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# 3D Geologic and Reservoir Modelling of a Distributive Fluvial System Derived from lidar: A Case Study of the Huesca Fluvial Fan.

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Understanding stratigraphic and depositional architecture in a fluvially dominated system is fundamental when trying to model and characterise properties such as geometric relationships, heterogeneity, lithologic patterns or trends of the system as well as any associated petrophysical properties or behaviours. The Huesca fluvial fan, an Oligocene – Miocene age Distributive Fluvial System (DFS) in the northern extent of the Ebro Basin, is used extensively as an outcrop analogue for modelling fluvial hydrocarbon reservoirs, as well as a base for the DFS model. To further improve understanding of the system, mapping techniques using lidar integrated with Differential Global Navigation Satellite System (DGNSS) measurements were used to create sub-metre (spatially) accurate geologic models of the medial-distal portions of the DFS. In addition to the digital terrain data, traditional field sedimentary logs, structural and palaeocurrent measurements, and samples for petrophysical analysis were also collected near the town of Piracés in a series of amphitheatres and canal cuts that expose excellent two and three-dimensional views of the strata. The geologic models and subsequent analyses derived from the data will provide a quantitative tool to further understand the depositional architecture, geometric relationship and lithologic characteristics across the studied portion of the distributive fluvial system. Utilizing the inherent quantitative nature of the terrain data in combination with the traditional field and sample data collected, an outcrop based geocellular model of the studied section can be constructed by using several geostatistical modelling approaches to describe geo-body geometries (thickness and width ratio) for the associated fluvial architecture, as well as facies distribution and observed petrophysical characteristics. The resolution of the digital terrain data (<10cm) allowed for an accurate integration of the field observations (palaeoflow, sedimentary structures and grain size distributions) into a more complete model of studied portion of the fluvial system. The three-dimensionality of the exposure lends itself well to using lidar as a tool when mapping geo-body geometry and architecture across several kilometres. This approach leads to more accurate, quantitative reservoir and depositional models of the distributive fluvial system.