



Fault distribution to the west of Songliao Basin by means of gravity analysis

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Our study area is located to the west of Songliao Basin, northeastern China. Its tectonic setting includes three parts, the Argun block, the Higgan block and the Songnen block from north to south. It belongs to the northeastern Asia orogenic zone surrounded by the Siberia plate, the North China plate and the Pacific plate.

As the global feature, the gravity anomaly values increase from west to east, and from southwest to northeast. The minimum value is 5mGal, and the maximum value is 5mGal. In the southwestern region, the variation range is from -87mGal to 65mGal. But in the northeastern region, it is between -65mGal and 55mGal. In the central region, the gravity anomaly values are between -55mGal and 25mGal, and the gravity anomaly gradient is bigger than that in other regions. In the eastern region, gravity anomaly values are bigger than those in other regions, and the gravity anomaly characteristics is complicated. There are gravity anomaly gradient belts, anomaly direction changes, distortion of contour lines, broaden or narrowed of the closed contour lines.

Gravity anomaly data can be used for study of tectonics division and regional geological structures. The gravity anomaly data has been processed using many methods. Firstly, analytic upward-continuation and apparent-depth filtering were used to separate the gravity anomaly field with different depth and different scale. Then, horizontal derivatives, vertical derivatives, analytical signal calculation, small sub-domain filtering were used to increase the gravity resolution for fault discrimination.

Through the interpretation of different depth and different scale gravity anomalies, we mapped the fault distribution of the study area. There are four types of faults with different trends, which are north east-east (NEE), near west-east (WE), north-east (NE) and north-west (NW). The NE and NW trending faults are distributed in the whole region. The WE trending faults are located mainly in the southern region of the study area, and have been cutten by NE trending faults. Most of the NEE trending faults are situated in the west by south, converging to some NE trend faults. And NEE trending faults usually disappear gradually with the increasing of depth. All the former faults of with WE, NE and NEE trends are cutten by NW trending faults. According to the above relation of intermesh and cutting between the four trends of faults, the start time are WE, NE, NEE and NW faults in sequence. The west La Mulun River fault is the northern boundary of North China plate. The Tayuan-Xiguitu fault is the boundary between the Argun block and the Higgan block. The Nenjiang fault is the boundary between the Higgan block and the Songnen block.