Characterization and management of the subsurface: Insights from the development of geothermal, oil and gas, and mineral resources

Geothermal energy is a versatile renewable energy resource that provides baseload power for electricity generation and can also be used for a range of heating and cooling applications in commercial and residential settings. Because geothermal energy relies on capturing the natural heat of the Earth, exploration for and development of geothermal resources requires extensive knowledge of the Earth's subsurface, including the mechanical, thermal, and chemical behavior and characteristics of rocks and fluids; dynamic processes such as those related to volcanic and hydrothermal systems; and impacts of changes to the subsurface as it is engineered to extract energy.

Development of advanced approaches for exploration and production of oil and gas and non-fuel mineral resources shares many similarities with those required for geothermal energy development particularly in terms of the need for improved understanding of the subsurface and the way rocks and fluids interact and behave in natural and engineered situations. With a foundation provided through an update on the status of new research within conventional geothermal and enhanced geothermal systems, our discussion will take a cross-sectoral approach from geothermal, oil and gas, and mining perspectives to highlight progress, challenges, and opportunities in:

- Managing uncertainty in subsurface data;
- Advances in technologies for subsurface characterization; and
- Dynamic permeability in fractured reservoirs.

Moderators:
- Jim Slutz, Committee Chair
- Franklin "Lynn" Orr, Chair

Panelists:
- Colin Williams, U.S. Geological Survey
- Kent Witherly, Condor Consulting
- Joel Renner, Case Western Reserve University
- Jim Faulds, Nevada Bureau of Mines and Geology
- Azadeh Riahi, Tusca Consulting Group, Inc.
- Ken Witherly, Condor Consulting
- Fikri Kuchuk, Schlumberger (retired)
- Jeffrey Yarus, Lawrence Livermore National Laboratory
- Pengcheng Fu, Lawrence Livermore National Laboratory
- Christine Dilib-Economides, University of Houston
- Sriki Ruchala, Schlumberger (retired)