

Three-Dimensional Geological Mapping for Groundwater Applications: *Workshop Wrap-up*

**Denver, Colorado
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The Challenge

- **With optimal benefit/cost, to construct an appropriate 3D geological model that will facilitate analyses for immediate and/or future needs**

- **Determine appropriate format & platform**
 - **Cross-sections**
 - **Structure contours & isopachs**
 - **Surfaces**
 - **solids**

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- **Determine desired level of detail**

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- **Determine achievable level of detail**

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- **Generalize existing models**

- **Drilling logged by a geologist**
 - **Core**
 - **Borehole geophysics**

- **Geophysical surveys**
 - **Seismic**
 - **Radar**
 - **Gravity**
 - **Resistivity**
 - **Hydrogeological tests**

■ **Water wells & engineering drilling**

- **location errors; centroids**
- **reliability assessment**
- **varying detail**
- **clustering**
- **nonstandard terminology**

■ DEM

- audit precision
- position drill holes vertically
- hang the model
- insights into geology

■ Bathymetry

- key hydrogeological features
- uppermost layer = water
- offshore geology

■ Offshore surveys

- extent of fine-grained sediments
- groundwater discharge

- **Digital geological maps**
 - **surficial & bedrock**
 - **new mapping**
 - **stacked polygons**
 - **outcrop & subcrop**
 - **fit**

■ **Build the model at maximum detail**

- resolution permitted by the data
- genetic & historical models
- modeling method
 - Site selection, correlation – prediction - geostatistics, edge control, marker beds, quality assurance

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- **Generalize as required by application**
 - **Lump units**

- **Quantify confidence level & priority level**
 - **Validation procedures**
 - **Priority for enhancement**

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- **Iterate & set priorities for new info**

- **Version & documentation**

■ Applications

- Vulnerability, resources
- Interaction, geos & hydrogeos
- Assign hydrogeological properties; deal with pinchouts
- Add water levels & chemistry
- Model & *iterate*

■ Legacy

- official geological model
- enhanced databases