Technology and Groundwater: Reinforce the Basics

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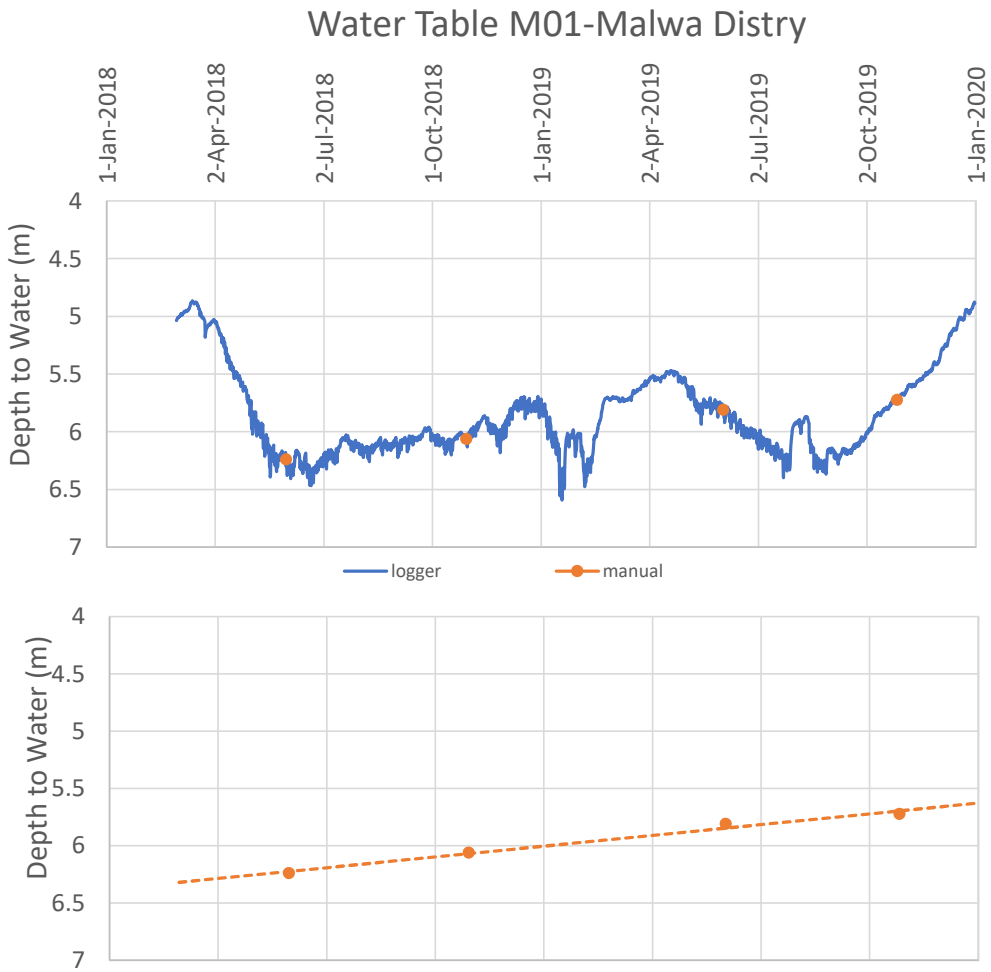
Water

