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Coordinated Observations of Migrating Tides by Multiple Meteor Radars in the Equatorial Mesosphere and Lower Thermosphere

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We present the migrating tidal winds decomposed jointly from multiple meteor radars in four longitudinal sectors situated in the equatorial mesosphere and lower thermosphere. The radars are located in Cariri, Brazil (7.4°S, 36.5°W), Kototabang, Indonesia (0.2°S, 100.3°E), Ascension Island, United Kingdom (7.9° S, 14.4°W), and Darwin, Australia (12.3°S, 130.8°E). Harmonic analysis was used to obtain amplitudes and phases for diurnal and semidiurnal solar migrating tides between 82 and 98 km altitude during the period 2005–2008. To verify the reliability of the tidal components calculated by the four meteor radar wind measurements, we also present a similar analysis for the Whole Atmosphere Community Climate Model winds, which suggests that the migrating tides are well observed by the four different radars. The tides include the important tidal components of diurnal westward-propagating zonal wavenumber 1 and semidiurnal westward-propagating zonal wavenumber 2. In addition, the results based on observations were compared with the Climatological Tidal Model of the Thermosphere (CTMT). In general, in terms of climatic features, our results for the major components of migrating tides are qualitatively consistent with the CTMT models derived from satellite data. In addition, the tidal amplitudes are unusually stronger in January–February 2006. This result is probably because tides were enhanced by the 2006 Northern Hemisphere stratospheric sudden warming event.