

Supplement of

Observations of traveling ionospheric disturbances driven by gravity waves from sources in the upper and lower atmosphere

Paul Prikryl et al.

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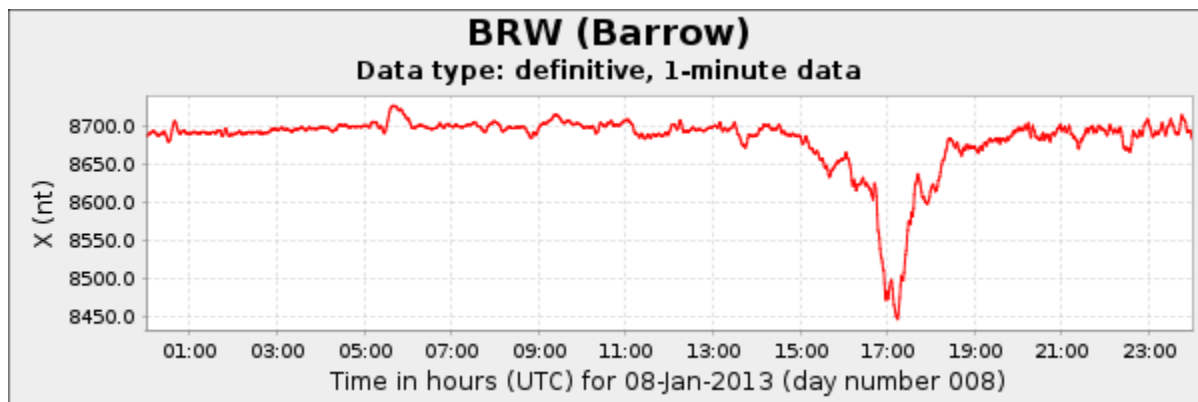


Figure S1. The north-south X -component observed by the magnetometer in Barrow (<https://img-data.bgs.ac.uk/GIN/>) indicating westward electrojet.

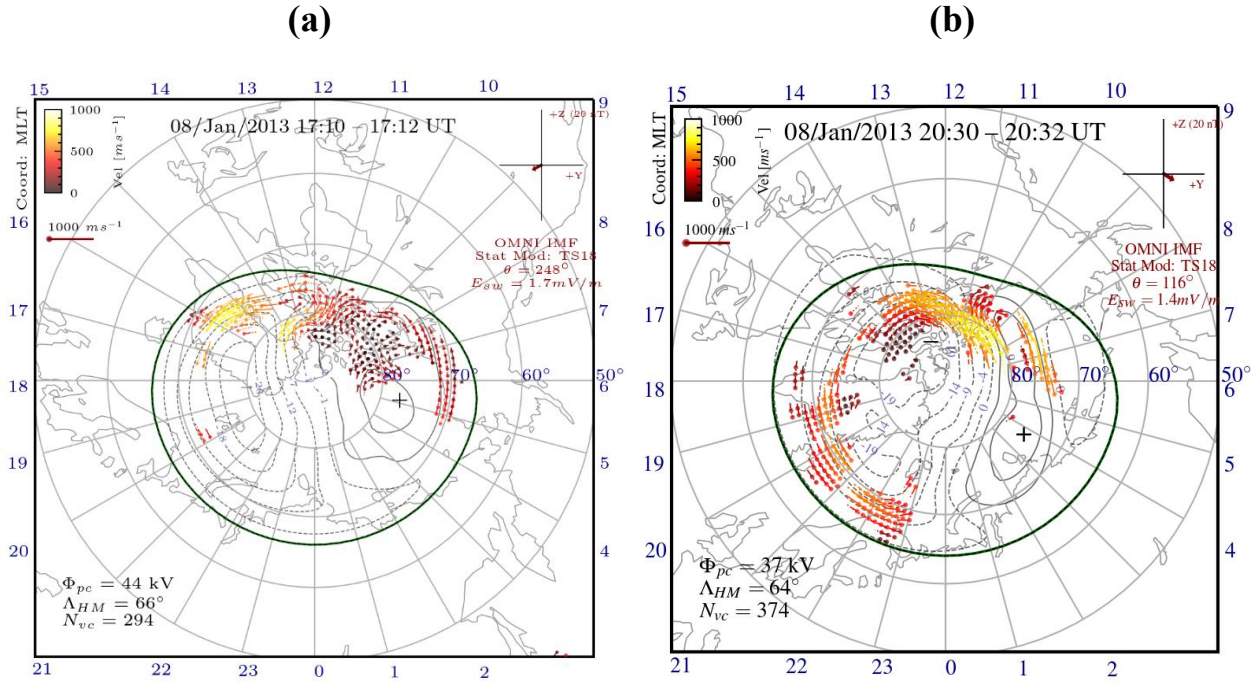


Figure S2. The SuperDARN ionospheric convection maps for the IMF pointing (a) downward ($B_y < 0$) and (b) duskward ($B_y > 0$).

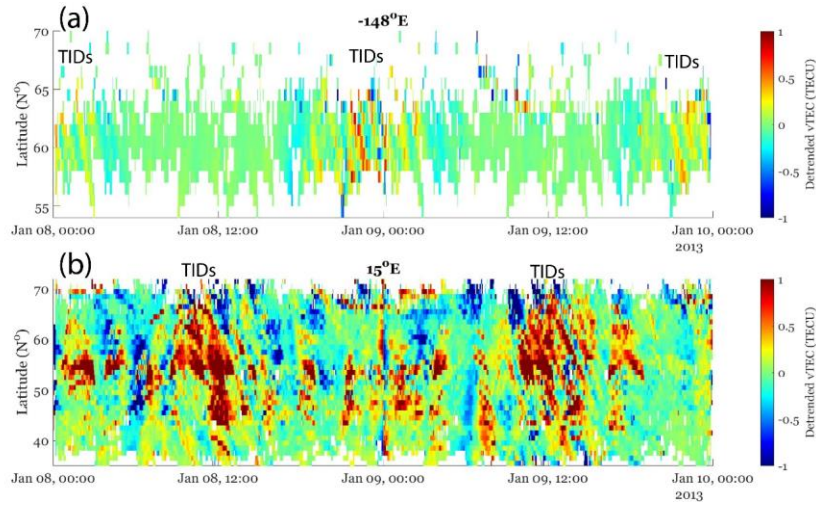


Figure S3. The detrended GNSS vTEC mapped at latitude bins along the longitudes (a) -148° and (b) 15° .