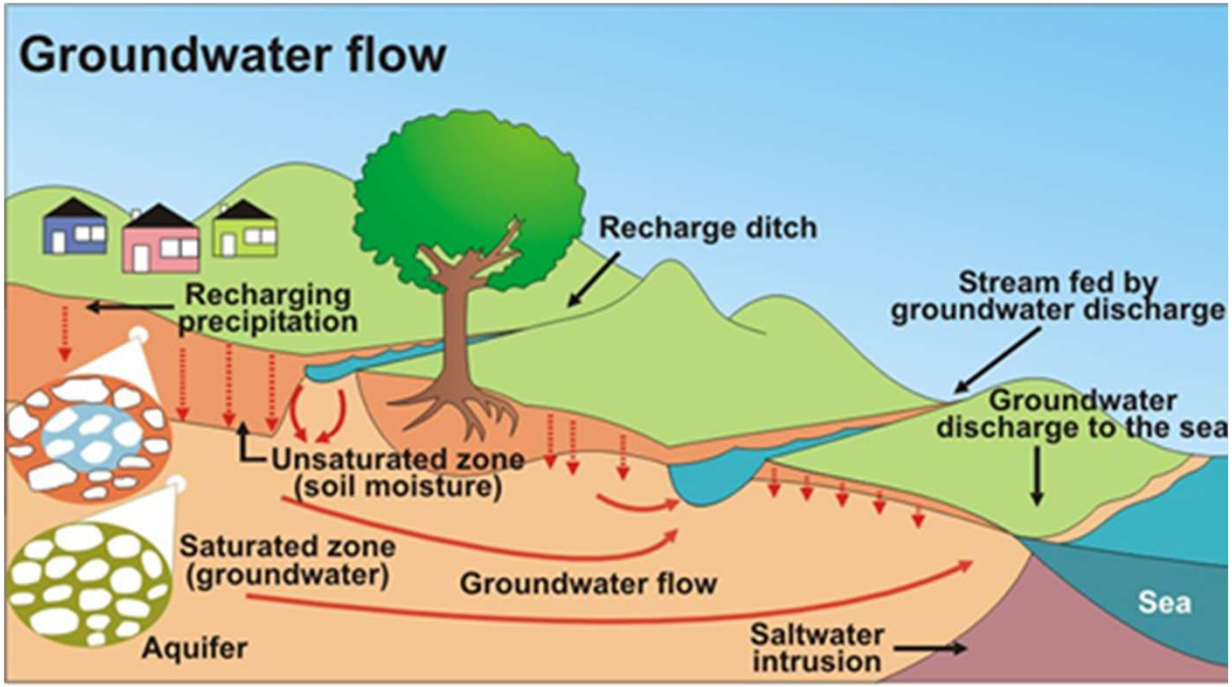
Disruptive technologies in the field of groundwater

- groundwater exploration
- groundwater monitoring
- groundwater abstraction
- **overall** groundwater management

DT 1: datalogger for piezometric monitoring - Insights from continuous data



Data source: ACIAR Project on Improving Groundwater Management to Enhance Agriculture and Farming Family Livelihoods in Pakistan

