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The Late Holocene climatic and anthropogenic record in flood-plain deposits of the Morava River (Czech Republic)

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The project is focused on deciphering the impact of climate and human activity on the sediment deposition in flood plain of the Morava River during the Holocene and particularly in the last millennium. To read the sedimentary record we acquired mineral magnetic characteristics and evaluated mineralogical composition of the sediments.

The thickness of the flood-plain deposits exposed in the erosion banks of the Morava River varies between 400 and 600 cm. Three vertical sections were sampled using plastic boxes (volume 6.7 ccm) with a vertical separation of less than 0.5 cm between sampling horizons for a total of 1806 samples. The high-resolution log of the mineral magnetic variations was obtained by rock magnetic methods (MS, NRM, ARM, SIRM, S-ratio). Magnetic record was completed by the grain size analyses and contents of organic matter (LOI), X-ray diffraction, quantification of expandable clay minerals (CEC), voltammetry of microparticles, and analysis of free Fe and Mn oxides by reductive/acid extraction. Radiocarbon dating was performed using organic material, such as tree trunk fragments, charcoal, and fern. The total Pb concentration and Pb isotopic variations measured in the sediments were used for identification of both Medieval and recent atmosphere pollution deposited in the river catchment. The combination of those methods permitted to identify several environmental changes in the Morava River catchment.

The oldest clear discontinuity begins at the depth of 200 cm, where the content of

the clayey fraction starts to decrease, and magnetic parameters have their first distinct maximum, possibly attributable to the colonization in the central Europe connected with large deforestation started in the 12th century. A significant increase of the Pb content with respect to the lover portion of the sequence was found at the depth of 150 cm indicating a period of intensive Medieval silver smelting (13/14th century). Above this level the sedimentation rate started to grow markedly, the mineralogy of the sediment was changed, and magnetic parameters have several well defined maxima. The sandy layer in the depth of 100 cm (17th century) probably indicate very dramatic erosion events in the catchment, followed by enhanced accumulation of sandy material during the Little Ice Age climax. The uppermost 50 cm represent material largely eroded from fields intensively exploited during the last century, documented by much enhanced concentration of magnetic minerals.

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