Professional Interests
Dr. Matt Reeves is an associate professor of hydrogeology, director of the graduate and undergraduate certificate programs in applied hydrogeology, and director of the Hydrogeology Field Course at Western Michigan University.

Dr. Reeves’ research involves applied and theoretical investigations of fluid flow, heat and solute transport in various types of porous media, with a specialty in fractured rock systems. His research has been applied to various problems, including assessing climate change impacts on water resources, contaminant disposal, geothermal energy, groundwater-to-surfacewater interaction and hydraulic fracturing for oil and gas.

Investigating Fault Interconnectivity and Stress Controls on Regional-Scale Fluid Flow at Pahute Mesa, Nevada National Security Site

Regional stress typically influences the permeability of faults and joints within rock units. Proper conceptualization of the role of regional stress on large fault structures is of particular importance for Central and Western Pahute Mesa where kilometer-scale radionuclide migration through fractured rock units has been detected. To assess the potential role of the stress field on fluid flow and radionuclide migration, dilation and slip tendency metrics are evaluated for all fault structures in a region of approximately 3600 km² using stress directions defined from earthquake focal mechanism inversion solutions and stress magnitudes compiled from multiple overcoring and hydraulic fracturing studies. A numerical framework is utilized to investigate the influence of the regional stress field and large fault-background fracture interconnectivity on fluid flow and radionuclide transport at a tens of kilometers scale. The stress analysis indicates the region experiences a transtensional stress regime characterized by reactivated normal faults with oblique slip. The southwest direction of ground water flow is consistent with the northeast-southwest maximum horizontal stress direction, and northeast-southwest trending fault structures have the highest potential for enhanced fluid flow attributed to regional stress. Trends in total fluid flow and advective pathlines through the domain are assessed given multiple scenarios used to realistically isolate influences of regional stress and its uncertainty, and the potential interaction between large faults and background fracture networks with respect to fluid flow.

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