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# On the distribution function of the geomagnetic field intensity according to the model of a giant Gaussian process and empirical data

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## Abstract

© 2015, Pleiades Publishing, Ltd. The quadrature formula is obtained for the distribution function (DF) of the intensity of the geomagnetic field B and the corresponding virtual axial dipole moment VADM in the model of the Giant Gaussian Process (GGP). The predictions of this model are compared, up to a high degree of detail, with the empirical data for the Brunhes Epoch, which are contained in the global databases (GDB) for paleointensity. With a fixed latitude φ, the DFs fB(B, φ) and fVADM(VADM, φ) are close to Gaussian within the first approximation. At the same time, the global DF fB(B) has a high coefficient of asymmetry a = 0.35 since the mean of this function is latitude-dependent. In contrast, the global DF fVADM(VADM) has far lower asymmetry a = 0.16, since its mean barely varies with latitude. The comparison between the distribution histograms of VADM according to the PINT GDB data for the Brunhes Epoch and the results calculated by the BGP model shows that the empirical data and the calculations by the GGP model noticeably differ in the interval of the small VADM. Specifically, the histogram based on PINT GDB data shows a significant predominance of these data compared to the model predictions. At the same time, the same data fairly well agree with the GGP model in directions. This contradiction is probably accounted for by the underestimation of the paleointensity values in the experiments by the Thellier method if the rock carries chemical magnetization instead of thermal remanent magnetization. An alternative explanation suggests a short drop in the geomagnetic dynamo power associated with a simultaneous decrease in both the mean value of the axial dipole and in the variances of all the other terms of the spherical expansion of the geomagnetic field (i.e., quadrupole, octupole, and other components).

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