



## About ionospheric threats on GNSS applications

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Ionospheric perturbations can adversely affect the performance of Global Navigation Satellite Systems (GNSS). This is due to the fact that extremes in plasma density, their rate of change and spatial distribution may cause unusually high range errors, phase and signal strength fluctuations of GNSS signals. Hence, performance parameters of GNSS systems such as accuracy, availability, continuity and integrity may strongly deviate from their average behaviour. In the presence of extreme ionospheric perturbations the limits of one of these quantities can be exceeded and thus the functionality of the GNSS system is threatened.

Reported are selected ionospheric events such as moving ionization fronts and severe scintillation events whose characteristic features may threaten specific GNSS applications. The events are analysed by using observational data computed in DLR Neustrelitz by using ground and space based measurements of the ionosphere since more than one solar cycle period. It has been found that large signal amplitude fluctuations may cause even loss of lock.

Statistical studies are performed to quantify the ionospheric threat by computing the occurrence probability of severe events exceeding a certain threshold.

In order to quantify the ionospheric perturbation degree and to reduce ionospheric threats by early warning, the use of ionospheric perturbation indices is discussed.