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Geoinformatic and geophysical methods for evaluation of deposition and reworking of sediments with contaminants in floodplain of the Ploucnice River, Czech Republic

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Complex study for the deposition and remobilization of pollutants in floodplain of the Ploucnice River requires geoinformatic, geomorphologic, geophysical and geochemical knowledge. Geoinformatic tools are usable in several science disciplines.
Photogrammetric methods are a big tool for land-use change development and digital surface model (DSM) reconstruction. The historical photographs from 1938 till 1994 were orthorectified using ERDAS 2013 LPS software. Historical and actual orthophotos were used to study the channel migration of the Ploucnice River and lateral shifts of the channel in the last 70 years. Historical digital surfer model, which is reconstructed from historical orthophotos with 60% overlaps, were used for 3D visualisation of historical landscape and shows land-use changes.
Accurate digital elevation model (DEM) from laser scanning dataset was created for geomorphological analysis. Topography was analysed with GIS methods and the geomorphologic interpretation was then performed.
The subsurface architecture of the floodplain and distribution of the sediment bodies were studied using electrical resistivity tomography (ERT). The Wenner-Schlumberger method with 104 electrodes in a single array was used. An inverse model resistivity section was produced from the apparent resistivity pseudosection by the least-square inversion method using RES2DINV software (Geotomo Software, Malaysia).
The contamination of the floodplain was analysed with both field and laboratory instruments. The portable gamma-spectrometer DISA 400A was used for acquisition of the total surface gamma activity in field. Several hundreds of soil samples (from drill cores) and recent flood deposits (after 2013 flood) were analysed by laboratory X-ray fluorescence spectrometer to describe deposition and remobilization of pollutants in floodplain, of which most important are Ba, Ni, Pb, U and Zn.
Geostatistical analysis was used for creation of a statistically valid prediction surface. The map of distribution of the surface gamma activity and map for contribution of pollutants after flood in the spring 2013were interpolated.