

# Comparison of Floodplain and Avulsion-Associated Deposits in Ancient Fluvial Successions: Implications for Crevasse-Splay Deposition and Avulsion Style

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Extensive heterolithic avulsion deposits accumulate during progradational avulsions. In contrast, incisional avulsions erode directly into floodplains and lack avulsion deposits. The nature of floodplain and avulsion deposits may be used to infer paleo-avulsion style. However, differentiating avulsion-associated and floodplain sediments in ancient successions is difficult because both may contain coarse overbank deposits. In order to discriminate between floodplain and avulsion deposits, we investigated overbank material below and lateral to channel-belt deposits in three ancient formations. Grain-size, paleosol development, and stratigraphy were characterized in the Ferris (Cretaceous/Paleocene; Hanna Basin), Fort Union (Paleocene; Bighorn Basin), and Willwood (Paleocene/Eocene; Bighorn Basin) formations in Wyoming.

Ferris floodplain deposits are dominantly carbonaceous claystones containing rare sandy lenses and little evidence of paleosol development. Where present, crevasse-splay deposits adjacent to channels pinch out in tens of meters. No evidence of heterolithic deposits was found below channels.

Fort Union and Willwood floodplain deposits contain extensively mottled paleosol horizons and extend laterally for kilometers. Channel-margin deposits are commonly tan decimeter-to-meter scale horizons with weak paleosol development. Heterolithic deposits comprising meter-scale coarsening-upward successions showing no or little paleosol development commonly underlie channels in these formations.

These observations indicate that Fort Union and Willwood floodplains contain significant avulsion-associated accumulations, while Ferris floodplains contain virtually none. This suggests that Ferris channels may have avulsed by incision, and/or that coarse-overbank deposition was suppressed in Ferris systems. By comparing field data to modern systems and modeling results, we consider how floodplain drainage, channel scale and sediment load may have affected sedimentation.