Peculiarities of the statistics of Gaussian coefficients obtained at numerical geodynamo simulations

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Empirical statistical distributions often exhibit significant deviations from the Gaussian distribution in circumstances where Gaussian distribution would initially be thought to describe the data well. For instance, this effect is known for residuals when modeling geomagnetic data: their d.f. are more peaked around the centre and have tails that are likely exponential. To understand and tentatively reproduce important features of the Earth's magnetic field the numerical solutions of dynamos are extensively used now, here we consider the secular variation structures using dynamo simulations and show the non-Gaussian statistical features of the corresponding spherical harmonic coefficients. This study aimed to test the compatibility of so-called "giant Gaussian process" statistical models of the palaeomagnetic field against numerical geodynamo simulations. Shown that the global effect of non-Gaussian shape of the population can be greatly reduced when considered at smaller time scales and the idea of statistical mixture of distinct Gaussian data populations may explain the shape of global histograms.