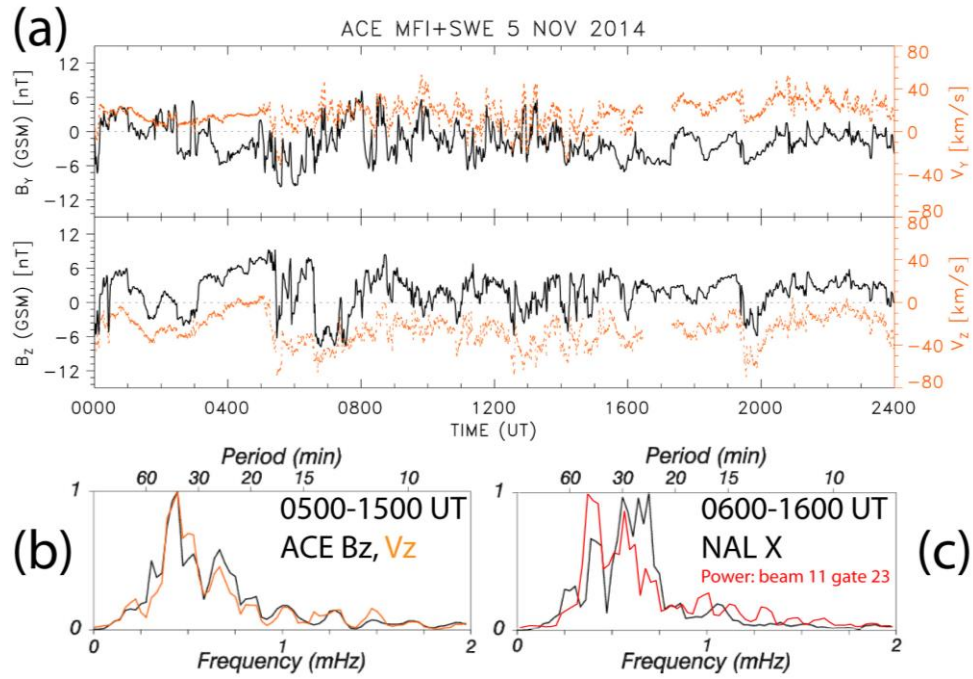


Figure S4: (a) The components of the magnetic field and solar wind velocity observed by ACE, (b) the FFT spectrum of the detrended time series of IMF B_z and solar velocity V_z , and (c) the FFT spectrum of the time series of the X-component of ground magnetic field perturbations in Ny Ålesund (NAL) and the Hankasalmi radar ground scatter power (beam 11, gate 23, slant range 1215 km; 06:50-16:50 UT).

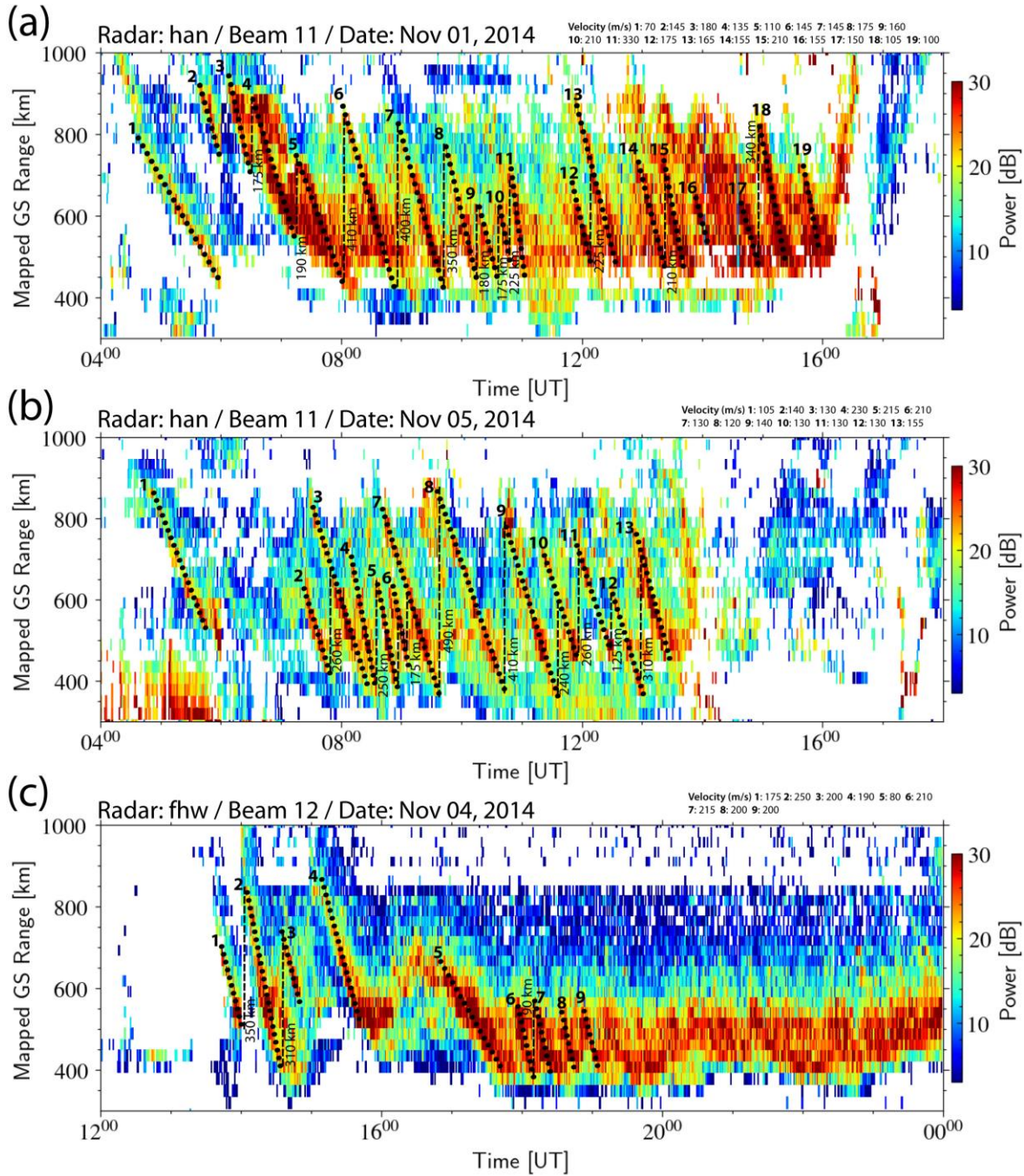


Figure S5: The mapped ground scatter power for the Hankasalmi radar on **(a)** November 1, **(b)** November 5, and for the Fort Hays West radar on **(c)** November 4, 2014, with estimates of TIDs wavelengths and phase velocities to support Figs 5, 6 and 8.

