

**ORIGINS, STACKING CONFIGURATIONS, AND FACIES
DISTRIBUTIONS OF GENETIC SEQUENCES, EAGLE SANDSTONE,
BILLINGS, MONTANA**

by

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The methodology of genetic sequence analysis greatly increases temporal resolution of strata by extracting time-significant surfaces directly from lithostratigraphic data. This integrated surface/subsurface study demonstrates the methodology's utility in recognizing discrete, time-bounded progradational events (genetic sequences), and describes the stratigraphic relations of genetic sequences within the Upper Cretaceous Eagle Sandstone near Billings, Montana.

At Billings, paralic sandstones of the Eagle are displayed along a continuous 40 mi outcrop. Using high resolution facies analysis, eight shoaling cycles representing eight genetic sequences are recognized. This is in contrast to three to five previously defined lithostratigraphic members. In subsurface, a ninth genetic sequence is located to the northwest, capping the other eight.

Time-significant surfaces that bound the nine genetic sequences are physically traceable in the surface and subsurface for tens of miles. Geographic shifts of similar facies across these surfaces define a sequence stacking configuration which reflects relative sea level changes during the Campanian. In stratigraphic succession, this configuration shows a progressive seaward stacking of sequences #1-4, with the exception of a slight landward shift of sequence #2. Sequences #5-7 were deposited landward of sequence #4 in a near vertically stacked configuration. Sequence #8 is shifted seaward of sequences #5-7. Sequence #9, the youngest, is displaced landward of sequences #1-8.