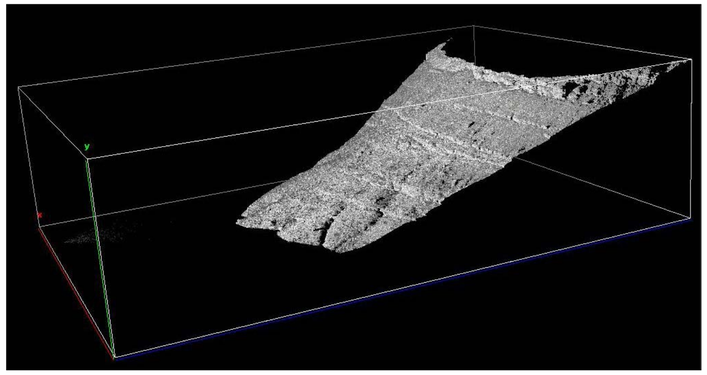
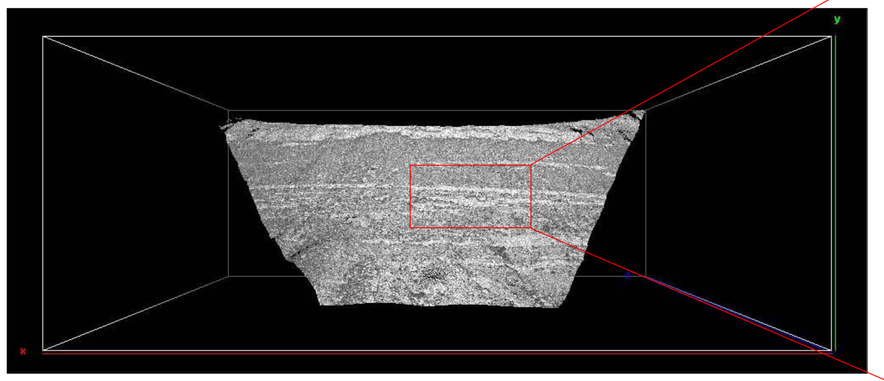
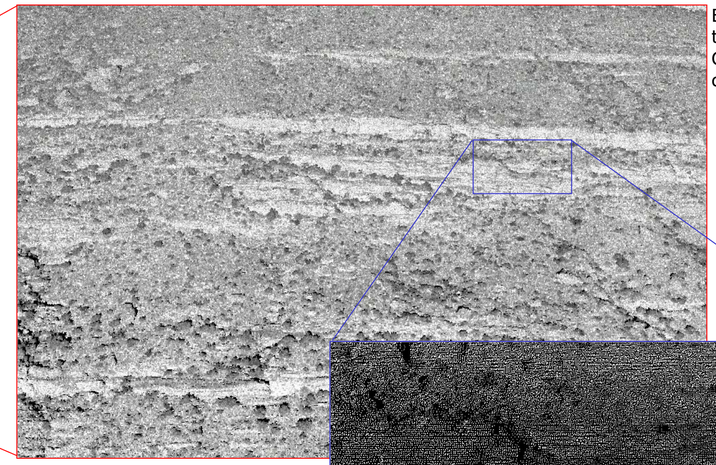
Click here to go to fourth poster.

Deep-water Clastic Case Studies

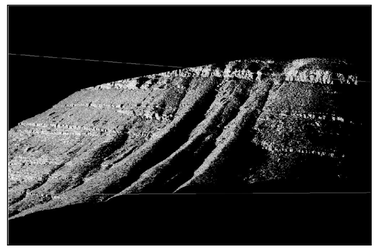
Brushy Canyon Formation, West Texas (sand-shale discrimination)





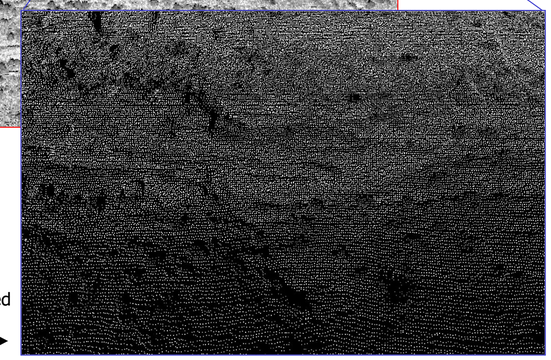


Blown-up image of the "100 foot Channel" point-cloud data set.



