

Tidal modulation of mesospheric gravity waves observed with MF radar at Poker Flat, and Tromsø

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The neutral wind velocity data from mesosphere to lower thermosphere observed by MF radars at Poker Flat in Alaska and at Tromsø in Norway has been observed since the late 1990s. The present study examines the relation between short-period mesospheric gravity wave activities and the background state including diurnal and semidiurnal tides using these MF radars' data for 10 years of 1999~2008.

Observed wind velocities having the 1~4 hour period components are analyzed as short-period gravity waves and those having harmonic components with periods of 48, 24, 12, and 8 hours are calculated every 30 minutes. The previous study in IUGG2015 showed that the maximum of GW-KE occurs at Poker Flat when zonal wind is easterly from November to December and zonal wind transitions from easterly to westerly from January to February and from May to August from climatological 1-day composite plots of 12 hour components of zonal wind and GW-KE. The results of Tromsø showed that the maximum of GW-KE occurs at local time when zonal wind is westerly from November to February and easterly from May to September. Next, considering the physical mechanisms under these relations, we confirmed that these relations can be explained by the critical level filtering of gravity waves except for summer cases at Poker Flat. We plan to investigate the summer relation at Poker Flat in more detail and discuss another physical mechanism.

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