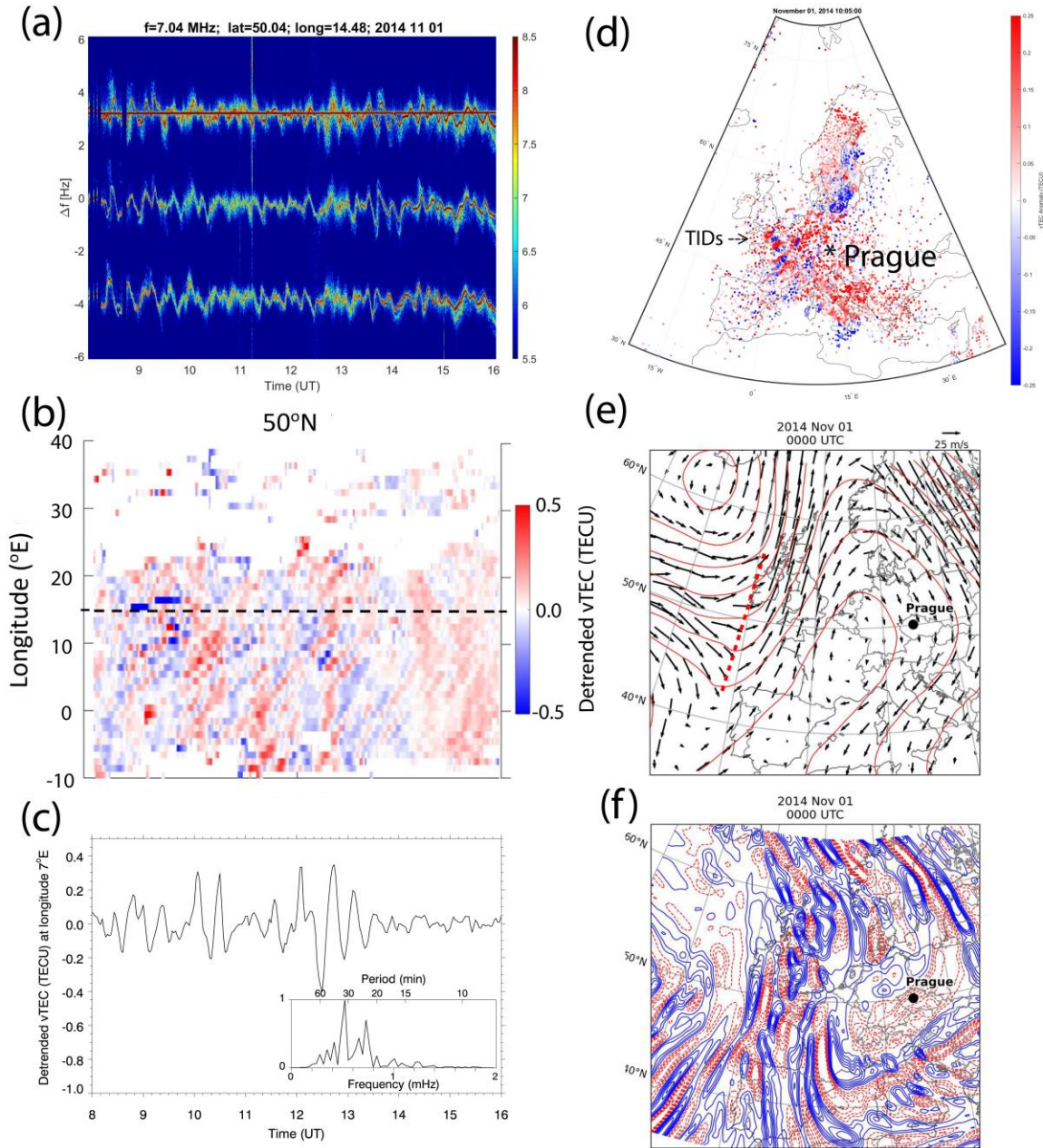


Figure S6. (a) The Doppler shift spectrogram recorded at frequency 7.04 MHz, (b) the detrended vTEC mapped along latitude of 50°N , (c) a time series of detrended vTEC at longitude of 7°E along with a normalized FFT spectrum, (d) a detrended vTEC map, and (e) the ERA5 300-hPa geopotential height (red contours at intervals of 100 m), approximate axis of inflection (red dashed line), and wind vectors (m/s) at 300-hPa level, and (f) the ERA5 divergence (positive in solid blue line) of the horizontal wind at 150-hPa level, on November 1, 2014.

