

Mapping of 3D seismic reflection surveys, availability of 3D digital topographic data for the surface of Earth and Mars, and development of computer software for 3D visualization and geologic framework modeling have led to rapid growth in 3D analysis of geologic structures.

Southwest Research Institute® (SwRI®) has developed a new technique to produce digital terrain models (DTMs) of the deformed model upper surface using dynamic structured light (DSL).* Digital images of the model's upper surface are collected throughout the deformation process. These images are processed in near real time to construct 3D DTMs representing the topography of the model upper surface.

Using this technology, scientists quantify the morphology of deforming models in high resolution and expand the data derived from laboratory simulations of geologic deformation. The DSL 3D imaging technology was selected among the 100 most significant accomplishments of 2004 by R&D Magazine.

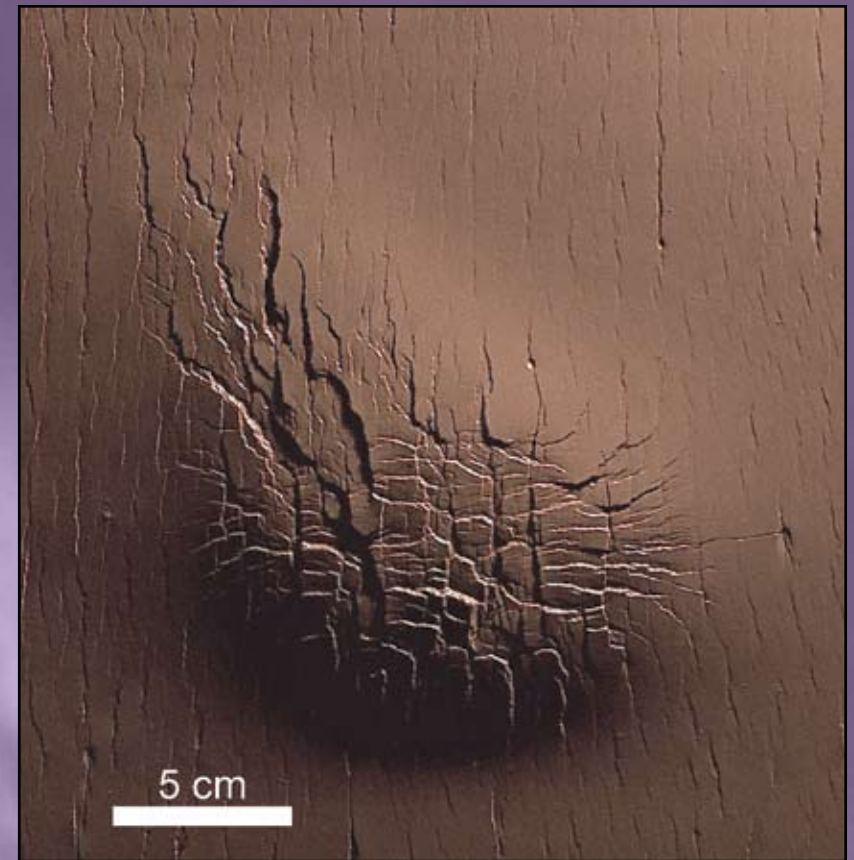
*www.3dimaging.swri.org

3D DTM Applications

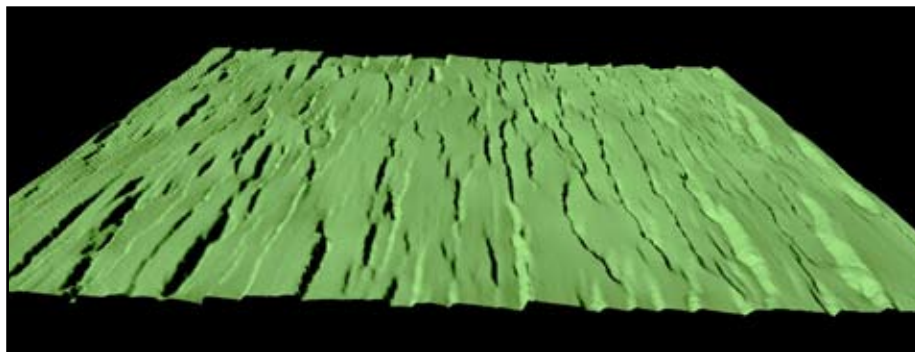
- Visualization
- Extraction of fault cutoff lines
- Export to finite element models
- Extraction of topographic slope
- Extraction of slope aspect information
- Quantitative evaluation of morphologic evolution
- Production of digital shaded relief models
- Quantitative comparison with real-world examples from digital topographical data, 3D seismic reflection surveys, and geologic framework modeling
- Fault growth and development

