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Faults kinematics, paleo- and present-day stress-strain state in the Central Baikal rift

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The central part of the Baikal rift system is commonly explained as a zone of continental extension separating of Siberian block attributed to North Eurasian plate and Transbaikal block attributed to Amur plate. The major and secondary NNE and NE active faults were recognized as normal faults with insignificant strike-slip component. We propose the interpretation of new data of investigation the junction zone of South Baikal, North Baikal and Barguzin basins using structural, geomorphological, seismological and GPS geodesy methods and paleostress reconstructions.

Regionally the morphology of fault patterns shows an-echelon structures of right lateral type for NNE trending zones and left lateral type for NE and sublatitudinal zones. In agreement with these morphological features our stress reconstructions show strike-slip type of stress tensors for the initial (Oligocene and Miocene) stage of faulting along the basins borders. The second deformation stage (Pliocene-Pleistocene) is characterized by extension stress regime with the same (NW-SE) direction of minimum compression axis (Delvaux et al., 1997; Sankov et al., 1997). It corresponds with present-day stress field obtaining by earthquake focal mechanisms inversion (Petit et al., 1996). The only NE trending Argoda-Garga deformation zone on the eastern border of Barguzin basin is an example of initial stage deformation development during Late Pleistocene-Holocene. The left lateral strike-slips are dominated in this zone as evidenced by geomorphology and structural data.

The results of our GPS measurements show SE block movements in the Central Baikal rift relative to Siberian block. The computation of relative horizontal deformations exhibits complicated strain distribution with prevailing of NW-SE elongation and NE-SW shortening. In general the results of GPS measurements show possibility of right lateral movements along NNE rift structures and extensional and left lateral movements along NE rift structures.

We suppose the evolution mechanism of Central Baikal rift structures corresponding to paleo- and present-day stress-strain state and faults kinematics data. The realization of NW-SE blocks divergence in the intracontinental setting includes the stage of initial crustal deformations which characterizes mostly by horizontal movements and strike-slip to transtension stress regimes. The latest are a consequence of horizontal compression of the crust prevailing within the continental massive. Also the edition lithosphere compression of far field plate interaction origin can't be excluded. The pure extension deformation regime and normal faulting are attributed to second stage of crustal destruction accompanied by intensive rift shoulders uplift and sedimentary loading in the rift basins. These conditions are dominated recently in the Center of Baikal rift. In contrast the active strike-slip deformation regime can be discovered within interbasin blocks and on gentle slopes of rift half-grabens as a relic of initial stage of crustal extension.