

论文

国际参考地磁场模型中高阶球谐项对地磁场长期变化的影响

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摘要 在国际参考地磁场 (IGRF) 模型中, 高阶球谐系数比低阶系数小得多, 所以高阶项对主磁场的贡献常被忽略不计. 但是, 高阶项对主磁场的长期变化却有重大影响. 本文根据第八代IGRF模型, 分析了IGRF 1945~1955中高阶球谐系数的异常特征对长期变化的影响, 然后用修正IGRF模型估计并改正了这些影响. IGRF高阶项随深度增加而迅速增大, 所以高阶系数的误差对深部磁场位形和磁场能量的计算有不可忽视的影响, 对核幔界面流动状态的推断和地核半径的地磁估计有更为重大的影响.

关键词 [地球主磁场](#) [国际参考地磁场](#) [地磁场长期变化](#) [球谐系数](#)

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EFFECT OF HIGH-DEGREE HARMONICS IN THE IGRF MODELS ON SECULAR VARIATION OF THE GEOMAGNETIC FIELD

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Abstract The contribution to the main geomagnetic field from high degree harmonics of IGRF models is usually neglected, since the high degree Gauss coefficients in IGRF models are much less than low degree ones. However, the high degree harmonics have significant contribution to secular variations of the magnetic field. The effects of the unusual behaviors in high degree Gauss coefficients of IGRF 1945~1955 on the secular variation are studied by using the eighth generation of IGRF. By comparing the original and the revised IGRF models, the errors in the high degree coefficients are estimated and corrected. Since the magnitudes of high degree terms increase rapidly with increasing depth, these errors will distort greatly the magnetic field configuration and magnetic energy distribution in the deep interior. The important effects are also detected in the calculation of the liquid flow pattern at the outer core surface and in the geomagnetic estimation of the core radius.

Key words [Main geomagnetic field](#); [International Geomagnetic Reference Field \(IGRF\)](#); [Secular variation](#); [Spherical harmonic coefficients](#).

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