

Temperature variations in the D- and E-region polar ionosphere during stratospheric sudden Warming

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We analyzed ion temperature and velocity observed by the European Incoherent Scatter (EISCAT) UHF radar at Tromsø (69.6 deg N, 19.2 deg E) during a stratospheric sudden warming (SSW) that occurred in January-February, 2017. The zonal ion velocities at 85-100 km height reversed approximately 8 days earlier than the zonal wind reversal in the upper stratosphere and the ion temperature at 85-95 km decreased simultaneously with the zonal ion velocity reversal at the same altitude. We found that the time variations of ion temperature in the daytime are close to those of neutral temperature derived from the ambipolar diffusion coefficients obtained with the Nippon/Norway Tromsø Meteor Radar (NTMR) data at the same altitude even when geomagnetic activity is moderate. This suggests that the D- and lower E-region ion temperature in the daytime is a good proxy for neutral temperature at the same altitude. We will explain the reliable ion temperature derivation in the D-region and its limitation, and also discuss relationship between ion temperature and vertical ion velocity variations at 85-95 km measured with the EISCAT UHF radar.

Keywords: polar ionosphere, EISCAT, D-region ionosphere