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Gradient geomagnetic measurements by stratospheric balloon

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Abstract

The study of the interior structure of the Earth and laws of its evolution is one of the most difficult problems of natural science. Among the geophysical fields the anomaly magnetic field is one of the most informational in questions of the Earth's crust structure. Many important parameters of an environment are expedient for measuring at lower altitudes, than satellite ones. So, one of the alternatives is stratospheric balloon survey. The balloon flight altitudes cover the range from 20 to 50 km. At such altitudes there are steady zone air flows due to which the balloon flight trajectories can be of any direction, including round-the-world (round-the-pole). One of the examples of such sounding system have been designed, developed and maintained at IZMIRAN during already about 30 years. This system consists of three instrumental containers uniformly placed along a vertical 6 km line. System allows measuring a module and vertical gradient of the geomagnetic field along the whole flight trajectory and so one's name is - stratospheric balloon magnetic gradiometer (SMBG). The GPS-receivers, located in each instrumental container, fix the flight coordinates to within several tens meters. Data transmission is carried out by «Globalstar» satellite link. The obtained data are used in solving the problems of deep sounding of the Earth's crust magnetic structure - an extraction of magnetic anomalies, determination of a depth of bedding of magnetoactive rocks and others.

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