



Glacier variations in the second half of the Holocene in the Northern-Chyisky Range, Central Altai

A.N. Nazarov (1), A.R. Agatova (2)

(1) Institute for water and environmental problems SB RAS, Barnaul, Russia, (2) Institute of geology and mineralogy SB RAS, Novosibirsk, Russia (agatr@mail.ru)

On the basis of radiocarbon dating of moraines and position of the uppermost findings of the wood remains we identified the relative amplitude and timing of the most important glacial and climatic events occurred in second half of the Holocene. We studied six glacial valleys of the North Chujsky range (Central Altai, Southern Siberia). 42 new radiocarbon dates cover the interval from 7000 years ago to the first half of 19th century. For this analyses we also used 26 radiocarbon dates obtained by our predecessors.

At 7000 years ago and earlier the upper tree limit in the North Chujsky range rose up to about 2600 m and it did not descend lower than now until 5000 years ago. We are speculating that at that time the glaciers were much smaller than now. The glaciers were the largest during the “Akkemsky” stage, occurred between 5000 and 4000 years ago. According to the 14C datings of wood remains the upper tree limit exceeded the modern level several times about 4000 and about 3000 years ago. The beginning of the “Historical” stage of glacier advance is associated with the activation of slope processes and glacier advances after 3000 years ago. Judging by the dating of relict wood the upper climatic boundary of this stage occurred earlier than 1700 years ago. The later glaciers variations did not exceed their sizes in 13-19th centuries. Before AD 500 the upper tree limit did not descend below the modern position. It was probably higher than now at AD 700 – 900 and the glaciers were probably smaller than today. At the boundary of 9th and 10th centuries, the upper tree limit descends and some trees growing previously at the uppermost frontier died. In 12th century the wood vegetation at the level of the modern tree limit has regenerated again (“Medieval cli-

matic optimum”). The optimum terminated in the middle or the end of 13th century (beginning of “Aktru” glacial advance).

Taking into consideration the dates of the trees killed by glaciers, the advance begun in the second half of 13th century and culminated in the late 13th -early 14th centuries.

The Aktru stage culminated at the end of 15th – the beginning of 16th centuries. After this advance the glaciers retreated and stabilized at the level of their first or second moraines. At that time we identified the degradation of wood vegetation at the upper tree limit, but not in the vicinity of the glaciers (2-3 km away from them). Definitive glacier contraction occurs in first half of 19th century. The thermal minimum of the middle of 19th century, the greatest in the last millennium, did not influence positively the mass balance of glaciers. The Holocene climatic variations in Altai were intense, but their amplitude reduces from past to present. The studies were supported by FAP "Integration" «Glaciers of mountains of inner Asia in 17th – 20th centuries and the tendency of their development in XXI century», RFBR (grants # 03-05-64852 and # 06-05-64920).