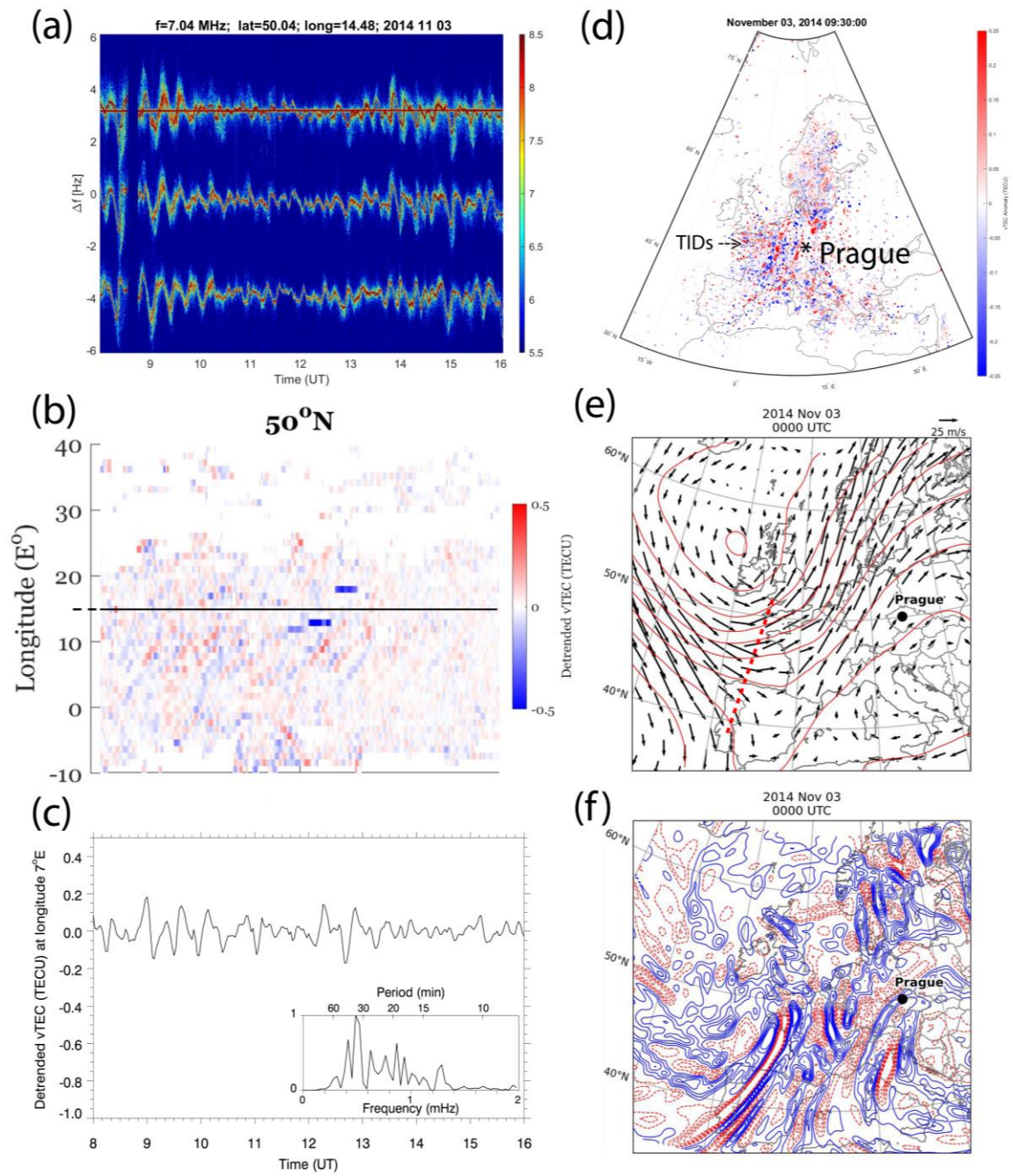


Figure S7. The same as Figure SF7, but for November 3, 2014.

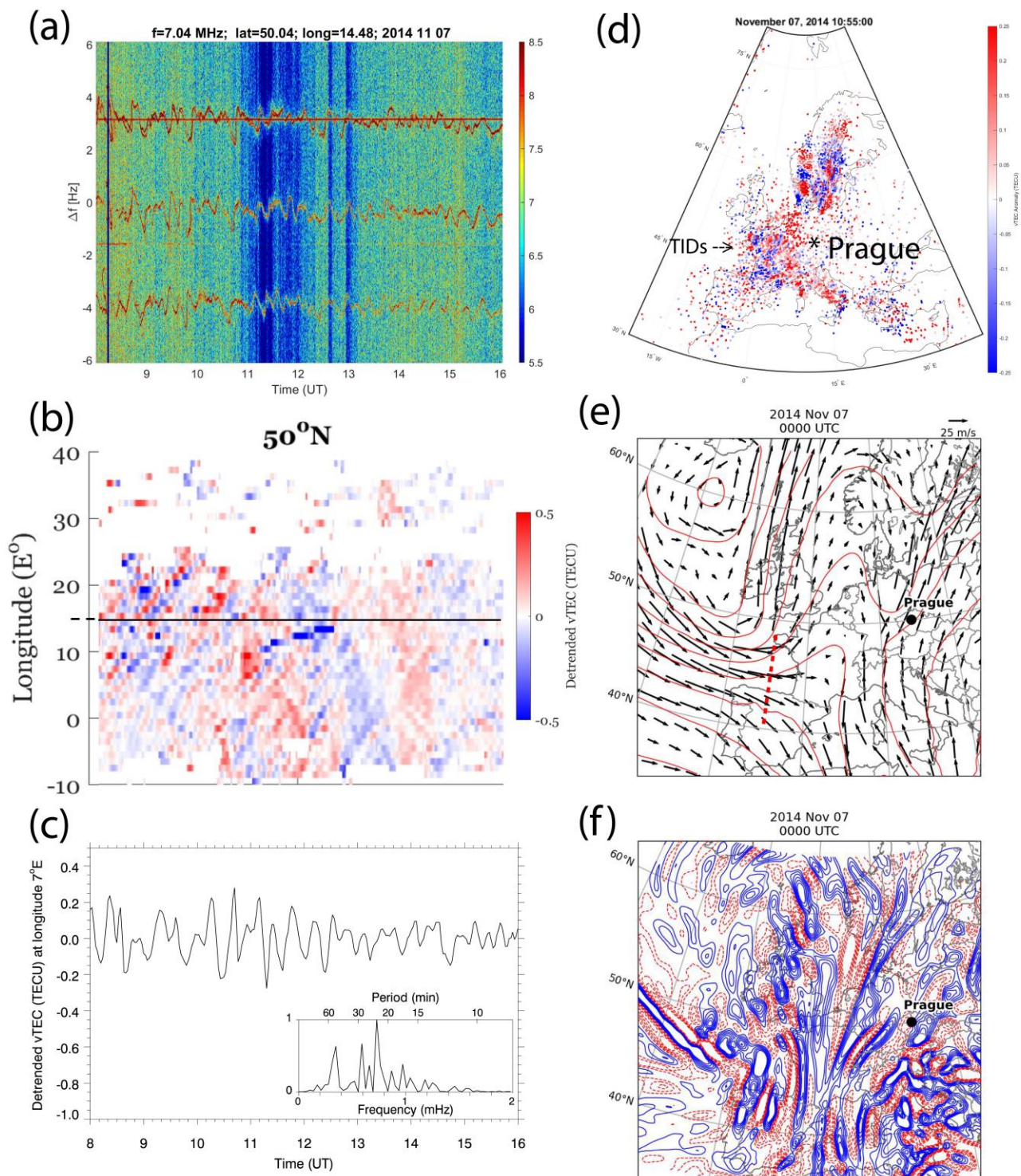


Figure S8. The same as Figure SF7, but for November 7, 2014.

