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Global distribution of atmospheric waves in the equatorial upper troposphere and lower stratosphere: COSMIC observations of wave mean flow interactions

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Temperature profiles derived from Constellation Observing System for Meteorology, Ionosphere and Climate Global Positioning System Radio Occultation (COSMIC GPS-RO) satellite constellation data are used to study equatorial gravity wave potential energy associated with waves having vertical wavelengths of less than 7 km and their interaction with the background quasi-biennial oscillation (QBO) wind. The data are binned into grids of size 20º in longitude and 5º in latitude. Results show evidence of vertically propagating convectively generated gravity waves interacting with the background mean flow. Enhancements in potential energy around the descending 0 m/s QBO eastward shear phase line are observed. Equatorially trapped Kelvin waves and Mixed Rossby Gravity Waves with zonal wave numbers s <= 9 are obtained by bandpass filtering wave number-frequency temperature spectra. Their temporal, spatial and vertical structures, propagation and wave-mean flow interactions are examined with respect to the background mean flow. Equatorial waves observed by COSMIC are compared with those seen in OLR data, with differences discussed.