



GIS reconstruction of LGM glaciation and climate in Lake Baikal watershed

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Field and remote (aerial photo, Landsat and Aster images) investigations were carried out in three mountain ridges in surroundings of Lake Baikal (Baikalsky, Bargusinsky and Khamar-Daban ridges). Glacial landforms and deposits (terminal and lateral moraines, cirques, areas of glacial scour, palaeo-stream channels, trimlines) as glacial limit markers in 3D space were identified and mapped. First cosmogenic ^{10}Be and ^{26}Al dates from glacial deposits were obtained for the south lake shore (15-13 ky BP, [Horiuchi et al., 2004]). Geomorphologic data were analyzed with using GIS (ENVI, ArcMap and ArcView software) and 3D glaciation model for LGM was constructed. The results obtained suggest that the glaciation was mainly defined by valley and ice cap glacier types. The glacier morphology and distribution was strongly controlled by western moisture transportation from North Atlantic. The shape and size of a glacier and correlated ice mass-balance allowed reconstructing the quantitative pattern of regional palaeoclimate. The reconstructed glaciers covered 12500 km² and ice volume was 1400 km³ in water equivalent. On average ELAs are estimated as 1100-1200 m above modern sea level and ELA depression as 1000-1100 m [Osipov, 2004], with maximum of the depression on windward ridge slopes. In this study the main mass balance parameters (ablation and accumulation values) were calculated from the palaeoglaciological tree dimensional GIS-model. Estimated vertical accumulation/ablation gradients were from 0.5 to 3.0 mm/m in water equivalent for glaciers of different morphology. Such lower gradients and glaciation energy are evidences of cold and dry environment and lower annual moisture exchange (precipitation/ice/glacier streams/precipitation). That is glaciation was strongly controlled by lowered summer air temperatures instead of winter precipitation. The applied glaciation/climate model show that summer temperatures lowering of about 7-9 degrees.

These values of ELAs and summer temperatures are comparable with the data from other regions [Porter, 2001; Ono et al., 2005] and seem suggest of global behavior of climate changes during LGM. This study was supported by Russian Foundation For Basic Research (RFBR), grants 04-05-64857 and 07-05-00221.