AAPG Annual Meeting
March 10-13, 2002
Houston, Texas

Julio Friedmann[1], Peter Vrolijk[2], Xudong Ying[2], Anil Despandhe[2], Gordon Moir[2], David Mohrig[3] (1) Univ. Maryland, College Park, MD (2) ExxonMobil Upstream Research Company, Houston, TX (3) Massachusetts Inst. of Technology, Cambridge, MA

Quantitative Analysis of Sandstone Intrusion Networks, Panoche Hills, California

Sand dikes and sills cut a 500-m thick marine shale package (Moreno Shale) in the Panoche Hills, California. The network of sand bodies served as a permeable network to drain rapidly deposited sediments in the Cretaceous Great Valley forearc. That drainage contributed to the development of cold seeps on the seafloor. The injection network served as a well-connected horizontal and vertical plumbing system that would have been overlooked if a purely depositional model were applied to the shale-dominated succession. A small volume of injections, with varying degrees of tortuosity, connects all sand bodies via injections ranging in size from millimeters to meters. Geological models suggests that <5% volume sands increase permeability by 3 orders of magnitude. The sand intrusion network consists of two basic elements: ? A lower, complex network of dikes and sills that extends about 200 m above the parent sands in the Panoche Sandstone. Dikes dip within ±30? normal to bedding. Strike orientations range through a full 360?. Sills are found bedding sub-parallel (±30? parallel to bedding) and often run both parallel and oblique to bedding along their length. ? An upper population of bedding-normal dikes with a consistent strike orientation and small strike variation (±20?)and little dip variation

Neither dikes nor sills contain internal fabrics. Laser particle size analysis (LPSA) shows grain sizes are uniform, belying any intrusion mechanisms that modify the original grain-size distribution. An isotropic stress state near the parent sand is favored, since both dikes and sills form without a strike orientation preference. Higher up, dikes intruded normal to the folds developed in the Great Valley Sequence, suggesting some regional structural control.