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IONOSPHERIC PERTURBATION DEGREE ESTIMATES FOR IMPROVING GNSS APPLICATIONS

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Ionosphere can adversely affect accuracy, continuity, availability, and integrity of modern Global Navigation Satellite Systems (GNSS) in different ways. Hence, reliable information on key parameters describing the perturbation degree of the ionosphere is helpful for estimating the potential degradation of the performance of these systems. So, to guarantee the required safety level in aviation, Ground Based Augmentation Systems (GBAS) and Satellite Based Augmentation Systems (SBAS) have been established for detecting and mitigating ionospheric threats in particular due to ionospheric gradients. The paper reviews various attempts and capabilities to characterize the perturbation degree of the ionosphere currently being used in precise positioning and safety of life applications. Continuity and availability of signals are mainly impacted by amplitude and phase scintillations characterized by indices such as S4 or phase noise. To characterize medium and large scale ionospheric perturbations that may seriously affect accuracy and integrity of GNSS, the use of an internationally standardized Disturbance Ionosphere Index (DIX) is recommended. The definition of such a DIX must take into account the practical needs, should be an objective measure of ionospheric conditions and easy and reproducible to compute. A preliminary DIX approach is presented and discussed. Such a robust and easy adaptable index should have a great potential for being used in operational ionospheric weather services and GNSS augmentation systems.