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Preliminary Study on Fusion Scheme of Multi-dimensional and Multi-scale Potential Field Data

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Gravity and magnetic surveys are widely used in geology exploration because of its advantages, such as efficient and economy, green and environment-friendly, widely coverage and strong horizontal resolution. In order to well study in the geology exploration, it is required to comprehensively combine the different scales (different scales data) and different dimensions (satellite data, aeronautical data, ground data, ocean data, well data, etc.) of gravity and magnetic data that were observed in different periods, however, the comprehensive application of the multi-dimensional and multi-scale gravity and magnetic data still stays in the initial stage. In this paper, we do research on the key point of the fusion of potential field data (gravity and magnetic data): the way to fuse the different scales and different dimensions of potential field data into a benchmark and the same surface. Based on this research, we propose a scheme to fuse the multi-dimensional and multi-scale gravity and magnetic data. The synthetic models show that this fusion scheme is able to fuse the multi-dimensional and multi-scale gravity and magnetic data with great fusion results and small errors, in addition, the most important is that the fusion data conform to the characteristics of the potential field data and can meet the needs of data processing in the following steps. One of case studies in China has been accomplished to fuse aeronautical and ground gravity data that are different scales by using this fusion scheme. The fusion scheme we proposed in this study can be used in the fusion of the multi-dimensional (aeronautical, ground and ocean) and multi-scale gravity and magnetic data, which is good for interpretation and popularization.