GC2024-SG070

Response of the upper ionosphere to the earthquake in the Sea of Japan on January 1, 2024 (preliminary results)

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The main shock of the earthquake occurred on January 1, 2024 at 16:10 local time (07:10 UT) 6 km north-northeast of the city of Suzu, located on the Noto Peninsula in Ishikawa Prefecture. According to the US Geological Survey, the moment magnitude of the earthquake was 7.5 and the focal depth was 10 km. The Japan Meteorological Agency estimated the magnitude at 7.6. In this work, GPS satellite data were used to analyze the response of the upper ionosphere, which makes it possible to determine variations in the total electron content of the ionosphere. In the variations in the total electron content after the earthquake, a signal characteristic of shock waves is observed. Based on the amplitude of the ionospheric signal in the total electron content, the energy of earthquakes was estimated, consistent with seismic estimates.

The research was carried out within the framework of the state assignment of the IPE RAS and the state assignment of the IDG RAS No. 1220329000185-5 "Manifestation of processes of natural and man-made origin in geophysical fields".