Geophysical Research Abstracts,
Vol. 10, EGU2008-A-02229, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-02229
EGU General Assembly 2008

Leakage of dam sites in karst terrains

G. Kaufmann (1) and D. Romanov (1)

Institute of Geological Sciences, Free University Berlin, 12249 Berlin, Germany
(georg.kaufmann@fu-berlin.de)

More than a quarter of our population relies on drinking water from karst regions. However, dam sites in karst regions are prone to failure due to the unnaturally high hydraulic gradients created by the impounded water. These high hydraulic gradients accelerate the dissolutional widening of fractures and bedding planes beneath the dam by orders of magnitudes. As a result, unbearable leakage of karst reservoirs can occur during the lifetime of a dam site.

We present a numerical model of flow and dissolution under an artifical dam, which takes into account the chemistry of the impounded water, the structure of the bedrock beneath the dam, and flow laws for groundwater flow in porous, fractured aquifer settings. The positive feedback between chemical dissolution and increased flow will enhance the enlargement of fractures, which then can drain the dam site efficiently, making it impossible to store enough water in the reservoir. We estimate the break-through times of the reservoir from a sensitivity analysis of the relevant parameters. The model can be applied to real situations in karst regions.