The geomagnetic field modeling of different areas of China based on the Three-dimensional Surface Spline model

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Based on surface observations, satellite data, we create the Three-dimensional Surface Spline (3DSS) model of Chinese mainland. Through this model, the magnetic field analyses of domestic plateau (Qinghai Tibet Plateau 28°N-38°N, 78°E -102°E), plain (Middle and lower reaches of Yangtze River Plain 27°N-34° N, 111°E-122°E) and marine (parts of the East and South China Sea 16°N-30°N, 123°E-136°E) areas have been investigated. In addition, single models of plateau and plain have also been created. In order to compare and verify results, the corresponding Two (2DTY) and Three-dimensional (3DTY) Taylor polynomial models have been derived. Issues like the removal of disturbing geomagnetic fields, the data gap between surface and satellite level, boundary effect are all seriously considered. Aims for evaluate the modeling results, several measuring points are not calculated intentionally while modeling, then calculate the residuals, change rate absolutes, RMSE. Results show that expect East component Y, the change rate absolutes of other components are less than 1% both in domestic and single models, which means the modeling result of 3DSS is better than other two models. 3DSS models of plateau and plain reflect fine distribution of magnetic field after comparing domestic distribution. 3DSS model fits the plateau best, plain is second, the worst in the marine area, which implies the creation of a 3DSS model might not need so many points. The modeling precision depends on the number and distribution of measuring points.

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