

# **CONFERENCE ON CHARACTERIZATION OF DEEP GROUNDWATER**

WHAT WE KNOW, WHAT WE DON'T KNOW AND WHAT WE NEED TO KNOW  
ABOUT "DEEP" GROUNDWATER

- **May 8, 2014**
- **Sponsor - NGWA & GWPC GWREF**
- **[Westin Denver Downtown](#) - Denver, CO**
- **Immediately follows NGWA Ground Water Summit**

## *What is meant by “deep” groundwater?*

- GW beneath the typical depths of today’s withdrawals for water supply
  - Private water supply wells -10s to 100s ft
  - PWS -100s to 1000s of feet
- Depends on hydrogeologic setting
  - Sedimentary basins - > 15,000 ft
  - Columbia volcanics – up to 3000 ft
  - Coastal /basin fill sediments – 5000 -10,000 ft
  - Glacial deposits – 2000-3000 ft.
- Changed over time from “deep stagnant water” to more dynamic understanding - defined not by depth alone, also genesis, age and chemistry (Hebrig, et.al, 2012)

## *Why is increased understanding of hydrogeology of “deep” groundwater important?*

- *Disposal Of Industrial Waste Fluids*
- *Water Supply – (Municipal, Agricultural, Industrial)*
- *Carbon Sequestration*
- *Geologic Repositories For Nuclear Waste*
- *Geothermal Energy*
- *Development Of Deep Shale Gas*

# Hydrogeology of deep aquifers

*a different hydrogeologic model  
need to evolve conceptual models*

## NEED TO CONSIDER

- Variable density of gw at depth can significantly effect rates and directions of flow
- Large spatial variation in permeability / porosity
  - Fracture zones, clusters
  - Geologic (tectonic structures)
- Requires use of pressure data –not hydraulic conductivity data
- Focused recharge
- Non-equilibrium flow at regional scale
- Flow system scale(s) poorly understood
- Transient at long time frames

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- ***Session 1 – Tools, techniques and methods***
- This session will focus on adaptation and development of tools and methods for collecting samples and in-situ hydrologic data for deep groundwater systems.

Need to develop hydraulic testing strategies designed to obtain data that is useful for characterizing groundwater occurrence and flow

- Strategy should aim to minimize interference between drilling and data collection – proper sequencing
- Pore pressure, T, fluid chemistry, local permeability, porosity, storativity

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## Session 2 – Hydrologic characterization of deep aquifers.

- This session will focus on analysis of data and information to characterize hydrogeologic settings, water quality and flow in deep groundwater systems.

## What types of data are necessary?

- Pressure head data
- Permeability data
- Recharge
- Hydrochemical
- Isotopic
- Geochemistry
- Fluid density and viscosity
- Mineralogy of geologic media

Hope to see you in Denver!!