R005-34
B 会場 ：11/5　 PM2 （15:45-18:15）
16:00～16:15

トロムソ Na ライダーデータによる北極域 MLT 領域 8 時間と 6 時間大気波動の研究

#野澤　悟徳 [1], 森川　千秋 [1], 津田　卓雄 [2], 川原　琢也 [3], 斎藤　徳人 [4], 和田　智之 [4], 川端　哲也 [1]
([1] 名大・宇地研,([2] 電通大,([3] 信州大学,([4] 理化学研究所

A study of 8 hr and 6 hr atmospheric waves in the polar MLT region above Tromsoe

#Satonori Nozawa[1), Chiaki Morikawa[1), Takuo Tsuda[2), Takuya Kawahara[3), Norihito Saito[4), Satoshi Wada[4), Tetsuya Kawabata[1)
([1]ISEE, Nagoya Univ.,([2]UEC,([3]Shinshu Univ.,([4]RIKEN,

We have investigated characteristics of 8 hr and 6 hr atmospheric waves in the polar upper mesosphere and lower thermosphere (MLT) from 80 to 110 km above Tromsoe, Norway (69.6 deg N, 19.2 deg E). Aims of this study are to reveal (1) relative importance of 8 hr and 6 hr waves to a 12 hr wave (probably, semidiurnal tide) in the wind dynamics and the thermal structure, (2) vertical structures (wavelengths) of the 8 hr and 6 hr waves, and (3) importance of the 8 hr and 6 hr waves on the convective and dynamic instabilities in the polar MLT region.

Short periodic tidal waves are less known than diurnal and semidiurnal tidal waves even though an amplitude of the 8 hr tide sometimes becomes comparable to that of diurnal tidal wave in the polar MLT region [Thayaparan, 1997; Younger et al., 2002]. Solar heating, and nonlinear interactions between the diurnal and semidiurnal tides are thought to generate the 8 hour tide [Thayaparan, 1997; Akmaev, 2001; Younger et al., 2002; Moudden et al., 2013]. A modeling study by Smith [2001] showed the solar heating was a dominant source of generation of the 8 hr tide at high latitudes. Pancheva et al. [2021] using meteor radar wind data (1 hr/2 km resolutions) at Tromsoe reported that the vertical wavelength of the 8 hr tide in November shows the longest among months, and is larger than 100 km.

By using the Lomb-Scargle method, we have derived 12 hr, 8 hr, and 6 hr components using wind (110 nights) and temperature (192 nights) data obtained by the sodium LIDAR at Tromsoe. Data with their data length longer than 16 hours are used here, and only data whose normalized amplitudes being larger than 99% significance level are used. Maximum amplitudes of the 8 hr wave ranges from 14 (9) m/s to 128 (156) m/s with an average of 44 (47) m/s in the northward (eastward) wind data for 110 (110) nights, and ranges from 4 K to 33 K with an averaged of 12 K in the temperature data for 162 nights. The 6 hr component has amplitudes from 11 (12) m/s to 153 (93) m/s with an average of 43 (41) m/s in the norward (eastward) wind data for 104 (105) nights. In the temperature data, it ranges from 4 K to 29 K with an average of 13 K for 178 nights. It is found that both the 8 hr and 6 hr components have usually smaller amplitudes than the 12 hr component in the wind data, while they are comparable to those of 12 hr in the temperature data.

In the talk of Nozawa et al. in JpGU2022, we reported the relative importance of the 8 hr and 6 hr waves to the 12 hr wave, so this talk will focus on results of the latter two aims: we will report vertical structures (wavelength) of the 8 hr and 6 hr waves between 80 and 110 km, and their importance on the convective and dynamic instabilities in the polar MLT region.

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