

Comments on a key feature in lacustrine stratigraphy: the black shale

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The development of a comprehensive lacustrine facies model has been prevented by the absence of an unambiguous paleobathymetric indicator, and by the limited applicability of Walther's Law in such a rapidly changing environment, even on the bed scale. Temporal changes in water input and sediment supply complicate the use of sequence-stratigraphic concepts in the interpretation of small-scale facies successions in lake basins. Furthermore, the relationship between climate changes and the lacustrine stratigraphic record is still a somewhat speculative field in continental sedimentology.

Lacustrine black shales (source-rocks) are described, as a rule, as transgressive strata. However, this transgressive character is interpreted on the basis of a marine sedimentation model. We suggest an alternative scenario because of a number of anomalies in the "transgressive black-shale paradigm". Lacustrine black shales more likely record lowstand episodes in detrital lakes. Worldwide descriptions of lacustrine black shales, including those of Brazilian Lower Cretaceous, show a set of common features that could be readily associated with saline environments and low bathymetry. They include mud-cracks, evaporites, dolomites, cherts, stromatolites, positive oxygen isotopic trends in carbonates and biogeochemical indicators of high salinity. Climatic excursions towards arid conditions appear to simultaneously decrease sediment supply (clastic dilution) and bottom-water ventilation, thus favoring organic matter accumulation and preservation.

It is suggested that climatically induced variations in the water/sediment influx and bottom-water oxygenation are the dominant factors controlling small-scale sedimentary cycles in lacustrine settings, with organic sedimentation being an intermediate stage between detrital and chemical sedimentation.