



Dramatic variations in electron temperature at European mid-latitudes caused by the severe storm of September 7-8, 2017: observations by Kharkiv IS radar and comparison with FLIP and IRI/TBT-2012 models

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The enhanced geomagnetic activity of September 7-8 led to strong positive and negative ionospheric storms. The Kharkiv incoherent scatter radar (49.6 N, 36.3 E) observed significant deviations of the electron temperature (T_e) from its quiet-time values. First, there was a sharp decrease of T_e from ~ 3000 K to ~ 2000 K at the altitude of 500 km observed on the morning of September 7. This decrease is attributed to increased local electron-ion cooling due to a 100% enhancement in electron density. Second, there was a dramatic 4000 K (a factor of ~ 5) increase in topside electron temperature before sunrise on September 8. This temperature increase was most likely caused by a heat flux from enhanced ring current heating. The field line interhemispheric plasma model (FLIP) has been used to investigate these observed phenomena. A comparison with the IRI climatological model (TBT-2012, recommended option for the topside electron temperature from IRI-2012) and with available satellite data (e.g. Swarm A, B, C) is also presented.