

OPEN-LOOP TRACKING AND WATER VAPOR RETRIEVAL ACCURACY FOR GPS RADIO OCCULTATIONS

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The launch of COSMIC/Formosat-3 constellation represented a major breakthrough in the remote sensing of the atmosphere with the GPS radio occultation technique. Not only has it dramatically increased the spatiotemporal coverage over the existing pseudo-constellation of CHAMP, SAC-C, and GRACE, but it was also designed to acquire the occulting GPS signal through the open-loop (OL) tracking mode from the very beginning. Previous studies have shown that over moist regions, the presence of fine vertical-scale water vapor structures could lead to strong signal dynamics and periods of low signal-to-noise ratios. Data acquired using the traditional closed-loop (CL) tracking mode are therefore prone to introduce errors in the lower troposphere. This has a detrimental effect on the water vapor retrievals, especially in the tropics. In this talk, we will review the implementation of OL tracking on COSMIC and SAC-C and provide an evaluation of its current performance and impact. We will discuss the improvement of water vapor retrievals from OL data over CL data and present an assessment of retrieval accuracy in the lower troposphere, taking into account the expected dry bias due to ducting. Comparisons with nearby radiosonde soundings as well as NCEP and ECMWF operational analyses will be presented.