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Oral
Radio occultation (RO) is a powerful tool for remotely sensing the atmosphere, producing globally distributed soundings with high vertical resolution and high temperature retrieval accuracy, especially in the stratosphere. The spatial distribution of the soundings typically prevents the use of these measurements for studying atmospheric effects with small horizontal or temporal scales. However, careful arrangement of a dedicated RO constellation can yield sounding clusters useful for the tomographic reconstruction of internal gravity waves with horizontal wavelengths in the tens of kilometers. This paper presents occultation cluster quality metrics predictive of internal gravity wave tomographic reconstruction error and uses these metrics to compare the performance of two alternative RO constellation geometries, mutual orbit groups (MOG) and a spread in right ascension of the ascending node (RAAN). MOG constellations have better overall performance and yield more consistent cluster quality across all sampled latitudes, while RAAN-spread constellations have improved equatorial quality and a trend toward reduced quality at the edges of the latitude range. Additionally, analysis of clusters by latitude, ray azimuth, and quality is performed in order to examine the trends in the outlier best- and worst-performing clusters for each constellation type. Because RAAN-spread constellations place far less demand on satellite propulsion that do MOG constellations and still obtain high quality RO sounding clusters in the tropics, the RAAN-spread constellations are practically well suited to studies of internal gravity wave emission from tropical deep convection and other potential RO tomographic studies of atmospheric processes relevant to tropical atmospheric dynamics.
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