PEGGHy: a controlled geological environment to challenge modelling and imaging methods

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Résumé

When testing new modelling or imaging methods, researchers often rely on synthetic cases. They usually consist of a reference geomodel in which data are computed so that the methods can be challenged. To make these data realistic, noise is added, whose features can be questionable. Moreover, geomodels are simpler than real geological environments because they cannot contain the whole spectrum of geological scales. To circumvent these issues, we have developed the Platform for Experimental Geophysics, Geotechnics and Hydrogeology (PEGGHy), which holds artificial, fully controlled geological structures and heterogeneities. PEGGHy is filled with aggregates which have been selected based on i) their lithological properties so that significant geophysical contrasts are expected, and ii) their porosity and permeability to provide heterogeneous fluid flows. In addition, the base of the pit and the top of some folded layers are sealed by geomembranes to create both a confined reservoir and a free aquifer. Thanks to photogrammetric data acquired by drone, PEGGHy goes with a 3D, centimetric precision digital twin. Such a numerical tool allows to quantitatively compare models derived from geophysical, geotechnical and/or hydrogeological data with the true subsurface geometry. It also allows to run various modelling codes and confront their results to real data, providing a unique opportunity to teach and test numerical schemes, discretization algorithms and auscultation methods.

Mots-Clés: plateforme expérimentale, jumeau numérique

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