



Determination of depositional environment and luminescence dating of Pleistocene deposits in the Biely Váh valley, southern foothills of the Tatra Mountains, Slovakia

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Introduction

The Tatra mountains have had several glaciations during the Quaternary. The deposits located in the southern foothills (Fig. 1) were classified as glaciofluvial, based on geomorphology, without further investigation. This project aims to answer the following questions:

What is the depositional history of these deposits?

Which were the depositional processes that shaped the foothills?

When were this sediments deposited?

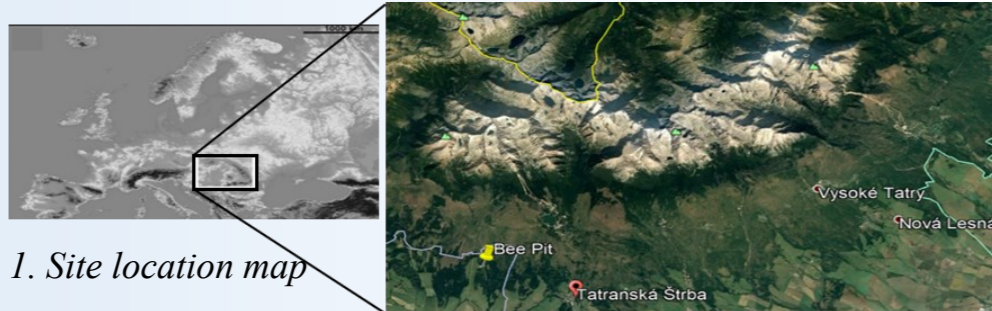


Fig. 1. Site location map

Methods

Collected samples in the fieldwork were used for sedimentological analysis and luminescence dating. The description of units was complemented with clasts shape and maximum particle size analysis. Both optically stimulated (OSL) and infrared stimulated luminescence (IRSL).

Results

• The sedimentological analysis yielded the identification of 13 units, mainly composed of gravel with cobbles and boulders with sand beds among the coarser ones (Fig. 2).

• Eleven samples were collected for luminescence dating.

• The OSL dating gave bad results due to the poor quality of the quartz grains so IRSL dating was used on the k-feldspar grains to determine the ages.

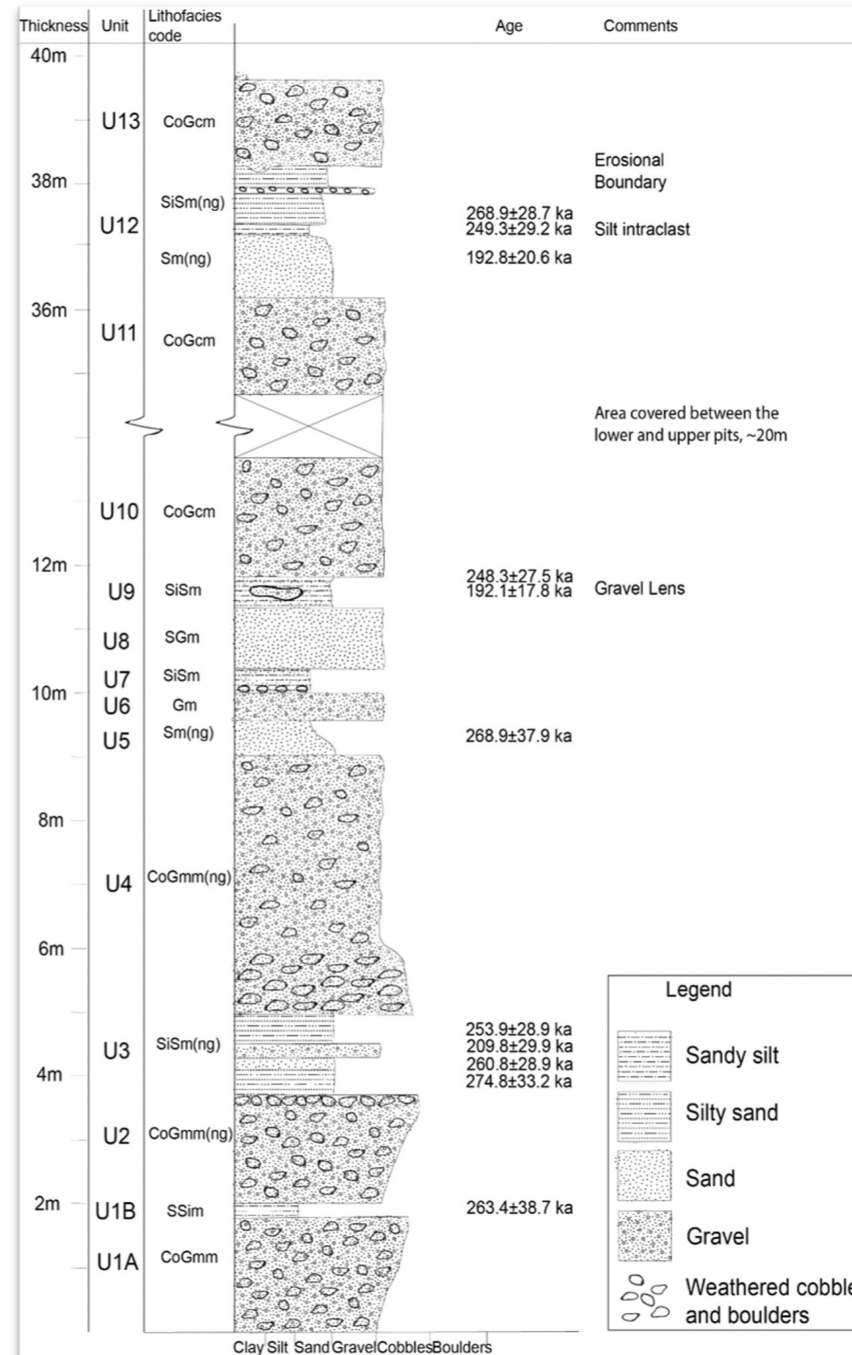


Fig. 2. General log depicting all the Bee Pit units with the ages from the collected samples

Discussion

• Sedimentological analysis indicated that the process of deposition had a high energy component, representative of subaerial sediment-water flows. Given the features of the sediments it was identified as a hyperconcentrated flow.

• For the age determination, the uncorrected pIRIR225 ages were selected given the lower fading rate, resulting in reliable ages.

Conclusions

• The results were compared to the know glacial history of the Tatra mountains.

• The obtained ages ca 200 to 260 ka and sediment features match with other deposits from the Tatra foothills that are correlated to the Riss glaciation.

• The results suggest a glacial advance to the present-day foothills of the High Tatras during the Riss glaciation and extensive deposition of glaciofluvial sediments outside the ice margin.