Operational space weather service for regional GNSS based applications

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SWIPPA (Space Weather Impact on Precise Positioning Applications) is a project initiated by the German Aerospace Center (DLR) and co-sponsored by the European Space Agency (ESA). The project aims at establishing, operating, and evaluating a specific space-weather monitoring service that can possibly lead to improving the precise positioning applications based on Global Navigation Satellite Systems (GNSS). Reported here is the current status of SWIPPA, detailed are the products and services that are currently available in a high resolution operational mode.

The established SWIPPA service centre at DLR operates a powerful data processing system working, in both real-time and post-processing modes, to provide the project consortium members with essential expert information delivered in the form of several products.

Generated are real-time products based on data from the reference network ascos®, a reliable network which is typically operated at a sampling rate of 1 measurement per second (1Hz sampling rate). Primary measurements are formatted and transferred to the DLR processing facility where new value-added products based on these measurements are produced and distributed immediately. For example, produced are regional maps of the Total Electron Content (TEC), maps of the TEC spatial and temporal gradients. For the mapping process, the achieved spatial resolution is 1 degree and the temporal resolution is 5 minutes.

Simultaneously, collected are several important ground and space based observations of the current space weather conditions, including: solar wind parameters, geomagnetic field’s horizontal component, percentage deviation of currently measured critical frequencies from monthly medians, and others. By regularly analysing and synthesising the incoming geophysical information, short messages are prepared, summarising the current conditions and warning for ongoing/upcoming ionosphere disturbances.

A strict evaluation of the service is currently under way, including reliability and applicability of the service, benefits, and possible future improvements.