Fluvial Research Group

UNIVERSITY OF LEEDS

Characterisation of distal fluvial sheet flood successions: implications for reservoir characterisation and evaluation

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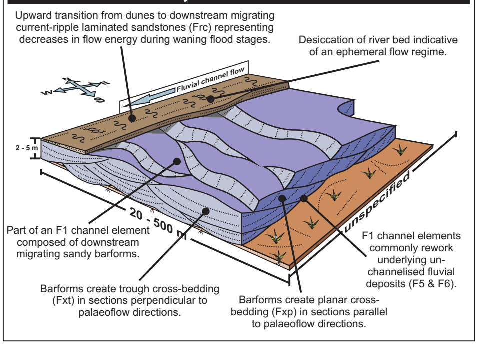
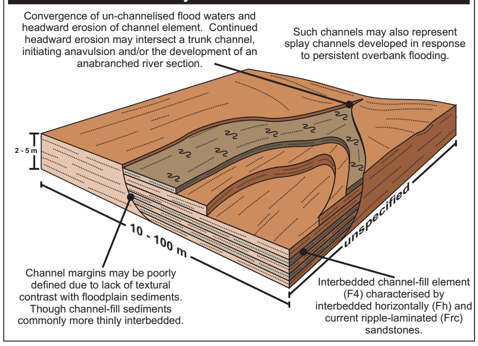
Distal fluvial sheet flood sandstones of the Permian Organ Rock Formation reflect deposition in an unconfined basin plain setting. Facies are characterised by a range of fine- to very fine-grained sandstones interbedded with siltstone and rare claystones. Minor channels, which are typically filled with intrabasinal rip-up clasts and reworked calcrete nodules, are present within the otherwise sheet dominated succession. The cyclic arrangement of subtle coarsening- or fining-upward cycles may represent the episodic progradation of channel-dominated systems into the distal parts of the basin, in response to either tectonic or climatic variation. Subtle variations in drainage pattern across the region, as revealed by palaeocurrent data, may reflect the early onset of uplift of the Monument Upwarp, which could have acted to control intrabasinal drainage patterns. Alternatively, multiple stream sources may have converged within the central part of the basin, as suggested by subtly differing grain populations within neighbouring parts of the succession. The Organ Rock Formation has received relatively little attention from sedimentologists to date, despite its close match in terms of facies architecture with several important hydrocarbon-bearing reservoir intervals including the Triassic of the Central North Sea (e.g. Skaggerak Formation) and the East Irish Sea (e.g. Ormskirk Sandstone and the transition into the overlying Mercia Mudstone Group). This project will determine how the rate of accommodation creation within the developing basin acted to control the distribution of sheet-like sand bodies and how subtle tectonic uplift may have acted to divert drainage patterns within the interior of the basin. One primary project objective is to determine whether such effects can be differentiated from the influence of multiple sediment entry points. A second primary objective is to ascertain whether climatic and/or tectonic controls on sedimentation can be effectively discerned from intrinsic sedimentary behaviour within these fine-grained systems.

