



Pleistocene glacial advances in the Verkhoyansk Mountains, North-Eastern Siberia

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Pleistocene glacial advances in the Verkhoyansk Mountains have been studied by fieldwork and satellite images. The main topic of research was the extend and timing of glacial advances in the Mountain System. Several opinions regarding these topics have been expressed in the last centuries. Grosswald and Hughes (2002) proposed a major ice cover during the last glacial Maximum (LGM). This ice dome centred over the Jana highlands east of the mountain system, stretching to the west across the main ridge of the Werchojansk System partly damming the Lena River. In the north, the ice dome was connected to a large ice sheet in the Arctic Ocean. In contrast to this opinion most researchers propose for the LGM an isolated valley glacier system in the Verkhoyansk Mountain with piedmont glaciers in the foreland. A middle Pleistocene glaciation reached the Lena River (e.g. Kolpakov 1979).

The study area was located along two rives in the south-western part of the mountain system (Tumara and Djanushka River). During the fieldwork extensive geomorphological mapping as well as sedimentological work was carried out. Selected profiles were sampled for Optical Stimulated Luminescence (OSL) and Radiocarbon dating. The research was supported by remote sensing data (Landsat ETM+ and Corona) to identify key regions for fieldwork and to map areas of the mountain system being not accessible.

According to our results, up to five major terminal moraines have been deposited by Pleistocene valley glaciers in the study area. The youngest glacier advance did not reach the foreland of the mountain system. The older glaciers created large concen-

tric terminal moraines up to 200m in elevation and with a diameter of some tens of kilometres in the mountain foreland. The outermost of these moraines are strongly eroded. The younger terminal moraines consist of several ridges caused by glacier oscillations with numerous lakes. Similar sets of moraines have been identified in the whole Verkhoyansk Mountain system using remote sensing data.

First results from absolute dating in the catchment of the Tumara River, mainly OSL age estimates of aeolian sediments covering moraines, are not in agreement with previous investigations about the timing of the glacial advances. The deposition of the uppermost terminal moraine took place before 30ka BP. The next terminal moraine downstream, which already reached the foreland, is older than 60ka BP, while the third terminal moraine may have an age of 80ka. This last age is based on a single sample of a sandy layer in the upper part of the moraine. The outermost moraine at the Djanushka River is presumably older than the last glacial cycle. As there are no terminal moraines upstream of the first and youngest dated moraine, a major glacial advance during the global Last Glacial Maximum is at least doubtful for the Verkhoyansk Mountains.

References:

Grosswald, M.G. & T.J. Hughes (2002): The Russian component of an Arctic Ice Sheet during the Last Glacial Maximum. *Quaternary Science Reviews* 21:121-146.

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