ON THE POSSIBLE BENEFITS OF EXTENDING THE PREDICTIVE SECULAR VARIATION IN THE IGRF MODEL TO A HIGHER SPHERICAL HARMONIC DEGREE

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The International Geomagnetic Reference Field (IGRF) is an internationally agreed global spherical harmonic model of the Earth's magnetic field of internal origin. It is currently computed every five years in the form of a model describing this field up to degree 13 at a reference epoch, plus a secular variation model up to degree 8 best estimating the linear evolution of this field over the following five years, under the assumption that such a linear approximation can provide a good enough prediction of the field, both for navigational and internationally agreed reference purposes (the very purpose of IGRF models). An important implication of this choice is that any change in the field described by spherical harmonic degrees between 8 and 13 may be neglected over five years, given the linear approximation involved in the description of the field variation, the uncertainties already involved in the determination of all other coefficients, and the practical accuracy needed for most IGRF applications. Recent progress in global field modeling based on increasingly accurate and numerous satellite data however show that all field coefficients can now be computed with higher accuracy than possible in the past, and that the higher degree secular variation coefficients could therefore be considered for inclusion in IGRF models. This thus raises the question of the possible usefulness of such a change in the definition of the IGRF. The present paper intends to investigate the feasibility, possible implementation and the potential benefit of such a change for IGRF applications, given our current knowledge, and lack of the knowledge, of the way the field behaves over time periods of five years.

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