Geophysical Research Abstracts, Vol. 9, 09188, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-09188

Recent crustal deformations of western part of Mongolia-Siberia mobile area: an integrated study

V.A. Sankov (1), A.V. Parfeevets (1), A.V. Lukhnev (1), N.A. Radziminovich (1), A.I. Miroshnichenko (1), V.I. Melnikova (1)

(1) Institute of the Earth's Crust SB RAS, Irkutsk, Russia (sankov@crust.irk.ru)

For obtaining of long and short-term components of the recent crustal deformations of Tuva and West Mongolia the data of structural, geodetic and seismotectonic studies were integrated. Stress tensors of both paleostresses and recent stress field were computed from a unified technique with the use of TENSOR program (Delvaux, 1993). The paleostress reconstructions from microfault slip data allows as to determine the sequence of deformation types at formation of the neotectonic structures. It is shown that the unified field of compression and transpression stresses has influenced the earth crust in this region since no later than the Pliocene for most part of the territory. The compression axis was oriented northeast. The state of paleostress reconstructed for the Hangay dome has shown the variability of stress-tensors in type. Together with strike-slip types of stress-tensors the extensional stress-tensors have been reconstructed there. The stress-tensor computations from the data of earthquake focal mechanisms have shown a close resemblance between the state of paleo- and present-day stresses in types and directions of stress axis.

Relying on the GPS-geodesy measurements of contemporary horizontal movements, quantitative estimates of the deformation rates have been obtained for the earth crust in the region. The zones of the different types of crustal deformations are identified. The zone of the predominant shortening in NE-SW direction is outlined along the Mongolian and Gobi Altay. The northeastern direction of horizontal shortening remains in the southern and western parts of Hangay dome; however, the deformation rates decrease more than two. In the northern part of Hangay (zone of Bolnay fault) the high rates of crustal elongation in NW-SE direction are observed. We have compared geodetic measurements of horizontal deformation rates with the calculations of seismotectonic deformations in the epicentral zones of the largest earthquakes with M

more then 7.5 in Mongolia over the last 100 years. The rated deformations correspond to the GPS-geodesy measurements both in values and directions of shortening axes. The total seismogenic deformation of the block enclosed between the North Eurasia and Dzungaria has been rated over the last 100 years. The rate of crustal shortening for the block made 1.21×10^{-8} yr^{-1} along meridian component and that of crustal elongation along latitudinal component 3.63×10^{-9} yr^{-1}. The total tectonic horizontal deformation has been rated from the geodetic data on displacements of GPS permanent sites IRKT (Irkutsk) and KSTU (Krasnoyarsk) that are within the stable Northern Eurasia, and URUM (Urumchi) that is within the Dzungaria block. The maximum horizontal shortening along NE34 in this triangle has the rate of $8.67\pm0.31\times10^{-9}$ yr^{-1}, and the rate of elongation in perpendicular direction is $1.48\pm0.78\times10^{-9}$ yr^{-1}.

The data obtained substantiated our conclusion that the NE28-35 horizontal compression of the earth crust is the main process controlling formation of neotectonic structures and seismic activity of the region on periphery of Mongolian block. The largest portion of the applied load realizes due to rapid displacements at the largest earthquakes. The variety of the state of stress types within the Hangay dome is due to the interaction between the local extension that results from supporting influence of mantle anomaly and the regional NE compression.

(RFBR #05-05-64702)