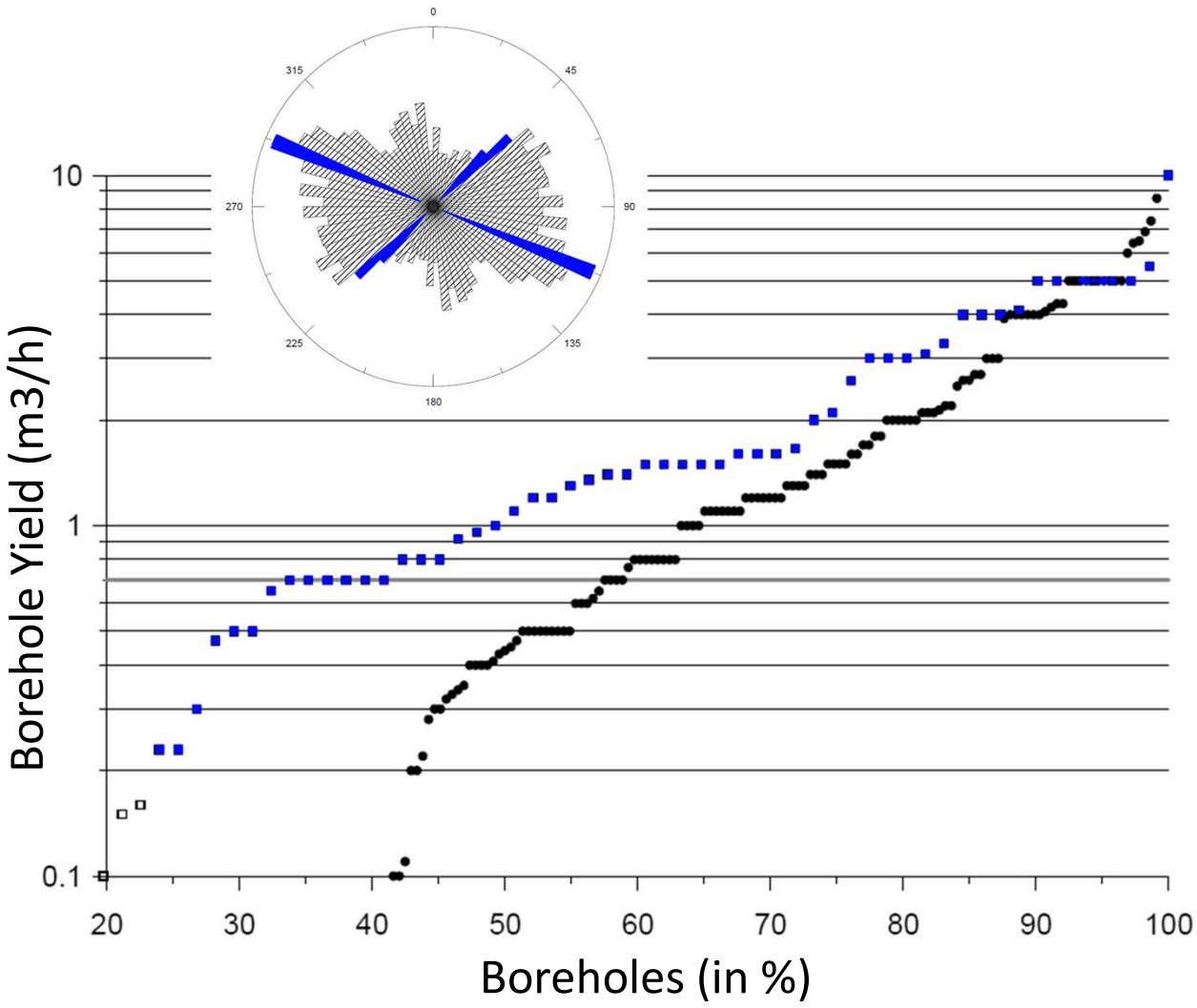


Environment Canada

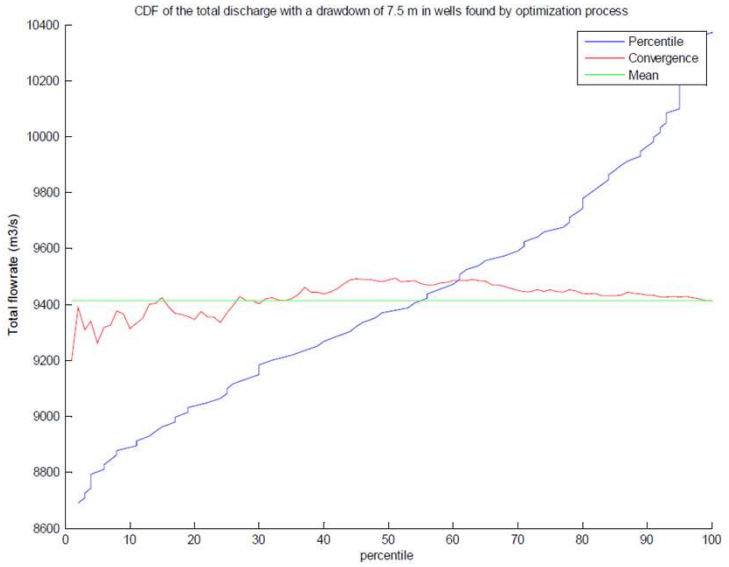
Groundwater management, including exploration, development, conservation, monitoring... it's all about having a conceptual model and test it!, and test it! and test it!, and test it!

