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The influence of landscape design on soil erosion in the Chernozem region of the South-West Foreland of the West Carpathians in the Medevial to Modern Times and po-collectivization periods

Anna Smetanová (1,2), Gert Verstraeten (3), Gerda Nyens (4), Bastiaan Notebaert (3,5), Piotr Szwarczewski (6), Ján Čurlík (7), Libor Burian (2), Seyed Ali Kazeminejad (8), Aleš Létal (9), and Markus Dotterweich (10)

(1) INRA, LISAH, Montpellier, France (anna.smetanova@supagro.inra.fr), (2) Comenius University in Bratislava, Department of Physical Geography and Geoecology, Bratislava, Slovak Republic, (3) KU Leuven, Department of Earth and Environmental Sciences, Leuven, Belgium, (4) KU Leuven, Nuclear and Radiation Physics, Leuven, Belgium, (5) Research Foundation Flanders - FWO, Belgium, (6) University of Warsaw, Faculty of Geography and Regional Studies, Warsaw, Poland, (7) Comenius University in Bratislava, Department of Geochemistry, Bratislava, Slovak Republic, (8) University Koblenz-Landau, Faculty 7, Landau, Germany, (9) Palacký University of Olomouc, Department of Geography, Olomouc, Czech Republic, (10) GEOarch - Applied Geoarchaeology, Landau, Germany

Since the onset of agriculture the erosion processes – water, tillage and wind erosion - have dominated the soil degradation and the loss of soil resources in the agricultural landscapes worldwide. Their influence has varied within time and spatial scales according to changing environmental and societal factors, including human-induced landscape design. The Holocene landforms transformation in a zero-order catchment of a dry valley (0.28 km2) in the Chernozem region of the South-West Foreland of the West Carpathians was studied. The analyses of geoarchives and spatial patterns of soil profile truncation and colluviation were performed and the historical field border structure reconstructed. The results showed strong relationship between the long-term soil erosion pattern and landscape sructure in areas with stable historical landscape structure. It favored the prevalence of tillage erosion and tillage induced soil translocation and minimized the fluxes and sediment delivery of wind and water erosion. The erosion of the entire 0,6 m thick humus horizon by tillage was documented during historical times. The intensification of agriculture since the mid -18th Century led to the change in field borders and thus shifted the long-term fluxes of soil translocation. The most profound changes were connected to the collectivization of agriculture since 1950's, when the entire catchment became part of one field and heavy machinery started to be applied. The general contour direction of the tillage decreased locally the down-slope tillage translocation, but became parallel to flow direction in the valley bottom and to the two main dominant wind directions. The areas with a significant proportion of parent material (loess) in the tillage horizon increased almost four-fold in 50 years. They are similarly to the older ones localized in the upper-slope position, but they spread to concavities and less steep slope gradients. It implied that the change of tillage direction in combination with intensification of agricultural practices did not significantly decrease erosion and did not influenced the soil remediation at slopes. In both, historical and present-day times, the field borders were not properly adjusted to topography and to the dominant soil erosion processes, despite the historical structure seemed to be better fitted to the less intensive Medevial to Modern Era agricultural practices and therefore more anti-erosive in whole. The importance of the landscape structure in the sediment redistribution confirmed the necessity of considering it when long-term sediment budgets are calculated and geoarchives studied in the lowland agricultural areas with a continental climate. It also proved that a cautious study of inherited and current soil erosion patterns and the response of soil erosion processes to landscape design changes under different environmental conditions have to be incorporated when agricultural adaptation to global change is considered. Anna Smetanová has received the support of the European Union, in the framework of the Marie-Curie FP7 COFUND People Programme, through the award of an AgreenSkills' fellowship (under grant agreement n° 267196). The ESF-EC-0006-07 and APVV-0625-11 are acknowledged for financial support.