



Topside sounder as a most reliable instrument for the Space Weather monitoring. Short review and future perspectives.

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At present, Space Weather monitoring and forecasting has taken a strong place among other methods of preventing and mitigating the consequences of natural and man-made disasters and controlling planetary environment. Despite the rapid development and widespread use of the global navigation satellite system (GNSS) technologies in purposes of the ionosphere monitoring, topside sounding is not inferior in modern terms, but in many ways surpasses these technologies. It is due to the fact that topside sounder working frequencies lie within the frequency band of the eigen oscillations of the ionospheric plasma and therefore these measurements are the most accurate among all methods for measuring the parameters of space plasma. In addition, the topside sounding provides information not only in-situ, at the satellite orbit altitude, but gives opportunity to restore the whole vertical profile of electron concentration up to the altitude of the main maximum of the ionosphere [1].

In the second half of the XX-th century several countries succeeded in launch of the satellites with the topside sounders onboard (Canada, USA, Soviet Union, Japan). One can find the review providing the main parameters of the majority of the launched sounders in [2]. It was the time of many discoveries concerning the ionosphere, especially its structure (equatorial anomaly, main ionospheric trough etc.) [3-6].

Next step was the organization of the regular monitoring of the ionosphere. The first attempt was made by Soviet Union in 1987 with the launch of the Cosmos 1809 satellite commissioned by Goshydromet. The satellite and payload were almost the copy of the most successful Intercosmos-19 satellite. It was supposed to be the first in the created satellite constellation for monitoring the ionosphere and outer space, but the collapse of the Soviet Union did not allow this plan to be realized. Nevertheless, the database of the topside profiles from Intercosmos-19 and Cosmos 1809 satellites contributed to the creation of the NeQuick model [7].

Now we can speak on the approaching of the new era of the Space Weather monitoring. By the end of 2023 the launch of the first two satellites “Ionosfera-M” is planned with the topside sounders onboard. It will give start to realization of the satellite constellation IONOZOND [8], which at the first stage will consist of 4 satellites. The system is commissioned by Roshydromet and Russian Academy of Sciences. The main parameters of the topside sounder and the scientific payload of the Ionosfera-M satellites will be reported.

References

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