Empirical Understanding of Sedimentary Architecture: Examples from the Campanian of Central Utah

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Depositional environment is the first order control on the architecture of both reservoir sandbodies and intra-reservoir barriers in clastic systems. Factors such as climate, subsidence and sediment supply provide a series of complexly inter-related, second order controls that interact to produce a wide range of potential geometries. Understanding these controls is key to predicting hydrocarbon reservoir behaviour and performance.

This project aims to investigate these controls empirically by utilizing a very large database of new and publically released information on body geometries. The database includes a standardized, hierarchical nomenclature for sand body shape which allows comparison of modern and ancient systems. Data from modern systems has been primarily compiled from publically available satellite imagery. Data from outcrops has been collected specifically for this project using novel data acquisition methods including oblique aerial, helicopter based lidar scanning (heli-lidar). The heli-lidar allows the very rapid collect of long (ten's km) geometrically constrained, 3D datasets from otherwise inaccessible areas. New methods for the processing and handling of these very large Virtual Outcrops have been developed which allow their visualization and the extraction of large volumes of geometrically constrained sediment body data.

Data collected from the non-marine part of the Campanian aged, Blackhawk Formation cropping out in the Book Cliffs and the Wasatch Plateau areas of eastern Utah illustrate the role of differential subsidence and proximity to sediment source in controlling fluvial architecture in two otherwise similar depositional systems.