

## **THE FORMATION OF LIGNITIC SHALES AND THEIR RELATIONSHIP TO AVULSION CYCLES: AN EXAMPLE FROM THE EARLY TERTIARY OF THE BIGHORN BASIN, WYOMING**

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Unlike early Eocene continental rocks of the Powder River Basin, Wyoming, those of the nearby Bighorn Basin do not contain extensive coal deposits. However, stratigraphic intervals of the Eocene Willwood Formation do contain laterally extensive lignitic or carbonaceous shales that have organic contents of up to 80 weight %. These intervals are stratigraphically limited and bounded vertically by red paleosols. We present data from one lignitic shale that outcrops for 3km. Measured sections along the outcrop are uniform and comprise a basal lignitic shale overlain by fine-grained deposits on which weakly developed, hydromorphic paleosols formed. The paleosols surround and are locally incised by ribbon sandstones, some of which cut down to and partly through the lignitic shale. The ribbons have width/thickness ratios 15. Some ribbons cluster at particular stratigraphic levels, which, together with paleocurrent trends, suggests that they formed anastomosed channel networks. Sections are capped by red paleosols showing moderate pedogenic development.

We suggest that the lignitic shales formed in low-lying topogeneous swamps that developed in distal portions of the floodplain prior to channel avulsion. The weakly developed paleosols and associated ribbon sandstones are interpreted as crevasse-splay complexes resulting from avulsion of the trunk river. The ribbon sandstones represent ancient anastomosed feeder channels of the avulsion complex. Thus, the lignite-bearing sections preserve an example of channel avulsion deposits, which have rarely been recognized in the geological record, and reveal an important link between trunk channel processes and the accumulation of organic-rich deposits in distal alluvial swamps.