Abstract title:
Geodetic observations to monitor natural hydraulic overpressure

C. Braitenberg\textsuperscript{1}, T. Pivetta\textsuperscript{1}, D.F. Barbolla\textsuperscript{2}, F. Gabrovšek\textsuperscript{3}, R. Devoti\textsuperscript{4}, I. Nagy\textsuperscript{1}.
\textsuperscript{1}University of Trieste, Department of Mathematics and Geosciences, Trieste, Italy.
\textsuperscript{2}Università del Salento, Dipartimento di Scienze e Tecnologie Biologiche ed Ambientali, Lecce, Italy.
\textsuperscript{3}ZRC-SAZU, Karst Research Institute, Postojna, Slovenia.
\textsuperscript{4}Istituto Nazionale di Geofisica e Vulcanologia, Osservatorio Nazionale Terremoti, Roma, Italy.

The pressurization of a channel system occurs naturally through intake of rainfall and river drainage. The consequences of up to 1MPa pressurization include sudden uprise of water level, blockage of channels, increased erosion and possible triggering of seismicity, with associated diversified hazards. We model the expected deformation with the Finite Element Method and analytical approaches, and find that the pressures induce deformation which can be geodetically detected. The careful analysis of GNSS timeseries and tilt observations recovered in N-Italy demonstrates that the signals are observable. The observations of tilt have been made in karstic caves where a GPS station has been colocated on the surface. The uplift of GPS during underground floods is expected to be up to several mm and the titling at the microradians level for the tiltmeters. The results demonstrate that geodetic observations could be used to monitor internal pressure loading of the underground channel system. The research is based on the results described in Grillo et al. 2018 and Braitenberg et al. 2019.

References