



The Department of Geological Sciences & Geological Engineering  
Distinguished Speaker Program  
&  
The GeoEngineering Centre Seminar Series  
Sponsored by Golder Associates  
jointly present:

## **Dr. Keith Turner**

Colorado School of Mines, Golden · Department of Geology and Geological  
Engineering

Thursday September 28<sup>th</sup>  
12:30 pm - 1:20 pm  
Miller Hall, Room 210

**“Applications of Geological Models: Reducing Geotechnical Risk and  
Supporting Sustainability”**

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Friday September 29<sup>th</sup>  
9:30 am - 10:20 am  
Miller Hall, Room 201

**“Challenges and Trends for Geological Modeling and Visualisation”**

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Friday September 29<sup>th</sup>  
4:30 pm  
Miller Hall, Room 201

**“Using 3-D Models to Support the Total Geological History Approach for Site  
Characterization”**

**Summary:**

The risk of encountering unexpected geological conditions at a construction site is inversely proportional to the level of detail and accuracy of the geological information and complexity of the ground for the site. An “engineering geological model” may be defined as “*an approximation of reality created for the purpose of solving a problem*” (Parry *et al.*, 2014). Fookes (1997) publicized the term “geological model”; later this concept was refined as “total geological history” (Fookes, *et al.*, 2001). Subsequently, Knill (2003) differentiated three model types: Geological models, Ground models, and Geotechnical models. Baynes *et al.* (2005) differentiated two types of geological model – conceptual, and observational – and applied the “total engineering” process to railway infrastructure in western Australia. A web-based interactive tutorial is available to support this method. However, application of the concept lagged due to the effort required to implement it effectively. Currently, improved computer capabilities permit the economical creation of digital 3-D geological models at various scales. These provide an effective path for the wider use of the “Total Geological History” approach because the entire 3-D volume must be populated; areas of sparse data or uncertainty cannot be ignored. This rigor generates debate and improved concepts and interpretations. In Europe, applications of 3-D models have supported geotechnical investigations for design and construction projects, providing the conceptual framework for the development of applied site-specific, observational, site characterization.

**BIO:**

Dr. Alan Keith Turner is a Queens geological engineering graduate (Sc'63) followed by a Masters in Geology from Columbia (1964) and a PhD in Civil Engineering from Purdue (1968). He is Emeritus Professor of Geological Engineering at CSM and currently is a Visiting Research Associate with the British Geological Survey. He began research in 3-D geological modeling in 1988 during a sabbatical in the Netherlands. He directed the first specialty conference on Geoscientific Modeling in 1989, sponsored by NATO, followed by a decade of 3-D groundwater modeling with the USGS for the Yucca Mountain Project evaluating the proposed nuclear waste repository. Between 1999 and 2002, Dr. Turner occupied the chair in engineering geology at the Delft University of Technology in the Netherlands, where he continued 3-D modeling research interests. Dr. Turner has been active in the Transportation Research Board (TRB) throughout his career, chairing numerous committees, task forces, and panels and serving as chief editor for TRB books on Landslides and Rockfall. TRB awarded Dr. Turner the 2010 Roy W. Crum Distinguished Service Award. Dr. Turner received the 2014 Schuster Medal, jointly awarded by the Association of Environmental and Engineering Geologists and the Canadian Geotechnical Society, for his contributions to North American geo-hazards research.