

Spectral analysis of local ground-based GNSS VTEC in view of its' relation with seismic activity in Aegean region (TECSEA)

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The advantage of ground-based data in ionosphere monitoring in comparison to satellite data is their good temporal resolution and long time-series over the same location. This fixed location assures homogeneity over time, especially in comparison to the satellites having non-repeatable orbits. The example of stationary data are VTEC series from ground-based GNSS receivers. There are global GNSS networks like IGS, or local networks controlled typically by the national agencies or institutions. The specific concept of the proposed research is based on time-frequency analysis of VTEC at several-day wave periods. The data originates from the local stations of National Observatory of Athens (NOA) and covers locations from 30°N to 45°N and from 10°E to 35°E. The study of VTEC signal focuses on its sensitivity to solar radiation, magnetic field variations and seismicity. Several authors presented examples of intra-diurnal variations recorded in several-hour data series from GNSS stations near the seismic activity (Sunil et al. 2015, Manta et al. 2020). Occhipinti et al. (2013) and Rolland et al. (2011) proceeded even further, and starting from the spectrogram of TEC time series they attempted to determine different spectral patterns for different types of disturbing waves in the ionosphere. The TECSEA studies incorporate longer data samples from entire years and focus on several-day wave periods. The ancillary data include geomagnetic indices, solar parameters and seismicity records. The first calculations revealed that local stations have similar signals at several-day frequencies. The variations at these frequencies also well coincide with the results from previous studies of Swarm Ne data over the same region, but also with ancillary Digisonde data. Some preliminary conclusions on their relation with seismicity can also be drawn.

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