



Geophysical constraints for the tectonic reconstruction of the Chinese Altai and the Junggar tectonic zones

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The potential field data analyses of the crustal structures combined with the geology provide a comprehensive geodynamic reconstruction of the Chinese Altai. In order to detect significant crustal structures and estimate their continuity in depth, location and trend of major gradients are determined from spectral and multi-scale edge analyses, pseudo-gravity and tilt derivative transformations. The majority of the magnetic lineaments is NW–SE-oriented and parallel to the Permian deformation zone which affects a large part of the western and southern CAOB. The NE–SW-oriented gravity anomaly lineaments coincide with the Late Devonian–Early Carboniferous deformation fabrics characterized by NE–SW trending upright folding and a crustal scale doming resulting from a NW–SE shortening. Magnetic and gravity data reveal that the Erqis system is probably an unsuccessful candidate for a suture zone between the Chinese Altai and Junggar plates as no prominent deep-seated discontinuity can be identified. Moreover, the lack of terranes forming the Chinese Altai is confirmed by the potential field analysis implying that various geophysical domains can be interpreted as distinct orogenic crustal levels characterized by different metamorphic grade, structural patterns and spatial extent of magmatic bodies. The geophysical heterogeneity of the Chinese Altai crust results from the Devonian and Permian tectonometamorphic reworking of accretionary wedge. Based on these results, we propose a tectonic model which explains the establishment of the Devonian magmatic arc upon the single Cambro–Ordovician accretionary wedge during massive crustal thinning and melting of juvenile crust. The final Permian collision led to a major crustal scale folding and exhumation of granulites, and partially molten crust along the collisional front in the southern Chinese Altai.