

Carbon nitrogen ratio, $\delta^{13}\text{C}$, $\delta^{15}\text{N}$ distribution in eroded and buried soil profiles along a small catena

Gergely Jakab (1), István Hegyi (2), Michael Fullen (3), and Zoltán Szalai (1)

(1) Research Centre for Astronomy and Earth Sciences Hungarian Academy of Sciences, Geographical Institute, Budapest, Hungary (jakabg@mtafki.hu), (2) Research Centre for Astronomy and Earth Sciences Hungarian Academy of Sciences, Institute for Geological and Geochemical Research, Budapest, Hungary, (3) Faculty of Science and Engineering, The University of Wolverhampton, Wolverhampton, UK

In addition to the serious environmental hazard soil erosion forms and reforms the soil surface. The intensity of these degrading and burial processes is highly variable, it fluctuates in time. One can only get a single view of the current status by the spatial analysis of soil depth and properties. Present study aims to estimate the dynamics of the former driving processes in detail those resulted the recent form of the landscape. Soil samples were taken along two intensively cultivated catenas from the surface to the parent material in vertical and from the ridge to the toe in horizontal direction. A non disturbed soil profile under continuous forest was also sampled as the initial, control status. Soil organic carbon (SOC), total nitrogen (TN), carbon nitrogen ratio (C/N), ^{13}C and ^{15}N stable isotope ratios were measured. Soil redistribution was supposed to be started right after the forest clearance ~ 300 years before. Results indicated that the whole amount of solum (1 m) was taken by erosion in some local spots. Most of the soil loss was deposited at the toe, while vertical SOC and $\delta^{13}\text{C}$ distributions (peaks) in the deposited profiles indicated the original soil surface at various depth. SOC peak in the profile indicated deeper in situ solum compared to the vertical peaks of the C/N and $\delta^{13}\text{C}$ values. Presumably the layer of the highest SOC values in the sedimentation profiles is also formed by the deposition of initial soil loss from the upper parts of the catena. At this initial phase the selectivity of erosion was supposed to be quite effective for SOC that resulted the highest value. Therefore C/N and $\delta^{13}\text{C}$ peaks fingerprint the original, in situ soil surface more adequately. The most effective erosion and deposition period was immediately after forest clearance. This emphasized that continuous tillage erosion had subordinate role compared to that of relief. Moreover, SOC erosion and burial in the present case was a sink in terms of mitigation of the atmospheric carbon content. G. Jakab was supported by the János Bolyai scholarship of the HAS, which is kindly acknowledged.