DT 2: Downhole CCTV – A must for water well commissioning and for diagnostic

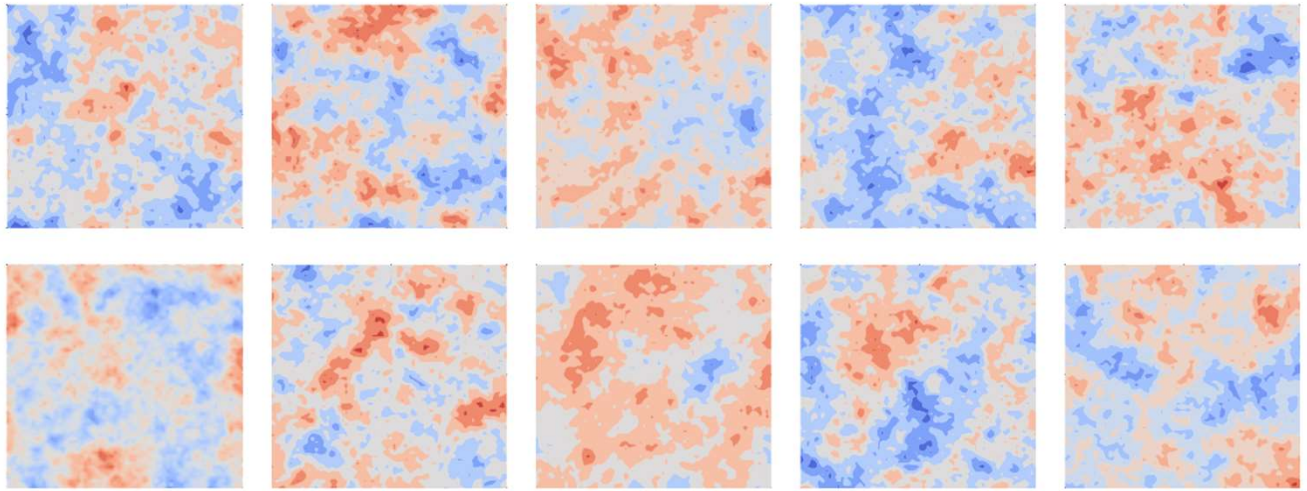
DT 3: Understanding the importance of global terrestrial constraints and fracture orientation while exploring discontinuous aquifers



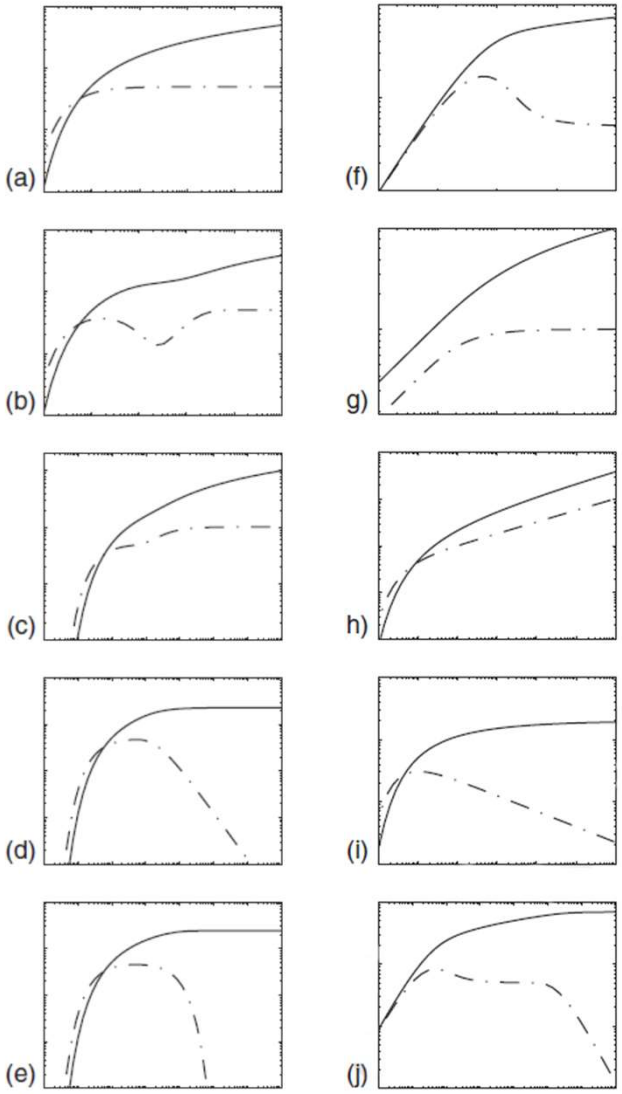
DT 4: Stochastic versus deterministic groundwater flow models - enhanced approach of groundwater flow



