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A Modern Planform, Process and Facies Analog for the Cretaceous Ferron Sandstone of Utah: Applications to Exploration and Reservoir Description

Christopher R. Fielding

*Department of Geosciences, 214 Bessey Hall, University of Nebraska-Lincoln, NE 68588-0340
(cfielding2@unl.edu)*

Facies analysis of the Upper Cretaceous (Turonian) Ferron Sandstone in the western Henry Mountains of south-central Utah, USA, indicates sediment accumulation in a series of flood-dominated, marine current- and wave-influenced, deltas. Twelve lithofacies are recognized: 1. erosionally based, thick cross-bedded sandstone bodies (Distributary Channels), 2. similar though thinner bodies containing common bioturbation (Marine-Influenced Distributary Channels), 3. root-penetrated, plant fossil bearing siltstone with minor sandstone (Coastal Floodplain and Floodbasin), 4. coal and carbonaceous shale (Coastal Mire), 5. thin-bedded, carbonaceous and bioturbated sandstone/siltstone (Coastal Lagoon), 6. erosionally based sandstone with large- and small-scale cross-bedding and bioturbation (Mouth-Bar Complex), 7. sharply based sandstone bodies internally dominated by hummocky cross-stratification, soft-sediment deformation, or lacking structure (Proximal Delta Front), 8. sharply bounded, calcareous, fossiliferous and bioturbated sandstone sheets (Abandoned Delta Lobe), 9. thickly interbedded sandstone, coarse- and fine-grained siltstone (Medial Delta Front), 10. thinly interbedded sandstone, coarse- and fine-grained siltstone (Distal Delta Front), 11. mainly siltstone with minor thin-bedded sandstone (Prodelta) and 12. fine-grained siltstone with bentonite beds (Offshore).

Deltas prograded into shallow water, forming sharp-based mouth-bar sand bodies. The upper delta front was evidently fluidal and prone to failure, leading to the development of rotational slope failures, debris flow filled gullies, and, in places, growth faults. Paleocurrent data indicate that the regional sediment dispersal direction was eastward. Data from delta-front facies, however, suggest that outflow plumes and associated bottom currents were deflected towards the southeast, giving rise to an asymmetric delta planform. The Holocene and modern Burdekin River Delta of NE Australia is considered a close planform, process, and facies analog for the Ferron Notom deltas. The Burdekin Delta facies assemblage is vertically and laterally heterogeneous, despite being the product of a consistent array of environmental controls. Adopting a model that incorporates such a degree of heterogeneity negates the need for multiple depositional models for complex stratigraphic intervals such as the Ferron Sandstone. The facies model also suggests that asymmetric deltas may be produced by directional growth of delta lobes, rather than by deflection of beach ridges. Stratigraphic stacking patterns strongly suggest that sediment accumulation in the Ferron Sandstone of the western Henry Mountains was forced by a regime of progressively more limited accommodation through time.

Chris Fielding grew up in Scotland, was awarded a BSc Honours degree in Geology from Edinburgh University (1979) and a PhD in Geology from Durham University (1982) on the sedimentology and stratigraphy of Pennsylvanian coal-bearing rocks in NE England. He then joined BP Exploration Co. as a petroleum sedimentologist, working out of London, Guangzhou (China) and Aberdeen until 1986 when he commenced an academic position at the University of Queensland in Australia. He remained at UQ for 16 years, rising to the rank of Associate Professor and was Director (Academic) of the Department of Earth Sciences from 2001 until his departure in mid-2002. Chris is now the inaugural Mr & Mrs JB Coffman Chair in Sedimentary Geology at the University of Nebraska-Lincoln, in the USA. He was Editor of the journal "Sedimentology" from 1998 to 2002, has been on the Editorial Board of "Sedimentary Geology" since 1995, and was Editor-in-Chief from 2005-2008. He was elected President-Elect of SEPM in 2010. His research interests span the sedimentology and stratigraphy of continental, coastal and shallow marine depositional systems, their paleoclimatological archives, and applications to resource exploration and production. He maintains active field-based research programs in eastern Australia, Antarctica, Atlantic Canada, Midwestern and Western USA. He will watch any kind of football.

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