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Dynamic hierarchic model of the main geomagnetic field sources

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The authors suggest the new method to construct the model of the main geomagnetic field sources. The originality of the proposed approach consists in that the problem was solved by the successive separation of the contributions made by different sources in spatial structure of geomagnetic field components. The last was calculated using IGRF coefficients. The calculations were carried out taking into account all three components of geomagnetic field that allowed determining six parameters of each dipole including the magnetic moment vector direction. Since a minimum of non linear functional was found to obtain the estimation of parameters the method doesn't require any assumptions about properties of the sources and their number.
The problem was solved for the period from 1900 to 2005 year with the 5-year time interval. Dipoles obtained differ in magnitude within three orders and are located at different distance from the Earth's center. The most powerful of them are located in the liquid core. There are eight such sources besides the main. The sources of 2 and 3order of magnitude coincide with the core-mantel boundary and even penetrate to upper mantle.
There is no doubt that the obtained hierarchic model represents the real physical processes within the liquid core and mantle. Firstly, the dynamics of the sources of 1-2order of magnitude determines the global features of secular variation. Secondly, the local anomalies of secular variations can be described as a result of the changes of the parameters of the 3rd order magnitude sources in time. Besides that it was found out that the location of the most part of the sources of the 3rd order of magnitude is determined near the tectonic plate boundaries or in the close vicinity of the hot spots.