THE HISTORY OF THE MOKSHA RIVER VALLEY DEVELOPMENT IN THE LATE PLEISTOCENE

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The Moksha River valley was studied in its lower part between the Tsna River confluence and the mouth of the Moksha River. Moksha is a meandering channel. On the key site the Moksha River has wide floodplain with large and small paleochannels on its surface (Fig. 1). Small paleochannels have the same parameters as the modern river channel: their width is about 100-150 m, wavelength is between 300-400 and 600-700 m. Large paleochannels' parameters are few times bigger: their width is about 250-300 m, wavelength is about 1500-2000 m. These large paleochannels (macromeanders) are the signs of Late Pleistocene high flood activity epochs.

We studied both large and small paleochannels to reconstruct palaeohydrology and history of the Moksha River valley development in Late Pleistocene. Large paleochannels correspond to the time of high river runoff. The oldest ones of small paleochannels were studied to know the time of lowering of the river runoff.

Wide floodplain and two levels of terraces are presented on the studied part of the Moksha River valley. The height of the floodplain is from 1 to 6 m, of the first terrace – about 9-11 m, of the second terrace – 18-22 m. The width of the valley in the study area is about 14-16 km, but sometimes it can reach 20-22 km and more. The width of the floodplain is about 12-14 km.

The main aims of our study were reconstruction of Late Pleistocene history of the Moksha River valley development and establishing the absolute chronology of paleochannels' formation.

In our study we used field and laboratory methods. Boreholes in large and small paleochannels were made during fieldwork in August-September 2019 and September 2020. Organic material from alluvium of the river valley bottom was sampled to make radiocarbon (AMS) dating to find the time of river incision and aggradation, paleochannels' formation and infilling. Radiocarbon (AMS) dating was done in the Laboratory of Radiocarbon Dating and Electronic Microscopy of the Institute of Geography (Russian Academy of Sciences, Moscow). Radiocarbon dates were calibrated (IntCal20) using the online version of OxCal 4.4 program [1]. Also, we made the reconstructions of paleo-discharges of the Moksha River based on big paleochannels' parameters. For quantitative estimates of paleo-discharges we used the method developed by Alexey Sidorchuk [2].

Data analysis shows the following results and conclusions. In the interval between 40-30 ka BP, the river incised deeper than the present level, due to the increase of the river runoff associated with climatic changes. Then the incision was replaced by the filling of the valley caused by the drying up of the climate and a lowering of the river runoff, that was more significant on the period of the last glacial maximum (LGM, 23-20 ka BP). In the Late Glacial starting from 18.5 ka BP there was again a significant increase in river runoff, which led to the formation of macromeanders and widening of the valley bottom. Modern wide high floodplain was formed at that time. The Holocene was characterized by a decrease in runoff and channel parameters and narrowing of the meandering belt of the river.

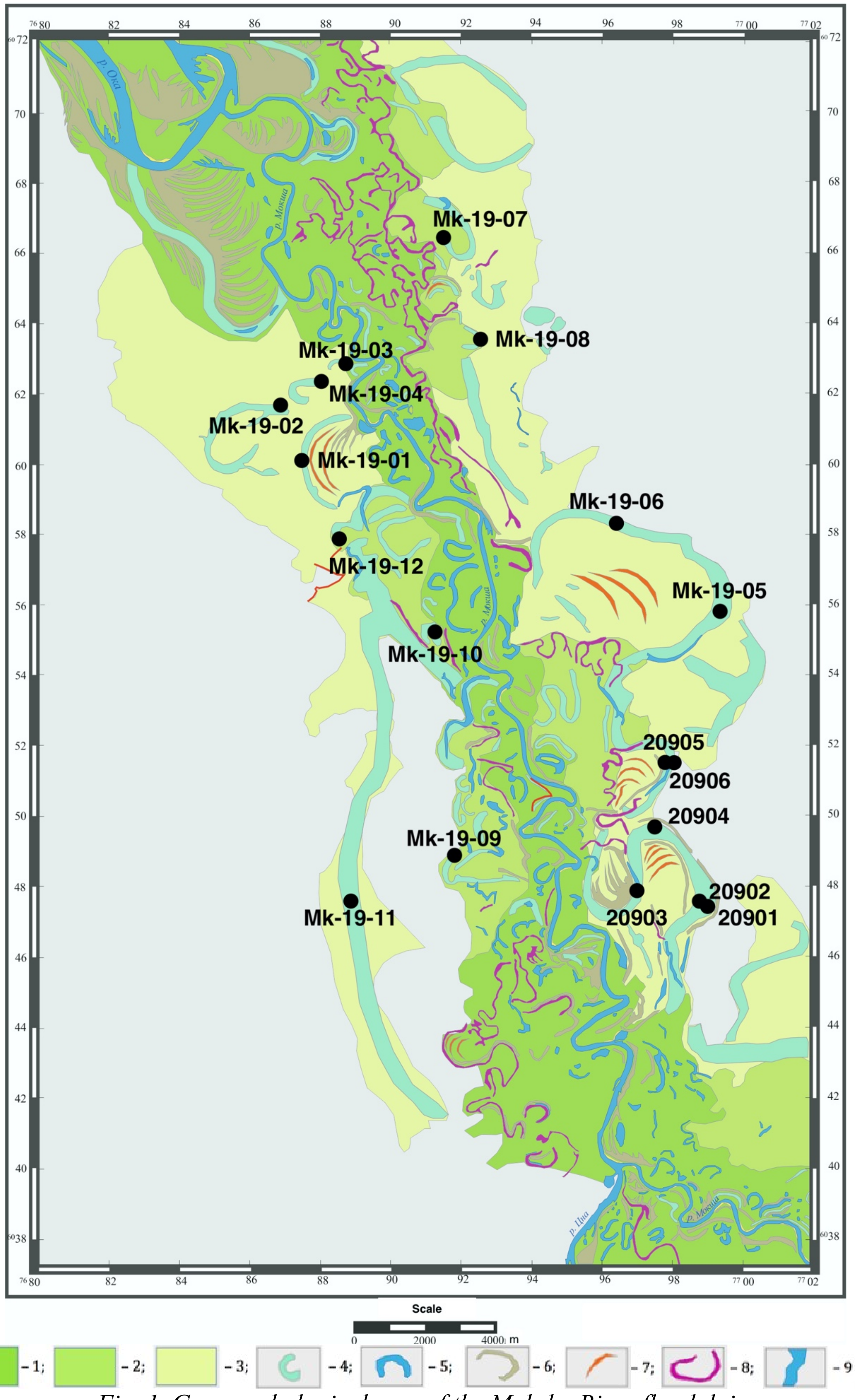

Fig. 1. Geomorphological map of the Moksha River floodplain.
Symbols: 1 – Late Holocene floodplain; 2 – Early Holocene floodplain; 3 – Late Pleistocene high floodplain; 4 – palaeochannels; 5 – oxbow lakes; 6 – levees; 7 – scroll bars; 8 – floodplain channels; 9 – modern river channel.

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