A STUDY OF THE REFRACTIVITY BIAS IN OCCULTATION RETRIEVALS USING END-TO-END SIMULATIONS

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It has been shown that the refractivity profiles from GPS/MET have a negative bias with respect to numerical weather prediction models in the lower troposphere. The bias tends to be worse in the moist tropics, suggesting that sharp refractivity structures arising from water vapor distribution are likely to be a main contributing factor. In this presentation, we show that a similar bias exists in the CHAMP and SAC-C data and that the bias depends on the retrieval methods used to process the data. The retrieval methods considered here are the standard (Doppler) method, the backpropagation method, and the canonical transform method. To better understand the underlying causes of the refractivity bias, we employ end-to-end simulations which include full-wave propagation effects on the signal as well as realistic simulation of receiver tracking errors and thermal noise. Our results show that, even under the ideal condition of spherical symmetry and perfect signal recovery, the retrievals obtained with the aforementioned methods could still result in a negative refractivity bias in the last few kilometers above the surface. The effects of receiver tracking errors on the bias are also evaluated.