



Multi-year observations of gravity waves in the MLT region from an all-sky meteor radar chain

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Gravity waves in the mesosphere and lower thermosphere are investigated from wind observations of a meteor radar chain on the basis of Hocking analysis method. The meteor radar chain includes four stations at the middle and low latitudes in the Northern Hemisphere: Mohe (MH, 52.5°N, 122.3°E), Beijing (BJ, 40.3°N, 116.2°E), Wuhan (WH, 30.5°N, 114.6°E), and Sanya (SY, 18.3°N, 109.6°E). This study presents the first observation of GW momentum flux and variances during 2009-2015 obtained from this new meteor radar chain in China. Distributions of momentum flux for multi-years illustrate obvious inter-annual variations. Lomb-Scargle spectral analysis of GW momentum fluxes and variances have been presented. The temporal variations of GWs in the Northern Hemisphere are depending on latitudes, altitudes, and components. We analyze the coupling relationship between gravity waves and wind. The propagation directions of GW momentum fluxes and background winds are opposite in some months. The maxima of zonal variances accompany the evolution of zero zonal wind contour. From the results, we can infer that the inter-annual, annual, and intra-annual variations of GWs in MLT regions are very complex. And the distributions of GWs in the Northern Hemisphere are depending on latitudes, altitudes, and components. Besides, the distributions are influenced by background winds and other factors in the propagation. More observations from meteor radar and other techniques are needed for further research.

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