



The rate of TEC (ROT) and the Rate of TEC index (ROTI) derived from the Swarm constellation mission observations

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Swarm is the ESA's first constellation mission for Earth Observation at Low Earth Orbit (LEO) launched on 22 November 2013. It consists of three identical satellites (Swarm A, B, and C) in near-polar orbits, which are equipped with a set of six identical high precision instruments: absolute scalar and vector field magnetometers, star tracker, electric field instrument, GPS receiver, and accelerometer. The Swarm Total Electron Content (TEC) product is derived from a dual frequency GPS receiver. Swarm A and C form the lower pair and fly side-by-side at an altitude of about 470 km, whereas Swarm B is orbiting at a higher altitude of about 520 km.

The satellite-based Rate Of change of TEC (ROT) and ROT index (ROTI) are the major parameters in Space Weather that are broadly used as a measure of ionospheric irregularity level. ROTI is defined as standard deviation of ROT over a defined time interval and can be derived from the Swarm TEC that describes the small-scale variability of the line of sight electron content resulting from the ionosphere and plasmasphere. These parameters are highly relevant for users in navigation and communications since strong plasma gradients cause GPS signal degradation or even its loss. This work will report about developments of the analysis, which combines ROT and ROTI from ground-based observations with LEO satellite observations of ROT and ROTI parameters, on the example of Swarm.