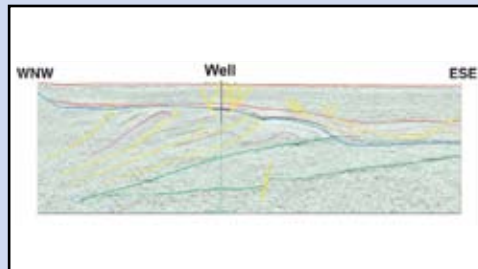


The Geosciences and Engineering Division at Southwest Research Institute® (SwRI®), a center of excellence in earth sciences and engineering, applies its extensive field and modeling expertise to provide innovative solutions to exploration and production problems in geologically complex settings.

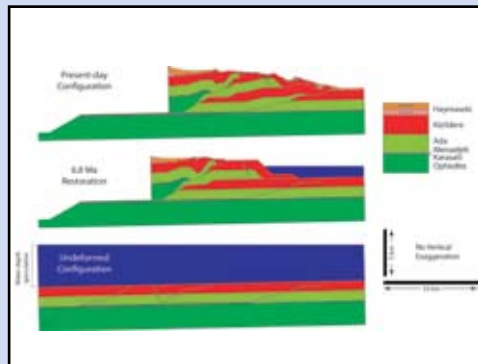
SwRI scientists and engineers use state-of-the-art computer modeling and visualization technologies to provide integrated, multidisciplinary solutions to a broad range of oil and gas industry problems. SwRI has the staff, expertise and facilities to offer complete independent services or to augment in-house corporate capabilities.

Structural Geology

- Field investigations of faulting in carbonate and clastic sedimentary strata
 - Fault system evolution
 - Fault zone deformation
 - Scaling relationships
 - Permeability architecture
- 2D and 3D geometric and kinematic modeling, balancing and restoration, along with seismic interpretation
- Prediction of effective reservoir properties based on sub-seismic-scale fault and fracture analyses
- Field and short courses in extensional and contractional tectonic regimes in the U.S. and abroad



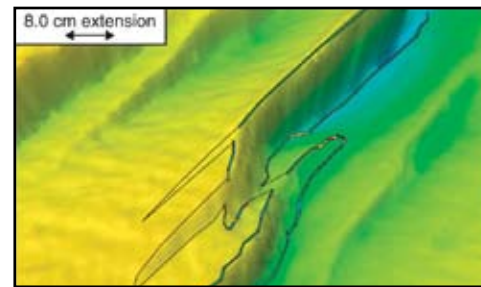
Interpreted seismic line from a fold-thrust belt helps constrain subsurface geometry.



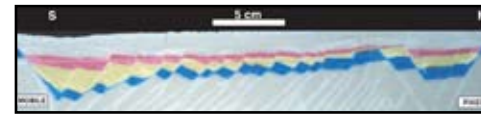
Sequence of restored geologic cross-sections shows evolution of the fold-thrust structures.

Physical Analog Modeling

Physical analog modeling of extensional, contractional and salt-related geologic structures, including the application of dynamic structured light for digital terrain analysis of developing models



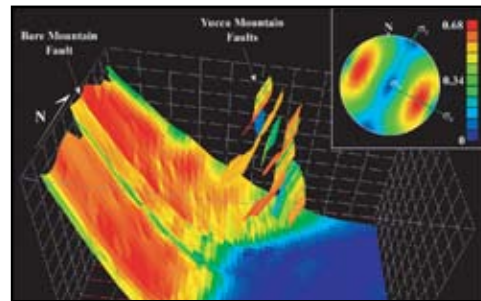
Digital elevation model of the top surface of an analog clay model constructed from dynamic structured light data used to evaluate geometry of fault interactions and potential for compartmentalization.



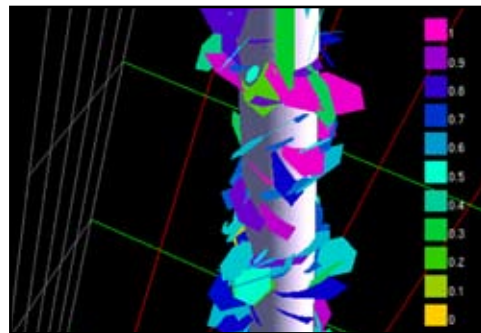
Analog model simulating deformation in an extensional tectonic setting increases understanding of the roles of major and minor faulting in reservoir deformation.

