A NEAR REAL-TIME PROTOTYPE SERVICE TO MONITOR THE EFFECTS OF THE SCINTILLATIONS ON GPS/GLONASS SIGNALS AT A GLOBAL SCALE

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The equatorial regions and the polar regions are the most affected by the scintillations phenomena that occur in the E and F layers of the ionosphere. They are characterized by strong irregularities in the electronic concentration but localized in space and time. They generate complex scattering and dispersion of the radio-signals. Our aim is to analyse those effects on the permanent and worldwide GPS/GLONASS signals distributed by IGS, the International GPS Service. Three potential indicators are examined: the ratio of losses of lock and cycle slips (on L2 frequency), the signal-to-noise ratio (when available) and the high frequency phase fluctuations. The prototype service provides global maps of scintillation distribution and intensity within two hours using the network of about fifty receivers at 1 s repetition rate. It provides also daily refreshed global scintillation maps based on the whole IGS network of about 300 sites at 30s repetition rate. Specific products are under development for monitoring the scintillations and their effects at a local scale such as airports or oil exploration sites. The calibration of the scintillation index is based on ionospheric scintillation monitor (ISM) datasets that have been obtained in Cameroon, Scandinavia… A permanent ISM is to be installed at Kourou (French Guyana) where two different types of GPS receiver are continuously operating.

This project is lead as a participation to ESA Space Weather Pilot Project which goal is to develop the community of space weather users in Europe. It is part of SWENET. Other partners are associated to this task. They are composed of technical experts, scientists or potential users in the fields of GPS applications and telecommunications. Those partners are: Fugro, DGAC, CNES, Rockwell-Collins, AIUB, LPCE, ROB.

See also:
http://scintillations.cls.fr
http://www.estec.esa.nl/wmwww/wma/spweather/