

Mid-latitude thermospheric wind changes during the St. Patrick' s Day storm of 2015 observed by two Fabry-Perot interferometers in China

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In this work, we utilize thermospheric wind observations by the Fabry-Perot interferometers (FPI) from the Kelan (KL) station (38.7°N, 111.6°E, Magnetic Latitude: 28.9°N) and the Xinglong (XL) station (40.2°N, 117.4°E, Magnetic Latitude: 30.5°N) in central China during the St. Patrick' s Day storm (from Mar. 17 to Mar. 19) of 2015 to analyze thermospheric wind disturbances and compare observations with the Horizontal Wind Model 2007 (HWM07). The results reveal that the wind measurements at KL show very similar trends to those at XL. Large enhancements are seen in both the westward and equatorward winds after the severe geomagnetic storm occurred. The westward wind speed increased to a peak value of 75 m/s and the equatorward wind enhanced to a peak value of over 100 m/s. There also exist obvious poleward disturbances in the meridional winds during Mar. 17 to Mar. 19. According to the comparison with HWM07, there exist evident wind speed and temporal differences between FPI-winds and the model outputs in this severe geomagnetic storm. The discrepancies between the observations and HWM07 imply that the empirical model should be used carefully in wind disturbance forecast during large geomagnetic storms and more investigations between measurements and numerical models are necessary in future studies.

Keywords: Mid-latitude thermospheric wind disturbances, Geomagnetic storm, Fabry-Perot interferometer