



Remarks on collapse and subsidence formation in karst – hazards and risks

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The ground-surface failure process of collapse in karst, as well as of any kind of discontinuous earth-surface deformation is like the “top of an iceberg”. Surface collapse or subsidence is the only final expression of a long-term subsurface progressive caving-in process of rocks above underground solution or anthropogenic opening. According to experience, based on engineering geology, karst geomorphology and speleology studies on collapse and subsidence formation in carbonate and gypsum karst authors state that the subsurface processes expressed finally by surface morphology are not well known. So many factors influenced formation of surface deformation - the primary voids (depth to the surface, shape and dimension), geomechanical properties of the overlying rock masses, degree of karstification of the massif, as well as stage of geological evolution of karst and cave systems and time, that each particular collapse or subsidence event has an individual mechanism and nature. There is no depth interval above a cave system that is safe from collapse, and it may occur long after the cave system was formed and is not limited to a defined period of the evolution stage. Anisotropy nature of karst decide that there are no mathematical models and engineering well operating equations, even if very conceptual only, available to predict exactly when or where surface expression of collapse processes might take place. Formation of these forms in karst must generally be expected anywhere at any time. Additionally natural collapse and subsidence hazards and risks in karst terrains extremely increase if human activity is performed – mining, groundwater exploitation, dam construction etc.