Evolution and age of the Central Western Carpathians morphology on the basis of a comprehensive caves study (cave morphology, neo-tectonic activity and age of cave sediments)

The problem of the age of the mountain areas has been discussed for a long time. Depending on the science area discussions concern the evolution of the hydrological system, age and changes of valleys incision or geological structures. The proposed research focuses on determining the age of the recent system of karst water circulation in mountains areas which is directly related to age of adjacent valley incision and morphology. The key to getting the information is study of karst systems located at the bottom of the valley or on a small elevation. The caves constitute a kind of "traps" and give a much greater chance of the preservation of sediments (and deposition processes records) in a period of intense destruction at the surface.

Caves cannot be studied as a forms separated from karst area (mountains, valleys etc.) history. Caves genesis is determined by adjacent valleys history. Close relation between karst forms, karst drainage system, cave morphology and valleys as hydrological base makes possible to study changes in mountain morphology, valleys levels, determination of the periods of intensive valley incision etc. basing on karst studies. The evolution of cave system can be reconstructed based on the examination forms of corrosion and erosion and sediment filling the corridors. One of most useful sediment type are speleothems which can be easily connected with specific stages of cave development. Speleothems are autochthonic deposits which are formed under vadose conditions then the age of oldest speleothems is estimation of minimum age of cave passage drying what usually is caused by hydrological base lowering – usually valley incision causing the change of the drainage system (the creation of new, low-lying karst spring). Layers of allochthonic, clastic sediments document periods of water inflow into the caves during the plugging of outflows or periods of water increase (for example at the deglaciation periods). Sometimes clastic deposits of different age are separated by flowstones what gives the opportunity to restore the flow regime changes and determine the time scale for these changes. These changes can be correlated with the events outside the cave (in the valleys).

Based on previous research results that the caves are developed in strong connection with the history of the surrounding valleys does not raise any slightest doubt. In a given system: ponors zone - a cave – karst spring, to determine the correct age, it is important to correctly determine epi-phreatic zone in the cave what can be done on the basis of examination of corrosion and depositional forms in the caves. The key to obtain numerical information about the age of the processes are sediments occurring in the cave. Basic are speleothems because (1) their relative age to the corrosion forms can be determined, (2) its can be directly and reliably dated by isotopic methods, (3) the age of the oldest speleothems sets the minimum age to passage drying (transition between phreatic and vadose state).

Discussions on the age of the caves of Tatra Mts. and Low Tatra Mts last a long time. Correct reconstruction of caves development help to understand youngest part of mountains history.

Taking into account the new analytical capabilities and increasing range of information, the purpose of our research we defined as follows: **based on the dating of the oldest speleothems and allochtonic sediments, analyzes of corrosion forms in the caves of the Tatra Mts. and Low Tatra Mts. determine the age of the current karst drainage system and thus age current valleys level and to reconstruct the evolutionary history of the valley during the last 500 thousand years.**

Additional effects of the research will be:

a. verification of the suitability of OSL method for determining the allochthonic deposits residence time in caves and determine the re-deposition of sediments in the cave;
b. the map of corrosion forms, sediment distribution and speleothems generation in surveyed caves;
c. create a schema of karst system evolution in the major valleys of the Tatra Mts. and the Demänovská Valley on the basis of a precise U-Th dating of speleothems.

As a final results will be created descriptive model of development investigated valleys and their catchment area in conjunction with the evolution of surveyed cave system.