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POSTER PRESENTATION

Re-Evaluating Fluvial Architecture of Pre-Vegetation Reservoirs Using Large Digital Outcrop Datasets from the Tumblagooda Sandstone, Western Australia, Southern Carnarvon Basin

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Very few studies quantitatively document the geometries of fluvial systems prior to the evolution of rooted plant systems. The colonisation of land by plants influenced weathering, energy of the system and the stability of channel banks. Many authors have compared them to modern ephemeral environments, dominated by upper-flow regime runoff and described "sheet-braided" architectures. Studying fluvial architecture is difficult as most outcrops have limited extent and thus prevent acquisition of a large enough dataset to fully evaluate these typically laterally extensive systems.

This study examines the Ordovician-Silurian Tumblagooda Sandstone of Western Australia, exposed within extensive 3D outcrops along a gorge system, that enables acquisition of a large digital dataset to document and quantify the fluvial architecture of a classic pre-vegetation paralic sandstone outcrop. Using detailed sedimentary logging over a large area, integrated with the newly acquired 3D photogrammetry derived from UAV imagery, a quantitative database has been extracted to characterise the architectures. 1579 channels have been recorded, exhibiting low- and high-relief lenticular architectures, interbedded with the more typical sheet geometries. Parallel lamination is rare within the study area, suggesting sheet-floods are not the dominant process. Complex accretion surfaces have been identified indicating upstream, downstream and lateral accretion. Results suggest a system dominated by low-sinuosity, low amplitude, channel-braided architecture with bar accretion surfaces. Its preserved architecture has been interpreted to reflect limited accommodation, that resulted in cannibalising and reworking of channels and the preservation of broad amalgamated channel bodies. Frequent channel avulsion resulted in the amalgamation of channel scours within large channel belts, enhanced by bank instability due to the lack of plants, that in modern systems colonise and bind the overbanks.

Modelling geobody architecture is a key input parameter for reservoir modelling. Previously pre-vegetation systems were thought to be sheet- and lobe-like, laterally continuous, with relatively homogeneous– Kh. This study shows that many pre-vegetation systems more likely have a labyrinth geometry, comprising a complex suite of channels with limited lateral extent. This results in Kh being more heterogeneous, which has a profound effect on reservoir facies prediction and reservoir production.