Top: Overhead photograph of irregular dome developed in clay model during regional extension

Bottom: Slope map of irregular dome developed in clay model during regional extension



DO 16309



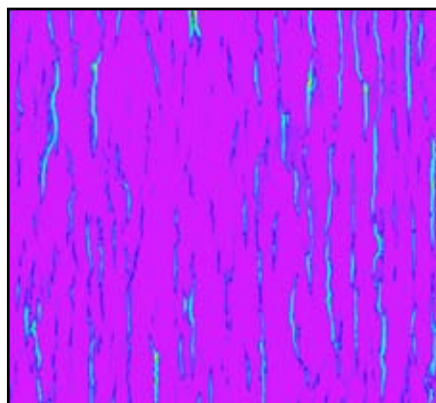
DO 16306

Digital terrain model (oblique view) showing extensional fault system in clay model



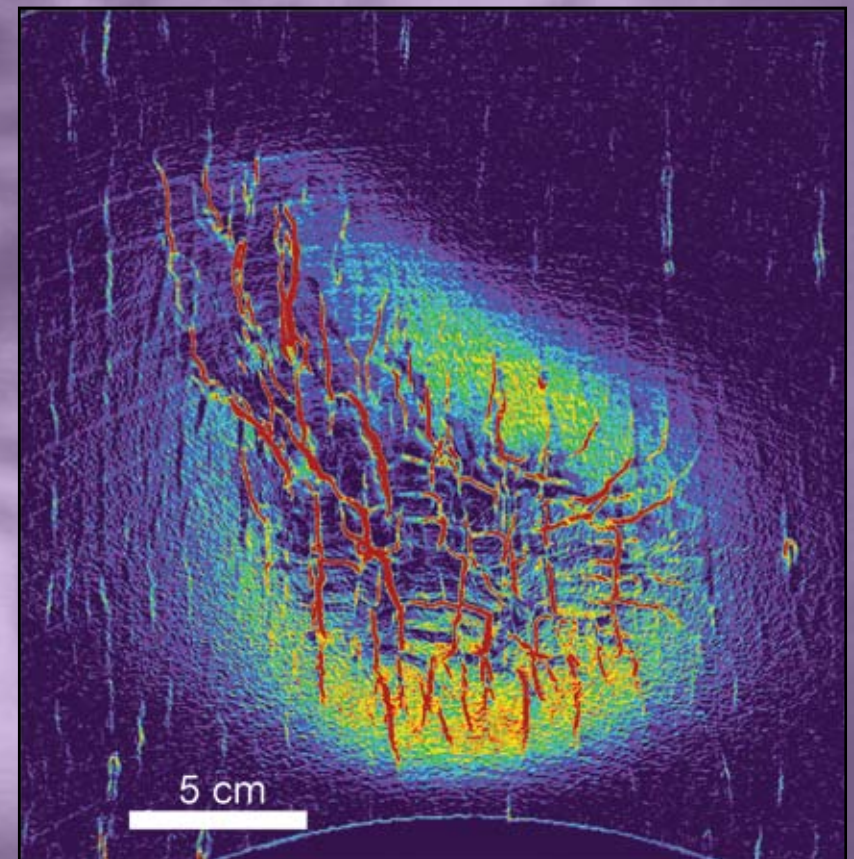
DO 16307

Overhead photograph showing extensional fault system in clay model



DO 16308

Slope map derived from digital terrain model of extensional fault system shown at left and above



DO 16310



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.

Digital Terrain Modeling of Geologic Structure Physical Models

**We welcome your inquiries.
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