



Comparison of global and regional ionospheric models

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Modelling of the Earth's ionosphere means the description of the variability of the vertical TEC (Total Electron Content) in dependence of geographic latitude and longitude, height, diurnal and seasonal variation as well as solar activity. Within the project GIOMO (next Generation near real-time IOnospheric MOdels) the objectives are the identification and consolidation of improved ionospheric modelling technologies. The global models Klobuchar (GPS) and NeQuick (currently in use by EGNOS, in future used by Galileo) are compared to the IGS (International GNSS Service) Final GIM (Global Ionospheric Map). Additionally a RIM (Regional Ionospheric Map) for Europe provided by CODE (Center for Orbit Determination in Europe) is investigated. Furthermore the OLG (Observatorium Lustbühel Graz) regional models are calculated for two test beds with different latitudes and extensions (Western Austria and the Aegean region). There are three different approaches, two RIMs are based on spherical harmonics calculated either from code or phase measurements and one RIM is based on a Taylor series expansion around a central point estimated from zero-difference observations. The benefits of regional models are the local flexibility using a dense network of GNSS stations. Near real-time parameters are provided within ten minutes after every clock hour. All models have been compared according to their general behavior, the ability to react upon extreme solar events and the robustness of estimation. A ranking of the different models showed a preference for the RIMs while the global models should be used within a fall-back strategy.