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It is known that GPS RO represents the vertical atmospheric structure with resolution better than many other remote sensing methods. Inversion of GPS RO data in geometric optics (GO) approximation allows the Fresnel resolution (~0.5-1.5 km) while wave optics (WO) methods allow the sub-Fresnel resolution (~0.1 km). However, these resolutions may be achieved under the assumption of local spherical symmetry or, at least, significant anisotropy of the atmospheric structures. On average, this assumption applies better for large-scale than for small-scale structures. Also, RO data are affected by observational noise (including the small-scale ionospheric residuals) which additionally degrades representation of the small-scale atmospheric structures. In previous studies of gravity waves, Tsuda et al. [2011] applied the WO inversions up to 30 km by reporting results better than with GO. In this study, by we attempted to answer a general question: down to what scale the GPS RO realistically represents the vertical atmospheric structure in the UTLS. For this purpose, we compared temperatures retrieved by WO from GPS RO with those from high resolution radiosondes, by testing different approaches for the ionospheric correction (including the use of L2C). By applying the high-pass filtering and calculating the cross-correlation functions, we found that the smallest cut-off vertical scale, which results in the correlation coefficient of 0.5 for some occultations, is about 0.5 km. This can be considered as the practical (representative) resolution of the GPS RO in the UTLS.
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