Valley incision in the Nízke Tatry Mts. estimated based on cave sediment age

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Triassic carbonate rocks forming the northern slopes of the Nízke Tatry Mts. (Slovakia) are hosting cave systems developed in eleven levels. Cave passages located in different altitudes were filled with fluvial, flood and chemogenic deposits in dependence on Demänovská and Janská karst valley incision. Except for the horizontal cave levels located in these karst valleys, additional cave systems were developed at high altitudes in the Nízke Tatry Mts. (in Krakova Hoľa, Kozie Chrbty, and Ohniště Plateau). Paleomagnetic polarities recorded in both fine clastic and chemogenic cave deposits were acquired by thermal and alternating field demagnetization. Magnetostratigraphic interpretation was verified by U-series dating of speleothems deposited in the sedimentary sections. The paleomagnetic age of sediments preserved in the high altitude cave systems was verified based on cosmogenic isotope activity measured in quartz pebbles. Based on obtained magnetostratigraphic pattern we are able to distinguish cave sediments deposited during Gauss (2.581–3.58 Ma), Matuyama (0.78–2.581 Ma), and Brunhes (<0.78 Ma) paleomagnetic chrons. The paleomagnetic record extracted from the high altitude cave systems indicates deposition between 3.2 and 1.8 Ma ago. The sediments had to be deposited during a period of tectonic stability when only shallow valleys were developed on both sites of the mountain range. The tectonic uplift in this area was accelerated since 1.8 Ma. The valley incision rate can be estimated based on paleomagnetic polarity and elevation data as follows: 6 cm/ka during 1.8–1.1 Ma; 32 cm/ka during 1.1–0.78 Ma; and 4 cm/ka since 0.78 Ma. The remarkable increase of the valley incision during the latest Early Pleistocene corresponds with results of valley incision study performed in the Swiss Alps (Haeuselmann *et al.*, 2007). The periods of aluvial aggradation in the caves were also correlated with terraces deposited by the Váh River running 10 km north from the karst area. Paleomagnetic polarity of the fluvial deposits filling the largest 4th cave level show the age of sediments younger than 0.78 Ma which is in agreement with stratigraphic inclusion of the most extensive Váh River terrace to the early Mid Pleistocene (Dropa, 1966).

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