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## Coupled processes in clay during tunnel excavation

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Tunnel excavations are known to perturb the hosting rock mass at long distances, with changes in the hydrogeological flow affecting, as well as deforming the rock mass, inducing subsidence in a zone above the tunnel. During the extension of the Mont Terri Underground Rock Laboratory, we had the unique opportunity to monitor the final part of the excavation of Gallery18 and the final breakthrough.

The joint effort of two experiments (CS-D lead by ETH Zurich and FS-B lead by LBNL) allowed for a detailed characterization of the poro-elastic response of the rock mass and the Mont Terri Main Fault Zone to the excavation. Geophysical, geomechanical, and hydrogeological monitoring include: (1) pressure monitoring in several borehole intervals; (2) deformation at a chain potentiometer and fiber optics grouted in boreholes (normal to bedding and parallel to fault zone), and platform-tiltmeters installed at the tunnel floor, as well as detailed 3D displacement at the SIMFIP probe.

All monitoring systems detected major perturbations starting from 15 days before the breakthrough and continuing for several days after it. We summarize the observations and will combine numerical modelling and observed trend to conceptualized the pattern of poro-elastic deformation. The results of the analysis could help shedding light on the poro-elastic behaviour of clay, providing interesting hints for the modeling community and helping in planning of future nuclear waste repositories in such material.