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**Opinion on PhD. thesis of Ekaterina Khilkevich**  
*Geological structure, morphology and formation of subglacial water-erosion valleys  
of the Belarusian Poozerie area in Quaternary*

The abstract of the PhD dissertation of Ekaterina Khilkevich indicates it to be an original monograph of the Pleistocene glacial tunnel valleys in the Belarusian. The abstract has 25 pages and 5 figures. The text is composed of 7 chapters, supplied with 19 references (among which there are 9 publications of the authoress) and summaries in Russian, Belarusian and English. The main objective of research was to determine the principles of the glacial tunnel valleys' development in the study area, their generations, morphogenetic evolution and its phases, and the associated natural resources.

Collection and detailed examination of geological data was done in 312 outcrops with structural and petrographic analyses, about 3000 drillings and several geological maps. Based on stratigraphic setting of the Alexandrian and Muravian interglacial deposits, the generations of the Berezinian, Pripyatian and Poozerian tunnel valleys were distinguished. Listing the morphological differences between tunnel valleys and their spatial distribution against the ice sheet margin during the last glaciation enabled to determine the mechanisms of their formation.

Two main groups of the glacial tunnel valleys were distinguished. The first one developed during rapid runoff of subglacial lakes and the second (less distinct) was eroded by supraglacial meltwaters migrating towards the ice sheet bedrock. These two groups were located against hypothetical zones in which warm, cold or mixed basal ice prevailed. It should be taken under consideration that modern dimensions of a single tunnel valley, especially of the second group, do not reflect a contemporary drainage pattern but have been formed during several intermittent episodes. And I do not believe that terraces (kame terraces?) could be preserved inside the buried glacial tunnel valleys and could survive during deglaciation (see Fig. 4). This aspect needs a hard geological evidence.

Clue points that formed the basis for the final conclusions specified the origin and development of glacial tunnel valleys in north-eastern Belarus, their connection with thermal regime of the ice sheet and relation to the ice margin. Morphology and structural variability of

glacial tunnel valleys are strictly dependent on variability of sedimentary conditions, setting of the ice sheet as well as meltwater production and its subglacial storage. The glacial tunnel valleys are very good groundwater reservoirs.

The thesis brings out several statements that are important for the regional and glacial geology in the territory of Belarus. The glacial tunnel valleys pattern is only roughly dependent on distribution of ice-marginal formations and the proposed two groups are a significant input into their classification. After analysis of PhD thesis, the accompanied publishing activity and the research experience of Ekaterina Khilkevich, I find them suitable to attain a PhD degree in general and regional geology.

Warsaw, 2023/11/06

A handwritten signature in blue ink, appearing to be 'M. K.', is located to the right of the date.