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Impacts of Space Weather Effects on the Ionospheric Vertical Total Electron Content

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Space weather effects on the terrestrial ionospheric vertical total electron content (VTEC) are caused by solar EUV- and X-Ray emissions, solar wind streams and coronal mass ejections (CMEs), amongst other processes. They can lead to major disturbances of telecommunication and navigation systems. Accurately predicting the global VTEC distribution is thus of utmost importance for our societal infrastructure.
Here we present results obtained within the German space situational awareness project OPTIMAP (OPerational Tool for Ionosphere Mapping And Prediction) through analyzing the solar effects on the global and regional distribution as well as on the temporal variation of the ionospheric VTEC. For the state-of-the-art analysis in the OPTIMAP project, key data from the GOES, SDO, ACE, SOHO, Proba2 and STEREO missions are analysed together with ground based parameters such as the F10.7 index. The ionospheric data are taken from global VTEC-maps provided by the International GNSS Service (IGS). The results will be used as input for the development of an improved operational VTEC forecast service providing forecasts up to five days in advance.