Short-period tidal oscillations in the winter mesopause regionover Syowa (69S, 39E), Antarctica

Masaki Tsutsumi[1], Takuya Kawahara[2], Takehiko Aso[3], Tsukasa Kitahara[2], Fumitoshi Kobayashi[2], Akio Nomura[2]

[1] NIPR, [2] Faculty of Eng., Shinshu Univ., [3] AERC, NIPR

Simultaneous MF radar and sodium temperature lidar observations were made during three austral winters in 2000-2002 over Syowa (69S, 39E) station, Antarctica. Wind velocities from 60 to 110 km were measured with the MF radar by combining a conventional correlation technique (mostly below 90 km) and a meteor wind technique (above 90 km). Absolute temperature values from 85 to 105 km were obtained with the lidar.

Each one-night temperature data was often dominated by a downward phase propagating wave structure with a typical wave period and vertical wave length of 6-8 hours and 20-30 km, respectively. Similar wave structure was also seen in the wind field above 90 km,where even semidiurnal and diurnal tides showed rather small amplitudes unlike in non-winter months.There is also a tendency that the wave phase was locked to the local time. These observational evidences suggest that short period tidal waves are largely responsible for the observed structure.

Comprehensive study of short period tidal waves in high latitudes has been rare so far except for some pioneering airglow based observations [Sivjee and Walterscheid, 1994; Oznovich et al., 1997; Walterscheid and Sivjee, 2001]. The short vertical wave length found in the present study is not expected by the airglow studies and therefore striking. A theoretical examination of the observed vertical structure is to be tried.

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