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The mapping of ionospheric TEC for central Russian and European regions on the base of GPS and GLONASS measurements

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The total electron content (TEC) is a key parameter not only for space radio communication but also for addressing the fundamental problems of the ionosphere physics and near Earth space. Currently, the main sources of information on the TEC in the global scale are GNSS signals measurements.
The spatial-temporal behavior of the ionosphere can be most effectively analyzed using TEC maps. To date, global IGS global ionospheric maps with a resolution of 2.5 degree in latitude and 5 in longitude and a time resolution of 2 h are most widely used.
To study the detailed structure of the ionospheric gradients and rapid process as well as for precise positioning task it is necessary to use more precise regional TEC maps. The Regional TEC maps are currently constructed by different research groups for different regions: USA, Europe, Japan etc. The West Department of IZMIRAN research group is a one in Russia who works on the task of regional ionosphere mapping since 2000. It was developed the methodology for obtaining information on the spatial TEC distribution, TEC maps of the ionosphere on the basis of the algorithm for multi-station processing of GNSS observations. Using a set of algorithms and programs, regional TEC maps with a spatial resolution of 1° and a time resolution up to 15 min can be produced. Here is developed the approach to establish the regular online internet service for regional ionosphere mapping of the Western Russia and Eastern Europe.
Nowadays the development of GLONASS navigation system is completely finished and it consists of a constellation of more than 24 satellites. It is good perspective for investigations of the ionosphere structure and dynamics on the base of the simultaneous observations of GPS and GLONASS systems. The GLONASS satellites have the inclination about 64 degrees as against GPS satellites with 56. So the GLONASS provides opportunity to study the high latitude ionosphere. The different scale electron density irregularities, presented in high latitude ionosphere, can complicate phase ambiguity resolution. As known the strong gradients are observed in polar ionosphere near equator and polar walls of the main ionospheric trough. At high latitudes GLONASS satellites are observed on higher elevations that decrease the influence of horizontal ionospheric gradients and as consequence enable represent with more true Total Electron Content over individual high latitude station.
In the report we discuss the features determining TEC from GLONASS observations and demonstrate its advantages for the high latitude ionosphere's studies. A comparison with TEC measurements from GPS/GLONASS for quiet and disturbed geomagnetic conditions is also presented.
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