Geophysical Research Abstracts
Vol. 20, EGU2018-2225, 2018
EGU General Assembly 2018

Lithosphere mantle density of the North China Craton based on gravity data

Bing Xia (1), Hans Thybo (2), and Irina Artemieva (1)

(1) University of Copenhagen, Geology Section, Copenhagen, Denmark (bixi@ign.ku.dk), (2) Eurasia Institute of Earth Sciences, Istanbul Technical University, Istanbul, Turkey

Based on gravity, seismic and thermal data we constrained the lithospheric mantle density at in-situ and STP condition by remove the gravity effect of topography, sedimentary cover, Moho and Lithosphere-Asthenosphere Boundary variation from the free-air gravity anomaly. The sedimentary covers has average density range from 1.80 g·cm^{-3} to 2.40 g·cm^{-3}. The average crustal density various between of 2.70 g·cm^{-3} and 2.78 g·cm^{-3}. Our new thermal model suggests that the surface heat flow in the North China Craton, including the western block, is >60 mW/m^2. Low surface heat flow (30 - 40 mW/m^2) is observed in the northern part and the southern corner of the Trans-North China Orogen together with the western margin of the Western block. Moho temperature ranges from 450 °C to 600 °C in the eastern block and in the western block is 550 °C to 650 °C. The thermal lithosphere is 100 -140 km thick where have the surface heat flow of 60 - 70 mW/m^2. The gravity effect of surface topography, sedimentary cover, Moho depth are 0 to +150 mGal, - 20 to -120 mGal and +50 mGal to -200 mGal, respectively. The gravity effect of both the thermal and seismic lithosphere-asthenosphere boundary ranges from 20 mGal to +200 mGal. The lithospheric mantle residual gravity ranges from -250 mGal to +100 mGal. The lithospheric mantle density with values ranges from 3.20 g·cm^{-3} to 3.26 g·cm^{-3} at in-situ condition and 3.31 g·cm^{-3} to 3.41 g·cm^{-3} at STP condition with a slight difference between values derived from the thermal and seismic LAB. We find that densities in the subcontinental lithosphere of the North China Craton are highly heterogeneous. Thin lithosphere with relatively high lithospheric densities and normal heat flow (30 - 40 mW/m^2) characteristics with the Archean lithosphere in the southwestern part of the Eastern Block. Similar high densities and high heat flow (50 - 60 mW/m^2) observed the major part of the Trans-North China Orogen. High densities and heat flow obtained the Western Block which indicates that the lithospheric mantle in this part has experienced modifications.