Geophysical Research Abstracts
Vol. 16, EGU2014-1542, 2014
EGU General Assembly 2014

Integrated geophysical approach in assessing karst presence and sinkhole hazard along flood-protection dykes of the Loire River, Orléans, France

Kévin SAMYN, Francis MATHIEU, Adnand BITRI, Aude NACHBAUR, and Luc CLOSSET
BRGM, Risk and Prevention Division, Orléans, France (k.samyn@brgm.fr, (+33) 02.38.64.36.89)

Non-invasive geophysical methods are often used for detecting near-surface defects and monitoring seepage in river dykes or dams. Between 2006 and 2011, a series of geophysical experiments were conducted to detect karst features below the dykes of the Loire River, Orléans, France. Multi-channel analysis of seismic surface waves (MASW) was used to obtain the shear wave velocity (Vs) profile of the subsurface below the dykes. As an effective approach for investigating the structure of the dykes, multi-channel resistivity surveys were also used to evaluate the electrical properties of material inside and under the dykes. This study discusses the exploration strategy and results for several sections of the dyke system. Based on the experimental data, Vs contours are used to geometrically and qualitatively describe the subsurface under the dykes and identify areas of mechanical weakness corresponding to karst features, while resistivity contours allow the distinguishing of interactions between karsts and the dykes through the identification of areas of flowing material to the depth. Known and unknown anomalies are identified. A practical approach that combines seismic and electric resistivity results is proposed to assess karst presence and sinkhole hazard along the investigated dykes using a susceptibility index. As a validation method, areas of strong karst susceptibility index along the dykes are compared to known collapse event (sinkholes, breaches, dolines) locations, available in databases.