GNSS applications to ionospheric disturbance studies

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We demonstrate a range of ionospheric disturbances detected with the GNSS receiver network of total electron content (TEC) measurements. These disturbances are originated from geospace storms and substorms, man-made space perturbations, terrestrial weather, and the energy release from the solid earth. The GNSS radio sounding provides a sensitive and versatile means for characterizing the correlation between ionospheric variations and their relevant drivers within the broad heliosphere-earth systems.

Global propagation of traveling ionospheric disturbances during the Sept 2017 storms. Shown also are the density enhancements caused by solar flares at various levels. The GNSS differential TEC is sensitive enough to detect even lower M-class weak flares.