Changes of temperature and semidiurnal tide in the polar lower thermosphere and upper mesosphere related to Sudden Stratospheric Warmings above Tromsø, Norway

Satonori Nozawa[1], Yasunobu Ogawa[2], Takuo T. Tsuda[3], Hitoshi Fujiwara[4], Masaki Tsutsumi[2], Yasunobu Miyoshi[5], Chris Hall[6], Stephan Buchert[7], Norihito Saito[8], Satoshi Wada[8], Takuya Kawahara[9], Toru Takahashi[2], Tetsuya Kawabata[1], Asgeir Brekke[6]

[1]ISEE, Nagoya University, Nagoya, Japan
[2]NIPR, Tachikawa, Japan
[3]The University of Electro-Communications, Chofu, Japan
[4]Seikei University, Musashino, Japan
[5]Kyushu University, Fukuoka, Japan
[6]UiT The Arctic University of Norway, Tromsø, Norway
[7]Swedish Institute of Space Physics, Uppsala, Sweden
[8]RIKEN, Wako, Japan
[9]Shinshu University, Nagano, Japan

We have made a long run of the EISCAT UHF radar at Tromsø (69.6°N, 19.2°E) and the EISCAT Svalbard radar at Longyearbyen (78.2°N, 16.0°E) from 23 UT on February 10 to 20 UT on February 12, 2016 connecting to an EISCAT ip2 run made from 08 UT on February 5 to 23 UT on February 10. We have succeeded in obtaining 7.5 day length of EISCAT radar data with a gap occurring from about 01 to 07 UT on February 7 at Tromsø. Sodium LIDAR observations collocated at the Tromsø site were also made together with (continual) meteor and MF radar wind observations in the upper mesosphere.

Minor Sudden Stratospheric Warmings (SSWs) occurred probably on February 1 and 9, 2016, just before and during the EISCAT observations. Thus, we have analyzed the campaign datasets to investigate changes in the polar lower thermosphere and upper mesosphere. Nocturnal mean temperature showed cooling around a SSW peak occurring on February 1, and the semidiurnal tidal amplitude was reduced around a SSW peak in the polar upper mesosphere. We have compared these results with those of other SSWs occurring January 2012 and 2015. The weakened amplitude of the semidiurnal tide seems a common feature above Tromsø around the SSW peaks. To investigate possible causes of these changes, we have investigated GAIA (Ground-to-topside model of Atmosphere and Ionosphere for Aeronomy) predictions.

Key words: SSW, Tromsoe, wind, temperature, EISCAT