

**AAPG Annual Convention
Salt Lake City, Utah
May 11-14, 2003**

James M. Borer, Safian Atan, Mary Carr, Marieke Dechesne, and Michael Gardner, Colorado School of Mines, Golden, CO

Outcrop-Based Heterogeneity Modeling of Brushy Canyon Submarine Fan Deposits: Enhancing the Value of an Outcrop Analog Through Modeling

Modeling provides an opportunity to maximize the value of an outcrop analog. The Brushy Canyon submarine fan project illustrates how long-term outcrop studies provide more than a single "type" analog or model. Instead, these studies provide a means to document and quantify geologic processes controlling reservoir heterogeneity, assess the ability of different modeling procedures to simulate realistic heterogeneity and rank the importance of different scales and types of heterogeneity with respect to fluid flow. Having detailed geologic reference models is essential for evaluating the success of heterogeneity modeling and upscaling. Outcrop modeling is similar to exploration phase modeling since it lacks production history matching and focuses instead on concept-based geologic scenarios. Regional outcrop studies provide stratigraphic and paleogeographic context to aid subsurface interpretation and narrow the field of potential exploration-phase geologic scenarios.

The initial construction of outcrop models is substantially different from subsurface reservoir models because outcrop datasets do not come prepackaged in the geospatial framework of a seismic cube and well logs. A large effort is required to import outcrop GIS data into modeling software to build a "subsurface" framework. This includes digitizing measured sections into GIS-based deviated well logs, generating a stratigraphic framework that honors photo panel thickness data and building realistic channel objects based on deterministic outcrop architecture and channel trends. However, once an outcrop geologic model is constructed it can be treated as a subsurface dataset for modeling experiments. Outcrop modeling promotes the packaging of outcrop data into a digital, geo-referenced format usable by subsurface geologists.