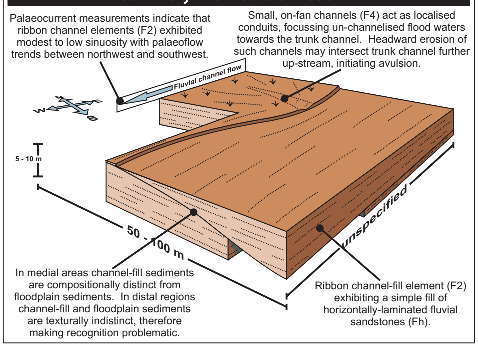
Summary Architecture Model - 1



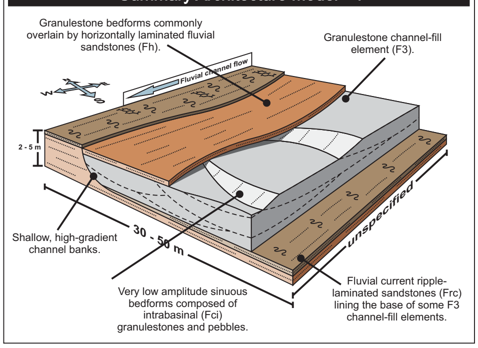
Summary Architecture Model - 3



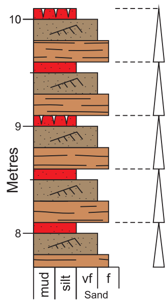
Summary Architecture Model - 2



Summary Architecture Model - 4

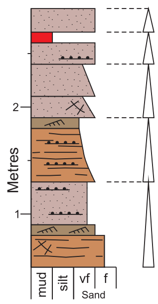


Succession UC$_1$



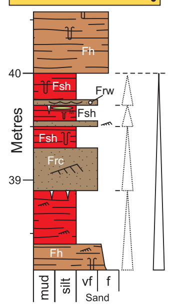
Log 058 - 8.5 - 9 m

Succession UC$_2$



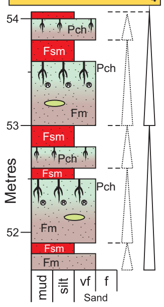
Log 044 - 0.5 - 2.9 m

Succession UC$_3$



Log 054 - 38.1 - 40.5 m

Succession UC$_4$



Log 054 - 51.6 - 54 m

Constituent Facies

Fh, Fd, Frc, Frw, Fm, Fsh, Fsm, Pch, Pcs

Key Features

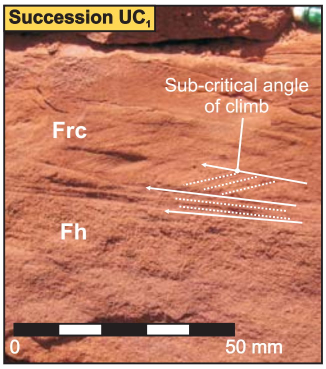
CU$_1$ This commonly observed relationship between Fh and Frc represents a transition from an upper- to lower-flow regime respectively. This relationship is indicative of waning flow conditions.

CU$_2$ Sand-dominated succession exhibiting cyclic, fining-upward sequences dominated by Fh, Frc and Fm.

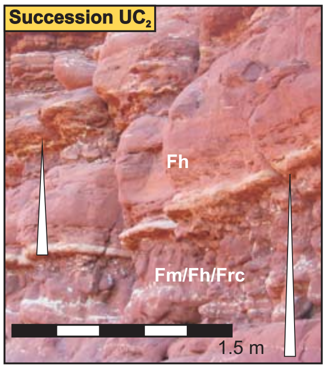
CU$_3$ Well developed succession of interbedded siltstone/mudstone (Fsh) and current- (Frc) and wave- (Frw) ripple sandstones.

CU$_4$ Sand-dominated succession exhibiting frequently developed hardpan (Pch) horizons.

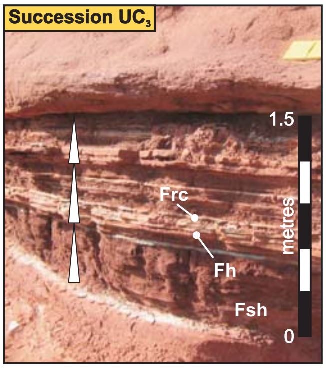
Succession UC$_1$



Succession UC$_2$

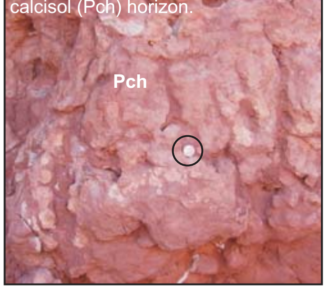


Succession UC$_3$



Succession UC$_4$

Upper surface of sandstone bed exhibiting well developed hardpan calcisol (Pch) horizon.



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