THE GLACIATION HISTORY OF THE BELARUSIAN POOZERIE AREA (AS BASED ON 3D GIS-MODELS OF THE GLACIAL/INTERGLACIAL PALEOSURFACES)

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The present-day landscape of Belarus was shaped by repeated Pleistocene glaciations. Five major ice sheets affected the country during the Pleistocene: the Narev, Berezina, Dnieper, Sozh and Poozerian glaciations. The sequence of glacial/interglacial deposits reaches a maximum thickness of 325 m, with an average thickness of 75-80 m (*Matveyev, 1995*). The last advance of the Scandinavian Ice Sheet in Belarus occurred during the late Pleistocene Poozerian Glaciation (*Karabanov et al., 2004; Matveyev, 1995*). The ice covered only the northern part of the country. The territory, which is situated within the last glacial maximum in Belarus, is named the Belarusian Poozerie Area.

There are a lot of geological materials related to the Quaternary period, collected by Belarusian geologists during the last decades. The aim of the present work is a reconstruction of the glacial history of northern part of Belarus (the Belarusian Poozerie Area), using the results of drillings in Quaternary deposits. The main instrument of the study is geographical information systems (GIS). GIS are getting a special significance in the current development of geology and geomorphology as GIS-technologies allow to visualize landforms and geological data, as well as to carry out different kinds of geomorphological and geological analysis and modelling (three-dimensional models of landforms and geological paleosurfaces).

The results of interpretation of drillings in Quaternary deposits and description of natural outcrops *(Levickaya, 1990)* have been used for reconstruction of the glacial history of the Belarusian Poozerie Area. These geological materials include information about position (latitude/longitude) of drilling wells (or natural outcrops) and interpretation of drilling/outcrop logs (depth in m a.s.l. of the Quaternary layers). The used material is also maps of Quaternary sediments of each glacial and interglacial in the scale of 1:500 000. The spatial information of the position of drilling wells and natural outcrops has been transformed in digital form according to its coordinates using the software of the geographical informational system ArcGis 9.1 (ESRI, USA). The upper paleosurfaces of pre-Quaternary (Devonian) sediments and all glacial/interglacial complexes have been constructed using the interpretation of drilling/outcrop logs (see the examples as Figures 1-6). These paleosurfaces have been created with the interpolation function (Spline method with option of tension) in Spatial Analyst of ArcGis 9.1. The maps of pre-Quaternary and Quaternary sediments *(Levickaya, 1990)* have also been transformed in digital form, using the special function of georeferencing in ArcGis 9.1. These maps have been corrected, taken into account the latest investigation in the Belarusian Poozerie Area. Finally, corrected information has been put in digital form as maps of pre-Quaternary bedrock and sediments of each glacial and interglacial.

In consequence, we find that the application of modern GIS-technologies in the study of glacial/interglacial patterns of the Belarusian Poozerie Area allows constructing GIS maps of pre-Quaternary and Quaternary upper paleosurfaces and sediments. The obtained results of GIS-modelling as well as geological data of the latest field investigation enable summarizing the glacial history of the northern part of Belarus.

References:

Karabanov, A. K., Matveyev, A. V., & Pavlovskaya, I. E., 2004: The main glacial limits in Belarus. In Ehlers, J., and Gibbard, P. (eds.): Quaternary Glaciations - Extent and Chronology, 15-18. Elsevier B. V., Amsterdam.

Levickaya R. I., 1990: Collection and summarizing of materials of Quaternary sediments of the northern part of Belarusian SSR for the composition of maps of Quaternary layers in the scale of 1:500000., Minsk. [in Russian].

Matveyev, A. V., 1995: Glacial history of Belarus. In: Glacial deposits in north-eastern Europe (J. Ehlers, S. Kozarski, Ph. Gibbard - eds), 267-276. Brookfield, Rotterdam.

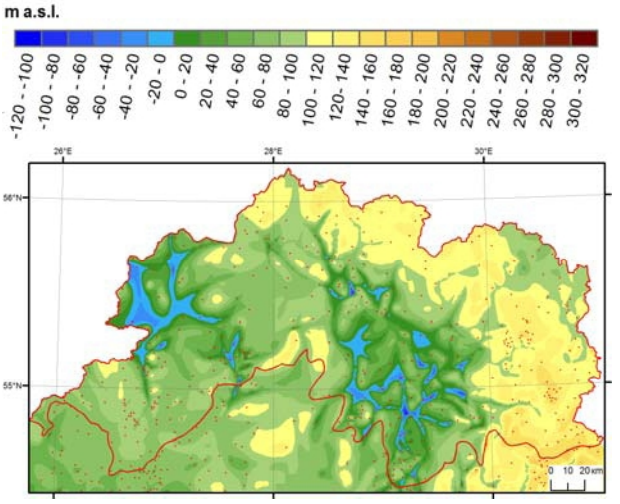

Figure 1. ***A model of the upper paleosurface of the pre-Quaternary (Devonian) sedimentary deposits***

