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

Jerome A. Bellian, David C. Jennette, and Roberto Gutierrez, The University of Texas at Austin, Austin, TX

Dual-Purpose Geologic Analysis Using Airborne and Ground-Based Lidar, Coastal Southern California: Quantitative 3-D Characterization of Modern Coastal Erosion and Ancient Reservoir Architecture

The 3-D imagery of airborne and ground-based lidar is gaining recognition as a powerful tool for quantitative geological analysis at many scales. Recent work along the seaside cliffs of southern California marks our first attempt to combine airborne and ground-based surveys for two independent reasons: (1) precise modeling of sandstone and mudstone bodies for reservoir architecture studies, and (2) quantification of coastal erosion and cliff stability. The sub-meter airborne lidar survey was conducted, in conjunction with Scripps Institute of Oceanography and the United States Army Corps of Engineers and covered near 65 miles of coastline. Later, two land-based lidar surveys captured greater detail (2-5-centimeter resolution) of the geology of the well-documented slope channel complexes near San Clemente and outside of La Jolla. These ground-based 3-D surveys were combined with conventional field mapping techniques to assemble a detailed geological model of channel complexes. The aerial and land data sets were then merged using differential GPS and CAD (computer-aided design) software into a single continuous 3-D dataset. The channelized nature of the systems, coupled with irregular cliff faces makes the 3-D imaging capabilities of the lidar system essential to capture true object dimensions and object intersections. This first-of-its-kind dataset allows quantitative analysis of the cliffs for analog studies as well provides a benchmark survey to monitor and record coastal erosion and sea-cliff stability.