3DStress®

Stress analysis using 3DStress®, an SwRI-developed program that calculates slip tendency and direction, dilation tendency, and leakage potential of faults and fractures



Slip tendency analysis (3DStress®) of Bare Mountain fault and Yucca Mountain faults, southern Nevada. Hot colors indicate areas of likely fault slip.



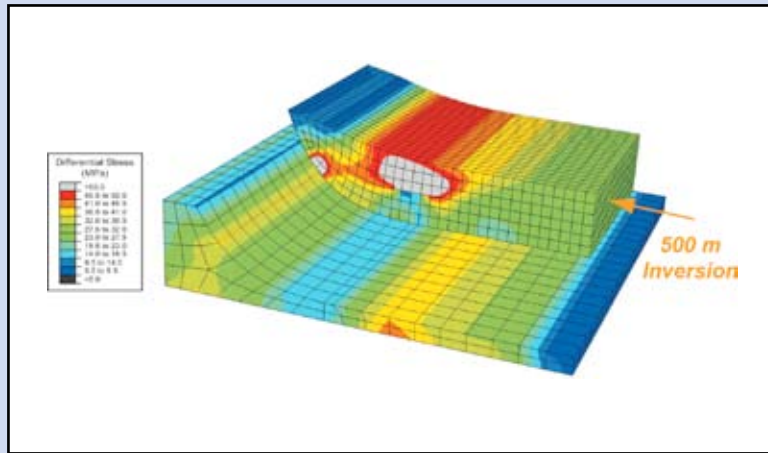
Dilation tendency analysis of synthetic fractures cutting through a simulated well. Pink, purple and dark blue indicate fractures that are likely to dilate in the current stress state.



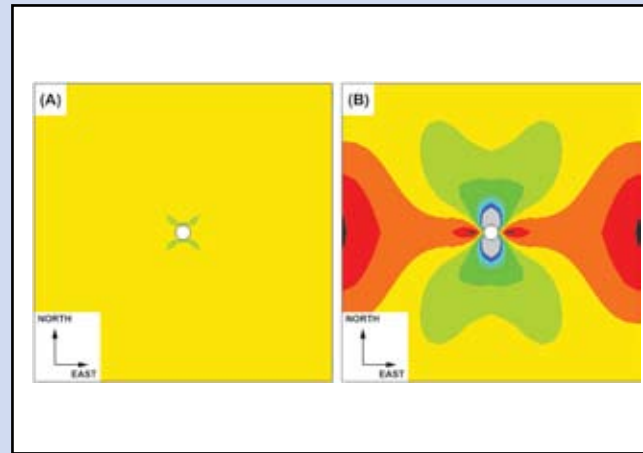
Details of fault zone and dilational fault zone segment filling material along southwest-clipping normal fault near Balmorhea, Texas.

Geomechanics

- 2D and 3D numerical geomechanical modeling using finite-element and discrete-element techniques
- Borehole stability analysis



3D finite element model simulating hanging wall deformation during fault inversion highlights increased differential stresses that may produce additional sub-seismic faulting and fracturing.



Map-views through 3D finite element models that simulate stress state (A) before and (B) after well bore is pressurized. Hot colors show high tensile stress.

**We welcome your inquiries.
For additional information,
please contact:**

David A. Ferrill, Ph.D.

Director

Department of Earth, Material, and Planetary Sciences

(210) 522-6082

dferrill@swri.org

Geosciences and Engineering Division

Southwest Research Institute

6220 Culebra Road (78238-5166)

P.O. Drawer 28510 (78228-0510)

San Antonio, Texas



Southwest Research Institute is an independent, nonprofit, applied engineering and physical sciences research and development organization using multidisciplinary approaches to problem solving. The Institute occupies 1,200 acres in San Antonio, Texas, and provides more than 2 million square feet of laboratories, test facilities, workshops and offices for more than 3,100 employees who perform contract work for industry and government clients.



*Benefiting government,
industry and the public
through innovative science
and technology*

An Equal Opportunity Employer M/F/D/V
Committed to Diversity in the Workplace

www.swri.org
www.geoscience.swri.org