

Study of quiet-time high-latitude thermospheric winds using a Fabry-Perot interferometer at Tromsø: Averages and exceptional events

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In the previous reports, we studied the dependences of average winds on Kp and F10.7 indices by using a Fabry-Perot interferometer (FPI) at Tromsø, Norway. In this study, we have further focused on the winds during both globally (Kp < 1+) and locally quiet times in order to provide a baseline wind without magnetic disturbances at latitude of Tromsø. The wind variations were measured from the Doppler shift of both red-line (630.0 nm, altitudes: 200-300 km, upper thermosphere) and green-line (557.7 nm, altitudes: 90-100 km, mesopause region) emissions with a time resolution of ~13 min. The wind data were collected from 2009 to 2015. In the upper thermosphere, the quiet-time average zonal wind shows westward acceleration at pre-midnight side at ~21-24 LT, while the meridional wind has a minimum around the midnight. In the mesopause region, the average wind tends to show a westward and eastward flow at dusk and dawn side, respectively. By applying sinusoidal regression to the mesospheric average zonal wind, we found that the semidiurnal component has a dominant amplitude of 12.1 m/s. During quiet time, we also found a few exceptional events of more than 100 m/s westward at dusk side in the upper thermosphere. We speculate these exceptional westward winds are related to local plasma convection under quiet time or substorm activities occurred at some other latitudes/local times.

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