GC2024-SG078

Measured by magnetometers patterns of the ionospheric response to seismic events in the Philippines on December, 2023

Svetlana A. Riabova[1,2] , Sergey L. Shalimov[1]

[1] Schmidt Institute of Physics of the Earth of the Russian Academy of Sciences, Russia
[2] Sadovsky Institute of Geosphere Dynamics of Russian Academy of Sciences, Russia

riabovasa@mail.ru

Using ground-based magnetometers, we studied the ionospheric disturbances observed after the earthquake in the Philippines on December 2, 2023 and its aftershocks.

A powerful earthquake of magnitude 7.6 occurred on December 2, 2023 at 22:37 Pacific time (14:37 UT) off the island of Mindanao. The epicenter of the event was located 110 km from the city of Butuan in the province of Agusan del Norte and 29 km north of the city of Hinatuan in the province of Surigao del Sur

After the main shock, aftershock activity was recorded to the southeast of the main shock. During the period from December 2 to December 31, 2023, the following aftershocks with a moment magnitude greater than or equal to 6 were recorded: aftershock of magnitude 6 (0:03 LT December 3, 2023), aftershock of magnitude 6.1 (1:40 LT December 3, 2023), aftershock of magnitude 6.3 (2:09 LT December 3, 2023), aftershock of magnitude 6 (4:52 LT December 3, 2023), aftershock of magnitude 6.6 (18:35 LT December 3, 2023), aftershock of magnitude 6 (22:35 LT December 3, 2023).

Weused instrumental observations of variations in the Earth's magnetic field, carried out at the Davao station (geographic coordinates: 7° N, 125.4° E; geomagnetic coordinates 2.22 N, 197.9° E). As a result, it was established that periods of geomagnetic variations after seismic events belong to the short-period (acoustic range), and long-period ones (range of atmospheric internal waves). It is shown that the origin of disturbances in the acoustic range can be associated with the arrival of seismic Rayleigh waves, which are the source of acoustic vibrations, while the estimated velocities of atmospheric internal waves correspond to their generation directly at the epicenters of events. We found that the magnetometric measurements make it possible to register ionospheric response from seismic events of noticeably lower magnitude compared to the GNSS radio sounding method (M=6 in the first case and M=6.5 in the second).

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".