

What is the most suitable model for simulating unsaturated/saturated flow in a karst aquifer with conduit systems?

Goal: Modeling unsaturated/saturated flow and transport in karst aquifer with a conduit systems: The case of Jeita spring aquifer (Lebanon)

Challenges
In karst

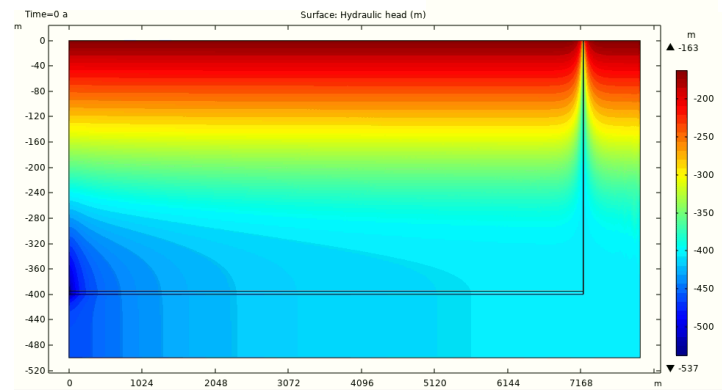
Duality of flow and infiltration, nonlinear model, highly dynamic systems.
Discrepancies between fast and slow transport

Methodology

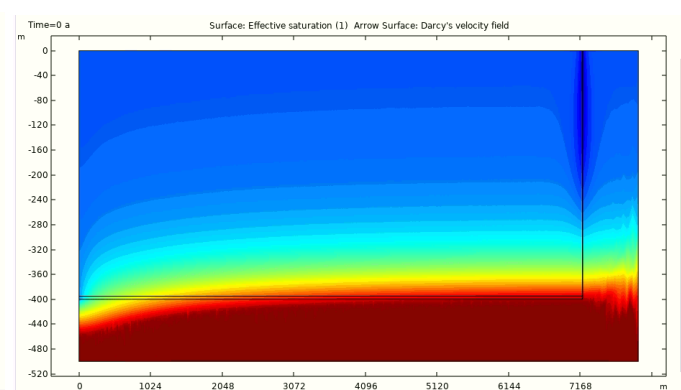
1. Synthetic model of conduit/ matrix (Richards equation)
2. Testing different models for the conduit: 2-D double continuum, pipe flow, channel flow
3. Calibration of a real case site: transient flow+ transport
4. Comparison of performance among different models

First results

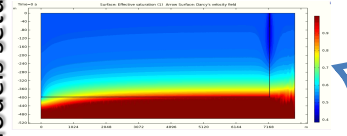
Preliminary head distribution



Effective saturation

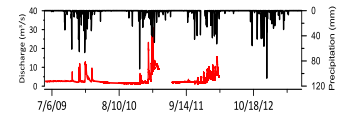


1. Models setup

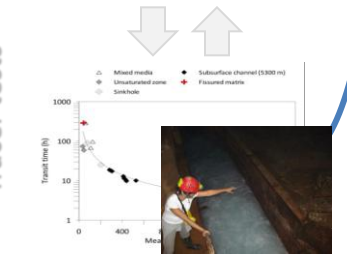


3. Calibration

Flow



Tracer tests



4. Validation and comparison