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Structural analysis of a percolating fracture network in karst systems: the Antro del Corchia Cave, Alpi Apuane, Italy

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Modelling evolution of Karst aquifer in carbonate sequences requires to model flow and dissolution processes within percolation network that exploited narrow joints and bedding planes successively widened or sealed by carbonate dissolution/concretion processes. The process is very rapid with respect to geological times being generally less than 50 ky the time required for developing an integrated karst network (e.g. Bakalowicz, 2005; Siemers and Dreybrodt, 1998). The first step in modelling such a complex system is to analyse the actual fracture systems in terms of fracture attitude, distribution and conductivity. We present the first results of a structural study of a portion of the Antro del Corchia Cave in Alpi Apuane (northern Apennine, Italy) which consists of a large karst systems developed in the late Triassic-Jurassic metamorphic sequence of the Alpi Apuane (Molli and Vaselli, 2006; Piccini et al., 2008). Detailed structural analysis of brittle deformation and of its relationships with concretions along a nearly N-S trending transect in the Antro del Corchia Cave allowed us to determine which part of the actual fracture network belongs to the backbone of the percolating network. Fractures clearly sealed by concretions, fractures with clearly evidences of fluid circulation and dry fractures cutting across concretions have been classified in the cave. These observations are then compared with the geology of the area and with the observed fracture network at the surface, a level about 400 m above the analysed transect in the cave.

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