS-RO Tropopause heights and Mapping Function: New Fingerprints for Climate Investigations

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Tropopause is a transition layer between the troposphere and the stratosphere. The exchanges of air mass, water vapor, trace gas and energy between the troposphere and the stratosphere occur through this layer. Accurate and continuous observations of the tropopause heights on a global scale are crucial for monitoring stratosphere-troposphere exchange and understanding the balance of atmospheric tracers in the upper troposphere and lower stratosphere. In our work, we propose to measure tropopause by using bending angles (BA) profiles given by GNSS Radio Occultation (RO). The proposed method fits the BA profiles with the dry Hopfield model. Through the layers in which tropopause is contained, the residuals have an anomalous trend. The plot of residuals in this zone form indeed a positive bump that we will try to exploit just to determine the relevant parameters of the tropopause. We will use the huge amount of data provided by several space missions devoted to RO (COSMIC, METOP, GRACE etc.) for tuning the algorithms, perform a validation of the approach and compare our results with those achieved applying different techniques. Furthermore an analysis of GNSS-RO tropopause behavior on global scale in the period 2006-2010 will be performed in order to detect climate signatures.

Finally with the same GNSS-RO observations we have reconstructed the Mapping Function in the same fashion, commonly applied in geodetic applications.

We deem that the global mapping function built with GNSS-RO and its evolution in time can be a parameter suitable for climate investigations as well