Crystalline Basement and Properties of the Junggar Basin

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The structure and properties of the crystalline basement of the Junggar basin has been a key issue for geoscientists world wide. We conduct a seismic wide angle reflection/refraction profile with joint inversion of gravity and geomagnetism along a transect through the Junggar basin from Emin to Qitai. This transect presents us with a detailed velocity structure of the crust and upper mantle, especially the precise velocity of the top surface of the crystalline basement of the basin. Along the profile several faults were found that penetrate through the crust. Faults with little reflectivity, lower Q values, and no obvious dislocation, are considered to be \textquoteleft\textquoteleft extension\textquoteright\textquoteright faults.

The density and magnetic intensity of material along the profile, especially near the top surface of the basement, has been obtained from gravity and geomagnetic anomalies (1:200000 scale) in the Junggar basin and adjacent regions. The rock properties along the profile have been determined from the velocity, density and magnetism at the top part of the Junggar basin, along with a velocity-density relation dependent on depth. The results indicate that masses of basic to ultra-basic rocks have been added to the crystalline basement in several sections, suggesting that a section of the upper mantle migrated into the crust along lithospheric faults and was mixed together. This inference is supported by high velocities, high densities and high magnetic intensities. Combined with other geophysical data, a comprehensive interpretational profile has been obtained and a geodynamic model for the crystalline basement structure and properties of the Junggar basin has been developed.