0.1 Gravity wave statistics at 23˚ S from lidar and meteor radar measurements

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We use lidar and meteor radar measurements to study gravity wave statistics in the 80-100 km height range at 23˚ S. The lidar measurements were made using a sodium lidar located at São José do Campos (23.2˚ S, 45.8˚ W) and the meteor radar measurements were made using a Skiymet radar installed at Cachoeira Paulista (22.7˚ S, 45.0˚ W). The meteor radar measures horizontal winds and the lidar measures the time-varying vertical distribution of sodium concentration, from which the fluctuating component of the atmospheric density is determined. Other gravity wave parameters are then derived via the known theoretical relationships between them. The lidar measurements indicate average rms horizontal winds of about 25 m/s at 90 km, and the meteor radar results show values around 30 m/s for the zonal perturbations and 40 m/s for the meridional. Although both lidar and meteor radar measurements indicate strong dissipation, the former give vertical growth lengths of about 40 km whereas for the latter they are in the region of 60 km for the meridional component and 85 km for the zonal. Both types of measurement indicate a predominantly semi-annual variation in gravity wave activity, with maxima at the equinoxes. Attempts to determine the gravity-wave related fluctuating vertical velocities and momentum fluxes from the meteor radar measurements do not appear to give reasonable results.