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Water vapor and precipitation are two related variables critical to weather and climate forecasting. We report on research exploring connections between the two. GNSS RO’s unique ability to peer into clouds is critical to profiling high concentrations of water vapor in and around areas of precipitation. Furthermore, its very high vertical resolution readily separates the free troposphere from the PBL and reveals distinct regional behavior. We will present comparisons with precipitation estimates including IMERG and TRMM that reveals correlations between high free tropospheric water vapor concentrations and precipitation. This includes how properties of the water vapor and its relationship with precipitation vary with region and season.
This work has also revealed ENSO related signatures that enable identification of an index of the phase and strength of ENSO based on free troposphere column water vapor.
Regarding the accuracy of the water vapor derived from GNSS RO, together with NOAA, we have undertaken a comparison effort with RS41 radiosondes to evaluate the systematic and random uncertainties of GNSS RO water vaper results retrieved via both the 1DVar and Direct retrieval methods. Initial results will be presented from COSMIC-2.
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