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Climatology of the Ionospheric Scintillations over the Auroral and Cusp European Regions

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Under perturbed conditions coming from the outer space, the ionosphere may become highly turbulent and small scale (from centimeters to meters) irregularities, typically enhancements or depletions of the electron density embedded in the ambient ionosphere, can form causing diffraction effects on the satellites signals passing through them. Such effect can abruptly corrupt the performance of the positioning systems affecting, in turn, the awareness and safety of the modern devices. In this paper we analyze data of ionospheric scintillation in the latitudinal range 57°- 88° N during the period October, November and December 2003 as a first step to develop a "scintillation climatology" over the Northern Europe. The behavior of the scintillation occurrence as function of the magnetic local time and of the corrected magnetic latitude is investigated to characterize the scintillation conditions. The Istituto Nazionale di Geofisica e Vulcanologia (INGV) and the Institute of Engineering Surveying and Space Geodesy (IESSG) of the University of Nottingham manage the same kind of GISTM (GPS Ionospheric Scintillation and TEC monitor) receivers over the European middle and high latitude regions. The results here shown and obtained merging observations from three GISTM, highlight also the possibility to investigate the dynamics of irregularities causing scintillation by combining the information coming from auroral to cusp latitudes. The findings, even if at a very preliminary stage, are here presented also in the frame of possible Space Weather implications.