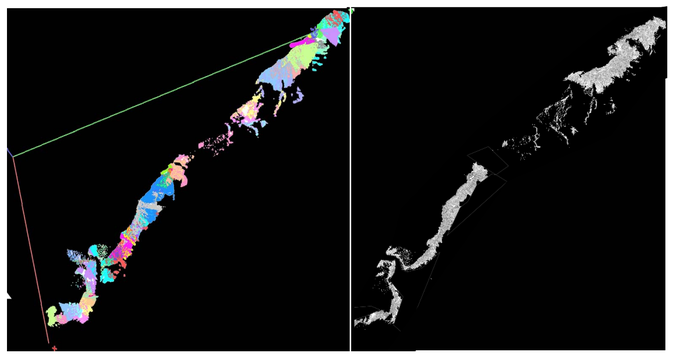
These point clouds are assembled directly from individual x, y, z, and intensity data downloaded from ILRIS 3D. These data were acquired by the Bureau of Economic Geology and Optech in May of 2001 at an average spot spacing of 7 cm. The data acquisition of each of these datasets was ~15 minutes. These data are from a Permian deep-water, confined, channel complex (the "100 foot Channel" from former Exxon terminology) in Guadalupe Canyon, West Texas. In this example the intensity values at each x, y, and z location are good sandstone-shale indicators. Simple intensity classification can yield instant net to gross relationships as well as vertical and horizontal sand bed continuity.

The scans above and to the left are displayed in order to demonstrate that ILRIS 3D operates nearly identically to a conventional camera in so much as ILRIS 3D acquires image data in a direct line of sight. Therefore, data shadows may exist in areas where ILRIS can not "see" from a single vantage point. In order to complete a full 3D model (eg. no data shadows), multiple datasets are required from multiple vantage points with some degree of overlap. ILRIS data may be processed with software that enables the user to pick one or several control points on various overlapping images to be merged (we use Polyworks by InnovMetrics). The data within the overlap-region are used to iterate to a minimum-3D-spatial error using hundreds of thousands of data points without the need for GPS (commonly iterate to 0.00000001 meters).

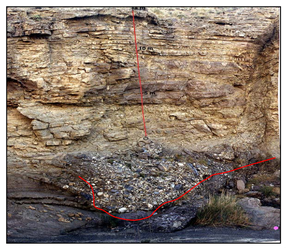


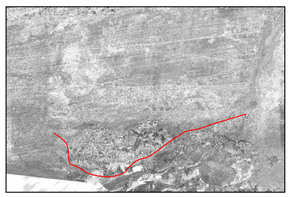
Close-up view of individual x, y, z and intensity points displayed with a grayscale color bar.

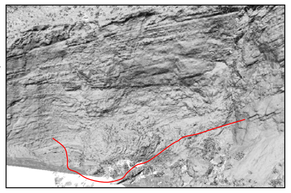
Solitary Channel, Southern Spain (3-dimensionality across multiple fault blocks)



