

LITHOSPHERE RHEOLOGY AND MESOZOIC BASINS IN THE WEST LIAONING-NORTH LIAONING-SONGLIAO AREA, CHINA

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Lithosphere rheology is regarded as an important aspect of thermal-mechanical properties of lithosphere. The rheological property of the lithosphere determines its response to tectonic forces. The West Liaoning (WL), North Liaoning (NL), Songliao areas (SL) belong to three tectonically different units with different lithospheric thermal-mechanical properties. Under continental extensional background of late Mesozoic era, they responded in different deformational ways, which resulted in the development of the NE-NNE extended basins with different structural styles, sedimentary fillings as well as oil and gas potential. Based on three geological-geophysical sections, covering a length of 2400 km, and more than 500 physical sites, we have established the thermal-mechanical structure and rheology of the above three lithospheric units. The basement of WL is part of the thick, stable and rigid North China plate, with an average lithospheric thickness of 85 km, whereas the basement of NL is the Caledonian Xilamulun Orogenic Belt, with a complicated structure, low rigidity and an average lithospheric thickness of 65 km. The basement of SL consists of the Hercynian Xingmeng Orogenic Belt, which is characterized by high heterogeneity and low rigidity, with an average thickness of 60 km. According to the rheological profiles estimated for the lithosphere of these areas, the depth of the brittle/ductile transition is 25 km for WL, but only 16 km for SL and NL. The total strength of lithosphere is 14×10^{12} N/m for WL, but only 7.4×10^{12} N/m for NL and SL. These differences play an important role in the formation of various basins in these areas.