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Holocene transpression structures along the borders of Tunka basin (Baikal rift system) evidenced by ground penetrating radar data

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The new data supporting the importance of recent transpression structures on south-western part of Baikal rift system were obtained from high-resolution Ground Penetrating Radar (GPR) images. The GPR was employed using 50 MHz and 400 MHz antennas for obtaining sub-surface structure along the northern (Tory segment) and southern (Kyren segment) Tunka basin border faults. The WNW striking Tory segment of North Tunka fault is characterized by clear evidences of Holocene activity. Three paleoearthquakes were recognized in its zone after trenching and deformed soils radiocarbon dating (Chipizubov et al., 2003). Nevertheless the fault cinematic was unclear – the sub-surface structures in opened trenches show both normal and reverse fault displacements. Combining the geomorphological and GPR data we show that the south steeply plunging active fault is characterized by mainly left lateral strike-slip movement with reverse component. It is consistent with the position of Tory fault segment on WNW trending restraining bend of North Tunka fault zone. The fault kinematic agrees with paleostress reconstructions along northern border of Tunka basin.

The W-E trending South Tunka fault is covered by Late Cenozoic sediments. The Kyren fault segment represents on Earth surface by gentle north facing scarp and line of the small hills. We have examined this scarp with GPR techniques and found a good correlation between surface and sub-surface structures. The Upper Pleistocene deposits are folded and cut by the faults and fractures with general flower-like structure. The hills on the surface coincide with upper part of thrust anticline in a cross-section. The relatively deep (more, then 20 m) roots of fold-fault system help us to discriminate between tectonic and possible slope creep evidences. We interpret the investigated structure of Kyren fault segment as a part of strike-slip fault zone acting within SW-NE compression. The obtained data confirm of crustal stress state evolution on south-western part of Baikal rift system from transtension to transpression condition in Late Cenozoic.