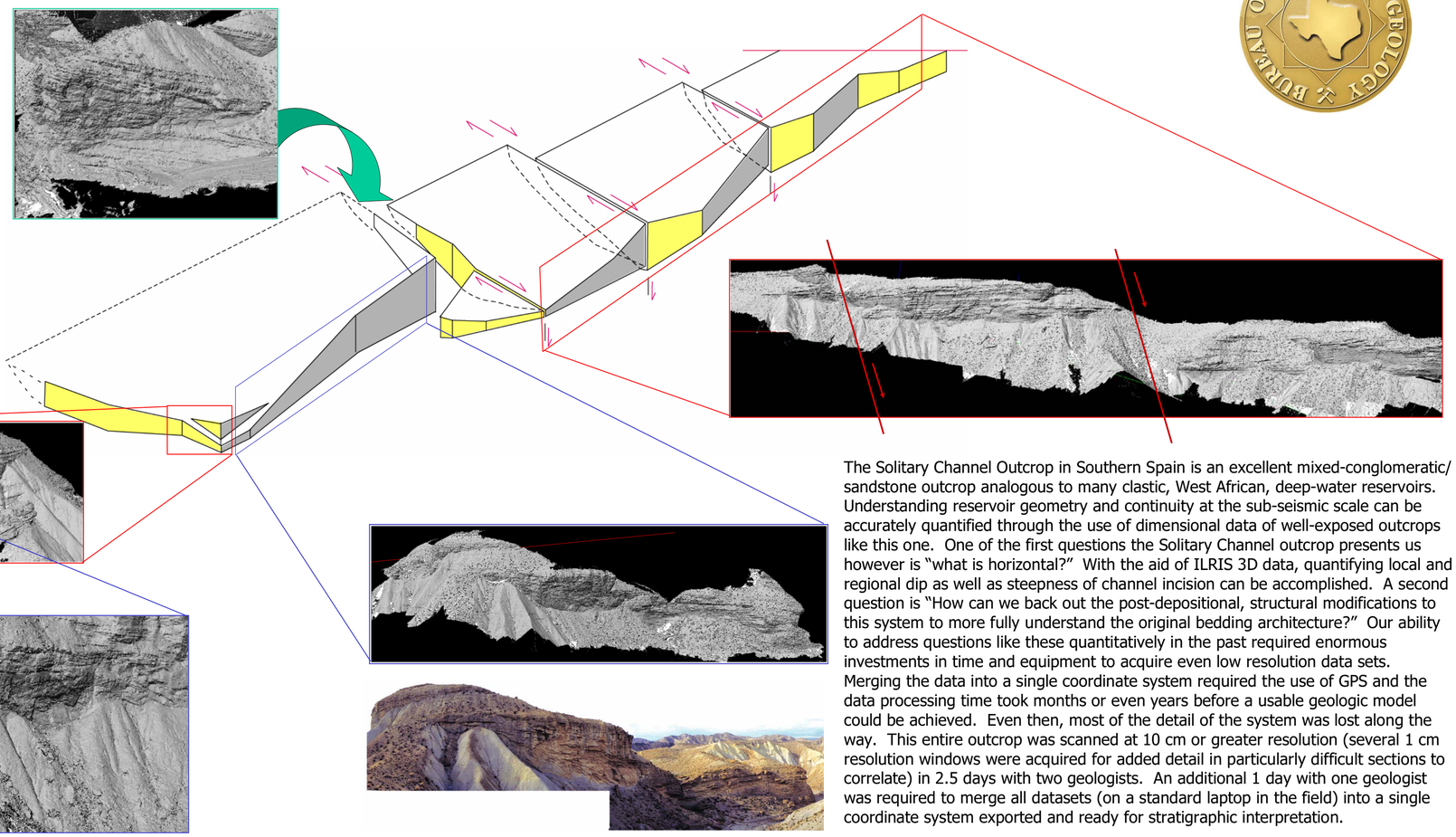
Each color indicates an individual data set used to reconstruct the Solitary Channel outcrop (left). The same image displayed with intensity of each x, y, and z point in grayscale is on the right.







The photo above displays tractional, conglomeratic channel fill. The upper right, ILRIS 3D intensity image is of the same channel fill. The lower right image is the same intensity image draped onto the TIN digital terrain model which enables the user to extract real dimensional data from the outcrop preserving spatial integrity of the deposit.



The Solitary Channel Outcrop in Southern Spain is an excellent mixed-conglomeratic/ sandstone outcrop analogous to many clastic, West African, deep-water reservoirs. Understanding reservoir geometry and continuity at the sub-seismic scale can be accurately quantified through the use of dimensional data of well-exposed outcrops like this one. One of the first questions the Solitary Channel outcrop presents us however is "what is horizontal?" With the aid of ILRIS 3D data, quantifying local and regional dip as well as steepness of channel incision can be accomplished. A second question is "How can we back out the post-depositional, structural modifications to this system to more fully understand the original bedding architecture?" Our ability to address questions like these quantitatively in the past required enormous investments in time and equipment to acquire even low resolution data sets. Merging the data into a single coordinate system required the use of GPS and the data processing time took months or even years before a usable geologic model could be achieved. Even then, most of the detail of the system was lost along the way. This entire outcrop was scanned at 10 cm or greater resolution (several 1 cm resolution windows were acquired for added detail in particularly difficult sections to correlate) in 2.5 days with two geologists. An additional 1 day with one geologist was required to merge all datasets (on a standard laptop in the field) into a single coordinate system exported and ready for stratigraphic interpretation.