Geophysical Research Abstracts,
Vol. 11, EGU2009-3679-1, 2009
EGU General Assembly 2009

A new gravity model of the crust and upper mantle of Asia based on seismic data

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Density structure of the crust and upper mantle provides us the information about tectonic processes and evolution of the lithosphere. One of the important problems of the gravity modelling is to distinguish the crustal gravity effect and gravity effect of the upper mantle. By removing the crustal gravity effect from the observed gravity anomalies we can obtain the residual anomalies that reflect the upper mantle inhomogeneities. A digital 3D density model of the Central and Southern Asia crust is constructed based on seismic reflection, refraction and receiver functions data as well as geological data. Corresponding gravity effect is calculated. At the first step we construct a new digital model of the Asia crust, which is based on local maps showing three main crustal layers and available seismic determinations. The crustal thickness reaches 70 km beneath the Tibet and only 5 to 6 km at the oceanized parts in the central and southern portions of the Red Sea median trough. By constraining crustal thickness and structure with seismic data and density values from the velocity distribution by means of the Nafe-Drake and Birch relationships, we computed density models for the crust and upper mantle. The complex model consists of four layers: upper, middle and lower crust and sediments and specified on a 1ºx1º grid within (-10-55ºN, 20 W-155º E.). The intensity of the gravity field and its regional pattern correlate closely with the topographic features of the region. Intense negative anomalies characterize central Asia (area of the plates collision), and positive anomalies are observed in Southeast Asia.