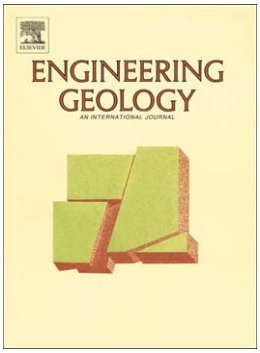

A multicriteria approach to karst subsidence hazard mapping supported by weights-of-evidence analysis

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PII: S0013-7952(15)30061-2
DOI: doi: 10.1016/j.enggeo.2015.09.001
Reference: ENGEO 4145

To appear in: *Engineering Geology*

Received date: 5 December 2014
Revised date: 27 August 2015
Accepted date: 2 September 2015

Please cite this article as: Perrin, J., Cartannaz, C., Noury, G., Vanoudheusden, E., A multicriteria approach to karst subsidence hazard mapping supported by weights-of-evidence analysis, *Engineering Geology* (2015), doi: 10.1016/j.enggeo.2015.09.001

A multicriteria approach to karst subsidence hazard mapping supported by Weights-of-Evidence analysis

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Abstract

Soil subsidence/collapse is a major geohazard occurring in karst regions. It occurs as suffosion or dropout sinkholes developing in the overburden overlying karst. Less frequently it corresponds to a breakdown of karst void ceiling (i.e., collapse sinkhole). This hazard can cause significant engineering challenges. Therefore decision-makers require the elaboration of methodologies for reliable predictions of such hazards (e.g., karst subsidence susceptibility and hazards maps, planning strategies, priority areas for detailed investigations).

This study aims at developing a methodological framework for the evaluation of potential conditioning factors controlling the occurrence of sinkholes in a context of limestone karst: potential conditioning factors are first determined based on underlying physical processes for different geological contexts (barren and mantled karsts). Then the relevance of each factor is evaluated against a set of representative karst subsidence locations using the weight-of-evidence theory and relevant factors are tested for independence. Relevant and independent factors are finally weighed and combined together (i.e., superimposed) to achieve karst subsidence susceptibility models. The best model (i.e., the one showing the highest predictability) is determined by a receiver operating characteristic (ROC) curve analysis, which is performed using a set of independent and representative karst subsidence locations.