

Outstanding Issues Concerning GPS RO Measurements in the Lower Troposphere

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The past decade has seen significant advances in the field of GPS Radio Occultation (RO). These include the development and implementation of open-loop tracking and new retrieval techniques that has enabled much more accurate atmospheric retrievals in the lowest few km's of the atmosphere. Despite these improvements, extensive analyses of current RO measurements from COSMIC/FORMOSAT-3 have shown that there still exist serious data quality issues affecting retrievals in the moist tropical lower troposphere. The lower troposphere issues include a strong negative bias below 1-2 km that are concentrated over the stratocumulus regions in the subtropical oceans and a positive bias for tropical occultations with low signal-to-noise ratios that are most evident between 3-4 km. In addition, many tropical occultations exhibit signal amplitude drop in the lowest 2 km that lead to the truncation of the retrieved profiles. As a result, a significant fraction of the retrieved profiles do not reach the lowest ~500 m of the atmosphere. These data issues place serious limitations in the use of RO data in the remote sensing of the planetary boundary layer (PBL) as well as in the assimilation of lower troposphere measurements in weather analyses. In this talk, we will describe our latest efforts in reaching a better understanding of these issues and discuss possible solutions through algorithmic and instrumental enhancements.