Acta Geologica Hungarica, Vol. 46/2, pp. 149-160 (2003)

Stable isotope study in a weakly developed paleosol horizon in the Quaternary Vár-hegy travertine (Budapest, Hungary)

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The intraformational paleosol and calcareous muddy cavity fills interbedded in the travertine of the Vár-hegy in Budapest were analyzed for carbon and oxygen isotope compositions and compared with the isotope compositions of the host travertine. Microscopic investigations indicate mechanical reworking of the travertine and mixing with the allothigenic siliciclastic material. Micromorphological features, e. g. needle-fiber calcite, carbonate hypocoatings around pores, ferruginous precipitations and clay infillings in the paleosol and cavity fills indicate that in-situ pedogenic processes were active in both layers. The presence of ferrihydrite in the A horizon of the paleosol also supports pedogenic alteration. The stable carbon and oxygen isotope compositions of bulk carbonate of paleosol and cavity fills ($\delta^{13}C$= -0.6 to 2.1‰ and $\delta^{18}O$= -16.7 to-12.9‰) are very close to the compositions of the host travertine ($\delta^{13}C$=1.1 to 2.1‰ and $\delta^{18}O$ = -17.7 to -13.7‰,) and differ from the probable isotope compositions of pedogenic carbonate ($\delta^{13}C$ values around -11‰). These results indicate that the studied paleosol and cavity fills have only minor pedogenic component (authigenic carbonate content up to 20%); thus the paleosol represents a weakly developed soil, mostly composed of travertine clasts and allothigenic siliciclastic material.

Keywords: Quaternary, travertine, paleosol, needle-fiber calcite, isotope

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Received: February 28, 2003