Table S1. The 2-D and 3-D propagation analysis of the HF Doppler sounders data

Date and time	v_{ha} (m/s)	Azimuth ($^{\circ}$)	f_o (MHz)
2014/11/01 09:00-10:15 UT	156 ± 21	89 ± 6	4.65
2014/11/01 09:00-10:15 UT	142 ± 8	103 ± 7	7.04
2014/11/03 08:30-09:30 UT	175 ± 6	118 ± 10	7.04
2014/11/05 10:00-11:15 UT	160 ± 15	105 ± 10	3D analysis
2014/11/07 08:00-10:00 UT	140 ± 10	105 ± 10	7.04
2014/11/08 10:00-11:00 UT	122 ± 5	144 ± 2	4.65
2014/11/08 10:00-11:00 UT	110 ± 15	106 ± 3	7.04
2014/11/08 14:00-15:30 UT	190 ± 10	135 ± 5	3D analysis

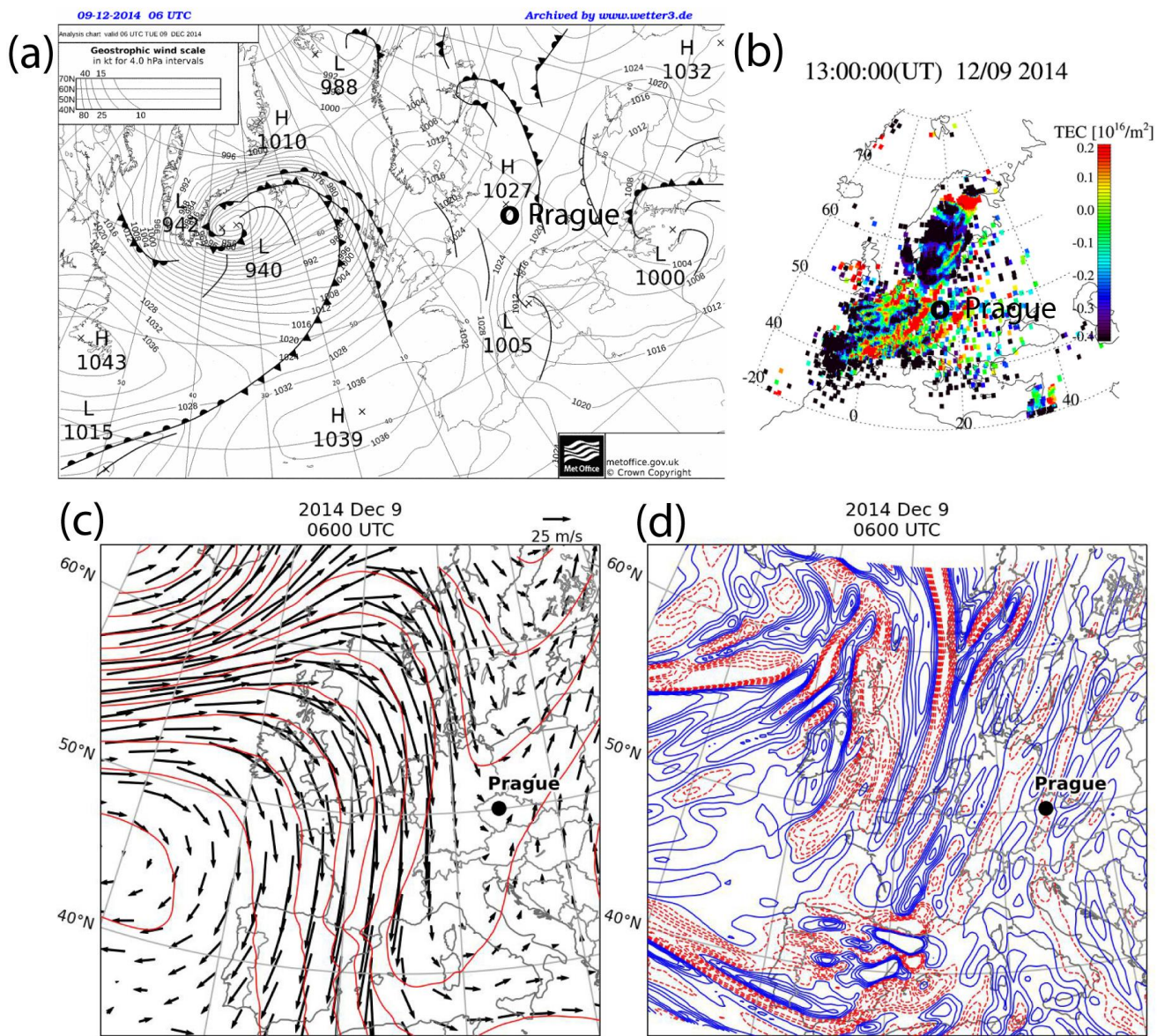
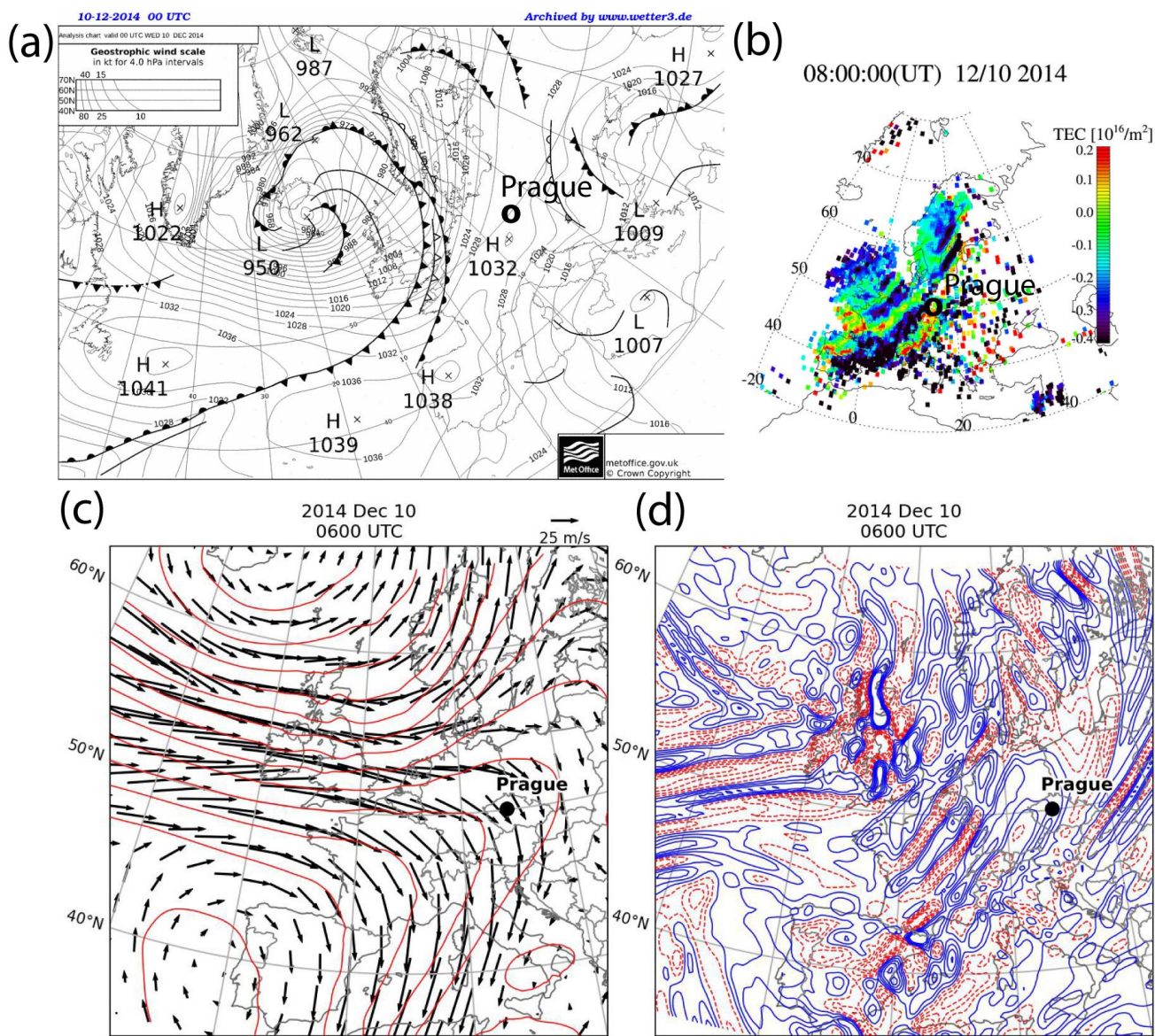


