Valley incision and karst development based on 26Al/10Be burial dating of cave sediments, Western Mecsek Mountains, Hungary, Pannonian Basin

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Abstract

The southern side of the Western Mecsek Mountains (_˜200-600 m asl) is the potential location of a high-level radioactive waste disposal site, therefore the quantification of its long-term surface lowering and uplift rates are of crucial importance. The study area includes partly loess covered karst on Triassic limestones, with typically small caves of cross-sections being narrow, lengths rarely exceeding 100 m and depths mostly remaining below 50 m. No successive cave levels were identified that would indicate long-term uplift; the most prominent subhorizontal passages developed close to the present-day karst water level. The karst receives allochthonous siliciclastic sediments (Triassic red sandstone, red clay and loess) transported through the valleys and washed into the caves through sinkholes.

Our main objectives were to constrain the karst development in time, to date the onset of the development of the modern caves and to obtain data on landscape evolution with special emphasis on valley incision. 26Al/10Be burial ages combined with cave and surface geomorphology enabled us to calculate incision rates at four locations. Slow incision/uplift rates, i.e., _˜10 m/Ma for the last _˜3 Ma and up to _˜30 m/Ma for the last 1 Ma, were estimated. Locally much faster river incision during the last _˜350 ka was recognised to be a result of significant reorganization of surface drainage pattern.

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Keywords: cosmogenic nuclides, 26Al/10Be burial age, cave sediments, karst evolution, uplift

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