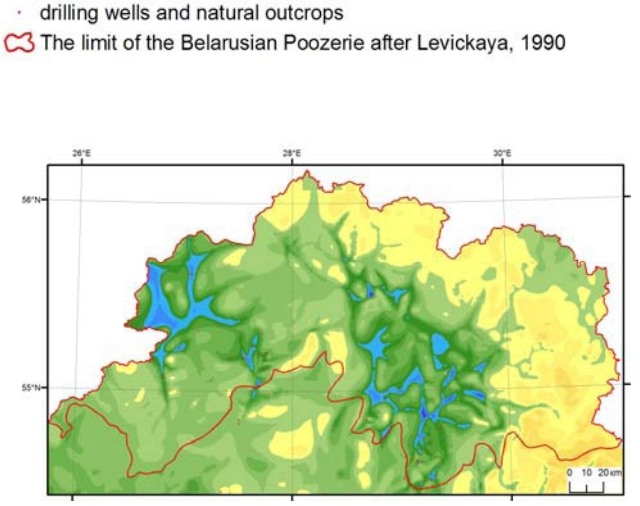

Figure 2. ***A model of the upper paleosurface of the Narev (a stadial of the Waalian) glacial complex***

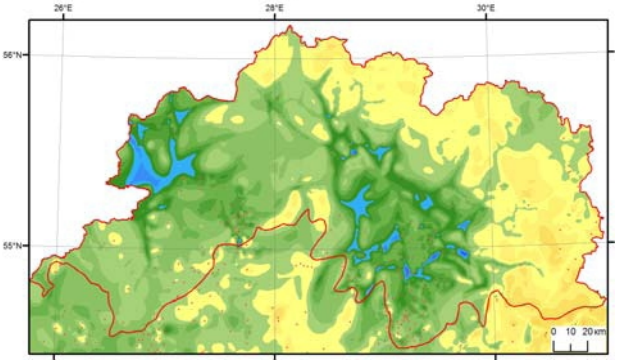

Figure 3. ***A model of the upper paleosurface of the Berezina (Elsterian) glacial complex***

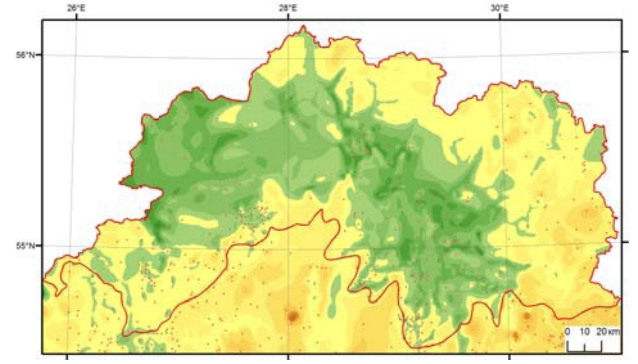

Figure 4. ***A model of the upper paleosurface of the Dnieper stadial of the Pripyat (Saalian) glacial complex***

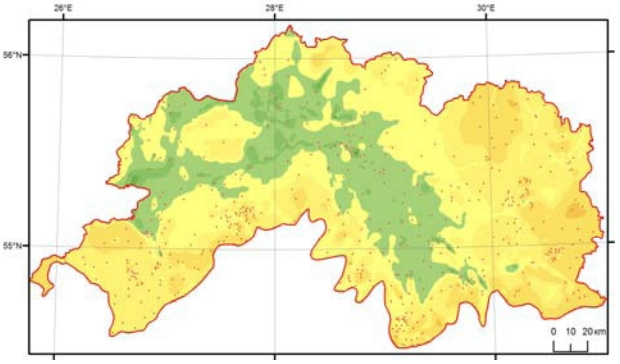

Figure 5. ***A model of the upper paleosurface of the Sozh stadial of the Pripyat (Saalian) glacial complex***

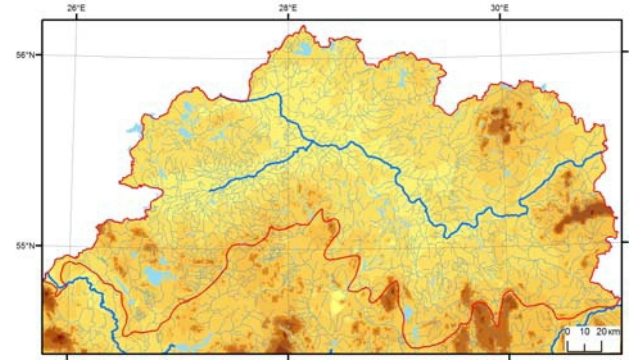

Figure 6. ***The digital terrain model (the upper surface of the Poozerie (Weichselian) glacial complex)***