Figure S9. (a) Low-pressure system deepening over the North-east Atlantic, shown in the surface pressure analysis charts (https://www.wetter3.de/archiv_ukmet_dt.html), (b) the detrended TEC map (<https://aer-nc-web.nict.go.jp/GPS/EUROPE/MAP/#2014>) showing southeastward propagating TIDs, (c) the ERA5 300-hPa geopotential height (red contours at intervals of 100 m), approximate axis of inflection (red dashed line), and wind vectors (m/s) at 300-hPa level, and (d) the ERA5 divergence (positive in solid blue line) of the horizontal wind at 150-hPa level, on December 9, 2014.



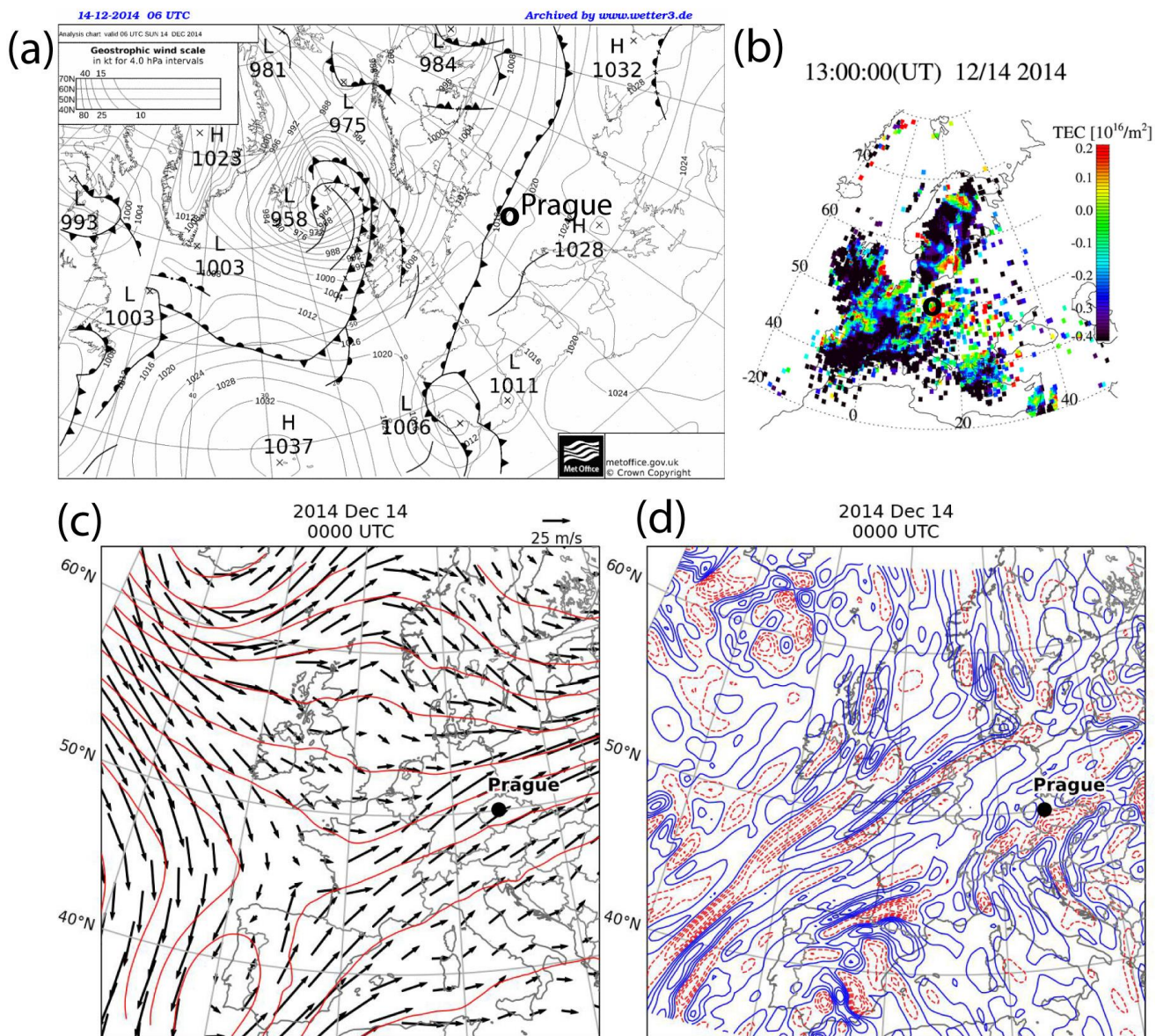


Figure S11. The same as Figure SF9, but for December 14, 2014.

