

Dynamics of large-scale ionospheric inhomogeneities caused by a powerful radio emission of the Sura facility from the data collected onto ground-based GNSS network

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Abstract

© 2017, Pleiades Publishing, Ltd. The measurements of variations in the total electron content of the Earth's ionosphere along the GPS satellite signal propagation path are described. The signal parameters were measured at a network of receivers at three distant sites: Sura (Vasilsursk), Zelenodolsk, and Kazan. They are arranged along the geomagnetic latitude of the Sura Facility under short-wave radio irradiation of the ionosphere. One feature of the experiment is the crossing of a disturbed region by the radio path between a GPS satellite and Vasilsursk. This resulted from the angular sizes of the Sura array pattern; the radio paths between a GPS satellite and Zelenodolsk and a GPS satellite and Kazan did not cross. Variations in the total electron content of up to 0.15–0.3 TECU were revealed at all three sites during four experimental campaigns (March 2010, March 2013, May 2013, and November 2013). The lateral scale of an ionospheric disturbance stimulated by a high-power radio wave and the velocity of its west-to-east propagation along the geomagnetic latitude were 30–60 km and 270–350 m/s, respectively. A decrease in the total electron content (down to 0.55 TECU) was recorded along the Kazan–Zelenodolsk–Vasilsurks line, which is connected with the solar terminator transit; the lateral scale of the related ionospheric inhomogeneities was ~65–80 km.

<http://dx.doi.org/10.1134/S0016793217010054>

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