Geophysical Research Abstracts
Vol. 14, EGU2012-1604, 2012
EGU General Assembly 2012

Formation of large collapse dolines: A three-dimensional numerical perspective

T. Hiller (1), G. Kaufmann (1), D. Romanov (1), and F. Grabrovsek (2)

(1) Free University of Berlin, Institute of Geological Sciences, Geophysics Section, Malteserstr. 74-100, Haus D, 12249 Berlin, Germany, (2) Karst Research Institute ZRC SAZU, Titov trg 2, 6230 Postojna, Slovenia

Collapse dolines are a prominent surface expression of karst regions. They can reach diameters from one meter to several hundred meters, and their depth range varies between a few meters and several hundred meters. Field studies reveal that several of these structures originate from the enlargement of fissures and bedding partings in the sub-surface through the removal of calcite by CO_2-enriched water, and the subsequent collapse of these enlarged voids, which cause mechanical breakdown of the overburden.
We use the three-dimensional numerical modelling tool KARSTAQUIFER to simulate the temporal evolution of a zone of fractures along the water table. Enlarged fractures can collapse, once a critical width is reached, thus initiating the breakdown and the formation of a collapse doline. The repeated collapse of the fractures keeps the removal rate of calcite high and thus provides an effective process to form a large collapsed zone, which then can migrate towards the karst surface and finally cause a collapse doline.