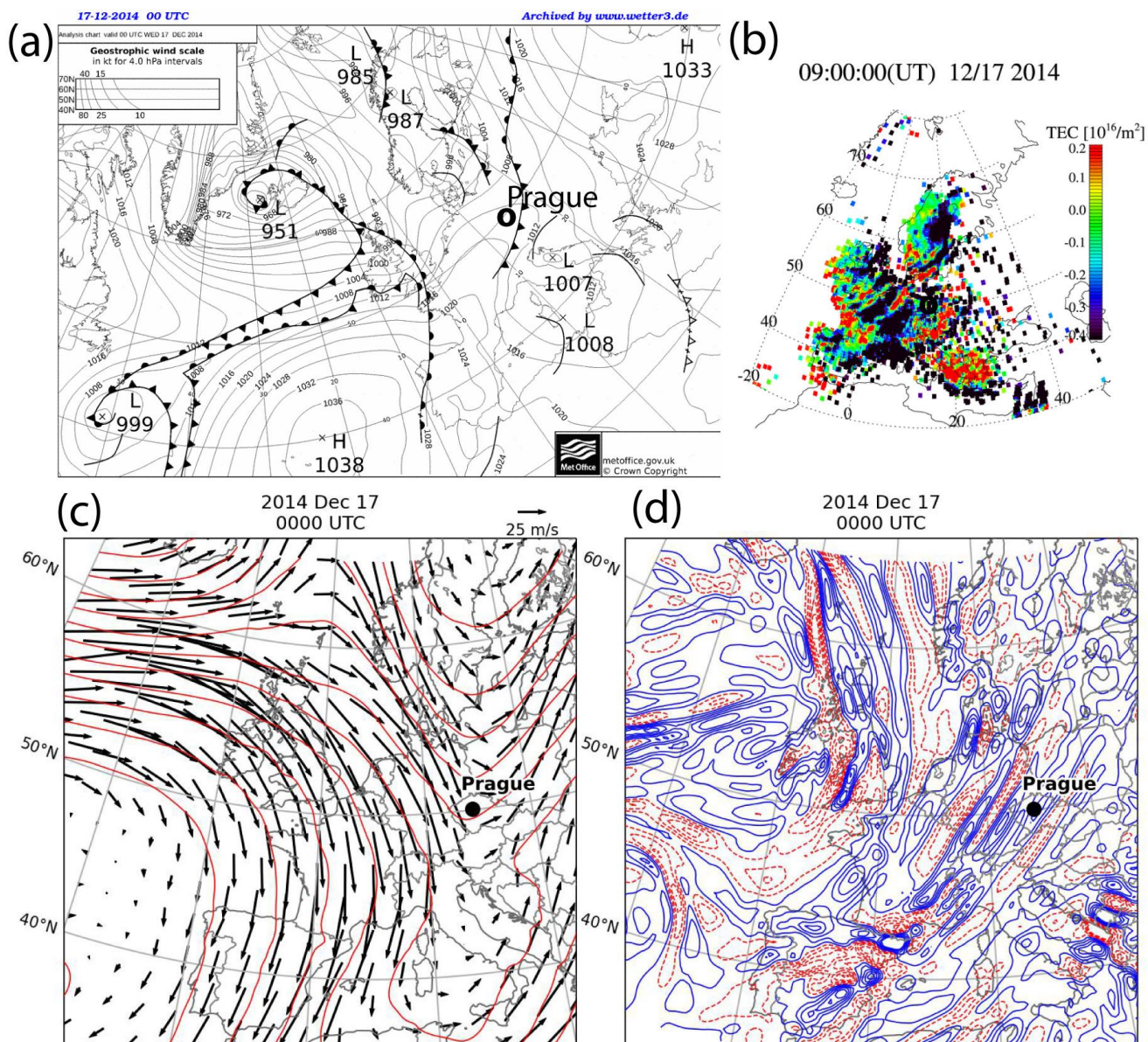


Figure S12. The same as Figure SF9, but for December 17, 2014.

