

Ion temperature and velocity 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. Ion temperature at 85-95 km decreased simultaneously with the zonal ion velocity reversal at the same altitude, and vertical ion velocity changes of about ± 2 m/s were also seen from ~ 8 days before the SSW onset. Downward propagation speed of the vertical ion velocity variation was ~ 0.01 m/s, as well as that of ion temperature variation. We also found that the ion temperature variations in the daytime were close to those of ambipolar diffusion coefficients derived from the the Nippon/Norway Tromsø Meteor Radar (NTMR) data at the same altitude even when geomagnetic activity is moderate. We will discuss energy and momentum exchanges between ions and neutrals at 85-95 km based on the observational results during SSW.