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### **C1.1-0069-18 APPLICATION OF HIGH AND LOW-ORBITING RADIO TOMOGRAPHY FOR EXPLORING THE IONOSPHERIC STRUCTURES ON DIFFERENT SCALES AND THE RT-BASED INDICES OF IONOSPHERIC PERTURBATION**

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The ionospheric radio tomography methods (RT) are actively developing at present. These methods are suitable for reconstructing spatial distributions of electron density based on radio signals transmitted from the navigational satellite systems and recorded by the receiving networks on the ground. The RT systems working with the signals of low-orbiting (LO) (Parus/Transit) navigational systems have been in operation since the early 1990s. Recently, the RT methods employing the signals from the high-orbiting (HO) satellite navigational systems such as GPS/GLONASS have come into play. In our presentation, we discuss the accuracies, advantages, and limitations of LORT and HORT as well as the possibilities of their combined use for reconstructing the structure of the ionosphere in a studied region during a given time interval on the different spatiotemporal scales. LORT reconstructions provide practically instantaneous (spanning 5-10 min) 2D snapshots of the ionosphere within an interval of up to a few thousand km. Vertical resolution of LORT is 25-30 km and horizontal resolution is 15-25 km. HORT methods are capable of reconstructing the 4D structure of the ionosphere (three spatial coordinates and time). The spatial resolution of HORT is, generally, at best 100 km, and the interval between successive reconstructions is 30-60 min. In the regions with dense receiving networks, the spatial resolution can be increased to 30-50 km and

time step reduced to 10-30 min. In California and Japan which are covered by extremely dense receiving networks, even higher spatial resolution (10-30 km) and shorter interval between the neighboring (up to 2 min) can be achieved. We discuss the LORT and HORT reconstructions of the ionosphere during different periods of the 23rd and 24th solar cycles in the different regions of the world. We analyze the spatiotemporal features and dynamics of the ionosphere depending on solar and geophysical conditions. Particular attention is focused on the periods of the strong geomagnetic disturbances. The storm-time ionosphere is characterized by extremely complicated rapidly varying structure. Under the action of a variety of the perturbing factors, the ionospheric parameters experience striking variations which can be traced by the RT methods. The RT reconstructions revealed multi-extremum plasma distributions, ionization troughs, steep wall-like gradients of electron density, spots of enhanced ionization, etc. A complicated structure of the main ionization trough with polar wall moving equatorwards was observed. The methods for constructing the RT indices of ionospheric perturbation which take into account the peculiar features of the HORT and LORT data are discussed. The results of comparing these RT indices to the indices of geomagnetic activity are presented. The work was supported by the Russian Foundation for Basic Research (projects nos. 16-05-01024 and 17-05-01250).