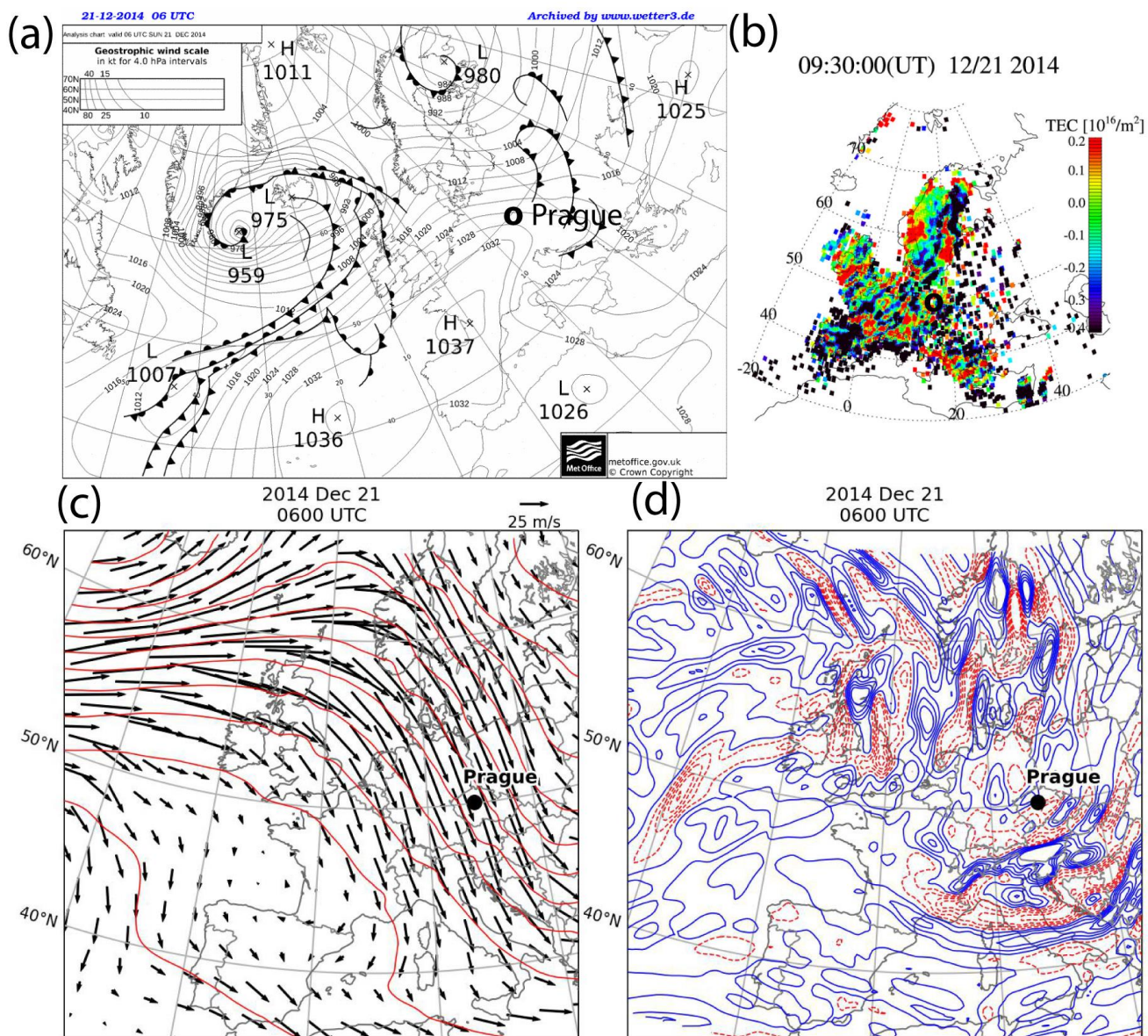


Figure S13. The same as Figure SF9, but for December 21, 2014.

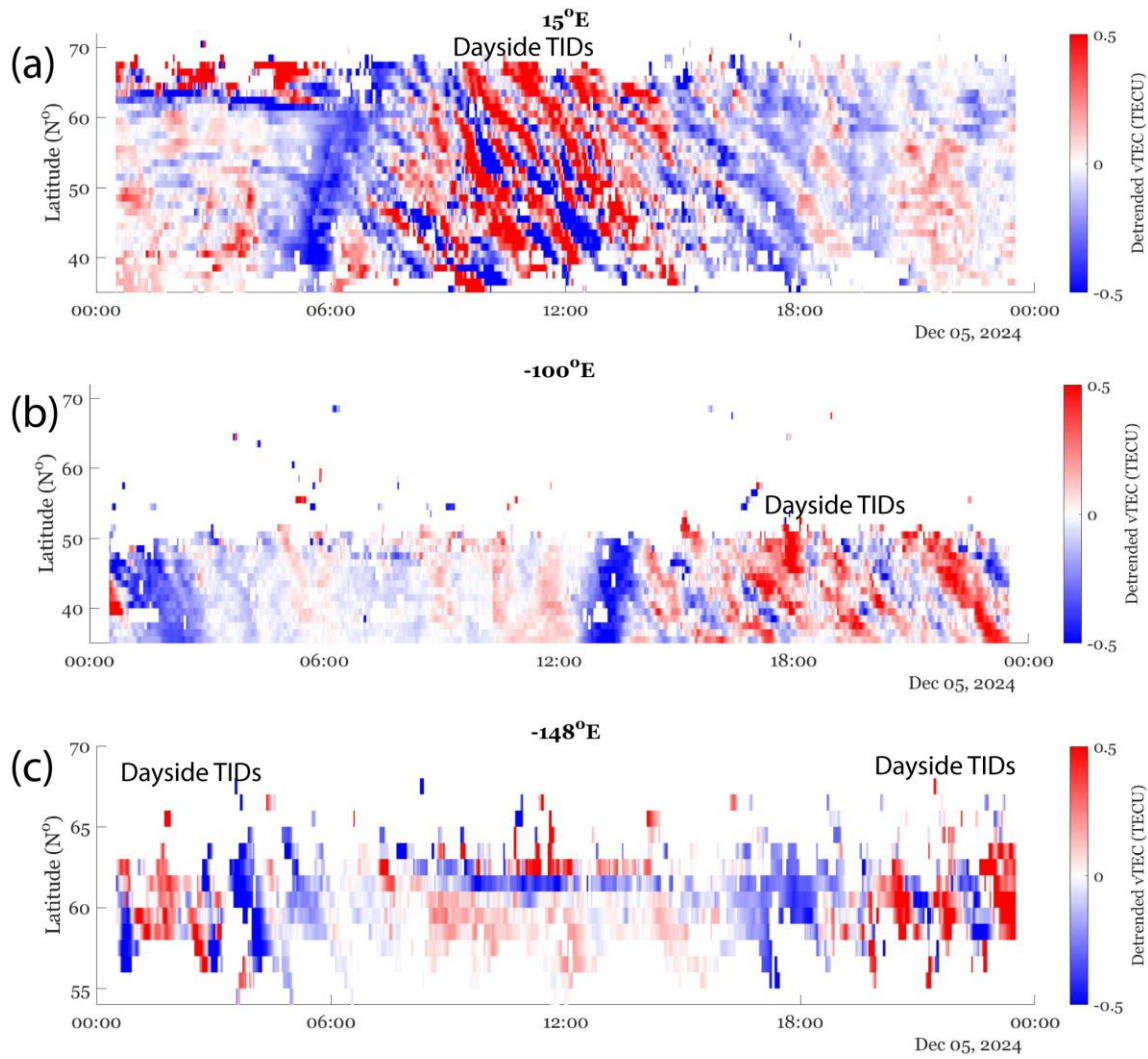


Figure S14. The detrended GNSS vTEC mapped at latitude bins along the longitudes (a) 15°E, (b) 100°W and (c) 148°W, on December 5, 2024.