CDF (cumulative distribution function) of the total calculated discharge

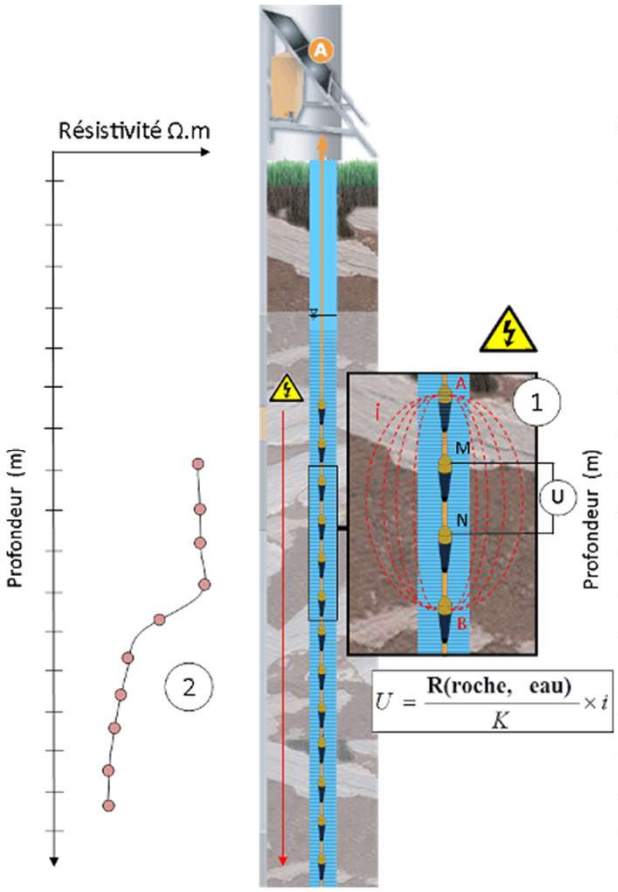


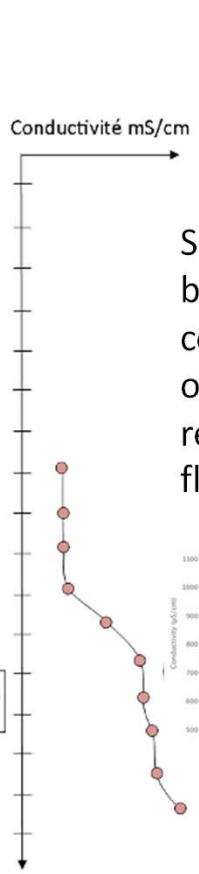
DT 5: Use of derivative for pumping test interpretation and identify groundwater flow models



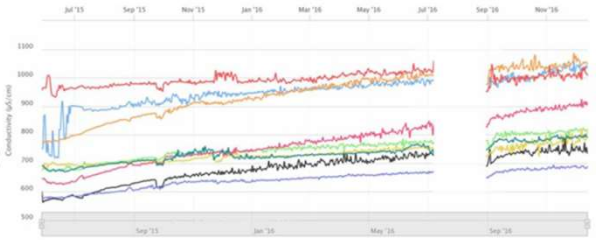
(a) Theis model: confined ideal aquifer
(b) Unconfined, or double porosity aquifer
c) Confined aquifer with a no-flow boundary
(d) Confined aquifer with a constant head boundary
(e) Leaky aquifer: Hantush and Jacob (1955) model
(f) Single well test with well-bore storage and possibly skin effects
(g) Single vertical fracture having an infinite conductivity: (Gringarten et al. 1974)
(h) General Radial-Flow model with $n < 2$
(i) General Radial-Flow model with $n > 2$
(j) Single well test with well-bore storage, infinite acting radial flow and constant head boundary

DT 6: Electrode cable measurement for exploring the depth of the fresh/saline groundwater interface





Sealed probe in boreholes converting the overall electrical resistivity into fluid conductivity



Take away message

- Managing groundwater resource is all about conceptual models
- Because this resource is invisible, understanding groundwater behavior requires combining a variety of indirect methods
- Methods combine the most standard field surveys with the most innovative AI technique and are still evolving