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This study investigates the 3-dimensional structures of tropical nonmigrating tides from the surface to 35 km as well as their seasonal variations using one-year (October 2019 – September 2020) GNSS radio occultation (RO) measurements obtained from the COSMIC-2 (C2 hereafter) mission. C2 mission is a constellation of six satellites launched on 25 June 2019, which provides ~ 5,000 ROs per day between □ 40 degrees latitudes with full coverage in the local time and space. Such coverage is actually required to separate the migrating and nonmigrating tides, which cannot be satisfied by ground-based measurements or sun-synchronous satellite observations. The resolved nonmigrating tides exhibit a strong geophysical distribution, with the strongest amplitudes over two major continents, Africa and South America, and a notable strength over the Maritime Continent. Such distribution is consistent with the diurnal variation in diabatic heating. Nonmigrating tides propagate upward with exponentially increased amplitudes, and their phase planes tilt westward and eastward on the western and eastern sides of the sources respectively, which is consistent with the horizontal propagation characteristics of internal gravity waves. Our results show that the dominant nonmigrating components in the stratosphere are DE3, DW5, D0 and DW2 (conventionally DW(E)k stands for a westward/eastward propagating diurnal tide with a zonal wave number k; D0 denotes a diurnal standing oscillation), and these components present obviously different seasonal and latitudinal variations, and different propagating patterns.
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