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Michael Bruemmer, Wan Yang, and Monica Turner-Williams, Wichita State University, Wichita, KS

Cyclo-Stratigraphic Architecture and the Controlling Processes of Upper Pennsylvanian Oread Cyclothem in the Transition Zone Between Shelf and Deltaic Depositional Systems, Southeast Kansas and Northeast Oklahoma

Close juxtaposition of deltaic and shelf depositional systems of the Oread cyclothem in SE Kansas and NE Oklahoma formed a unique stratigraphic architecture. We reconstructed the architecture using 50 outcrop sections and 150 logs in a 2000-km^2 area to understand the controlling processes. The ~{!0~}layer-cake~{!1~} siliciclastics and limestones of the shelfal Oread cyclothem change to deltaic deposits southward. The persistent and thin Leavenworth Limestone signifies marine transgression. Maximum-transgressive anoxic and phosphatic Heebner Shale is ~~2 m on the shelf, but thickens to 23-m deltaic deposits in 5 km. Regressive Plattsmouth algal-mound facies changes to arenaceous packstone, and pinches out into deltaic sandstones in 3 km. Extensive Elgin deltaic deposition occurred during continued regression but was interrupted basinward by Kereford minor transgression. We speculate that an upwelling system developed in the study area, similar to that along NW African Shelf. The onshore and alongshore currents formed a hydrographic barrier to northward Heebner delta progradation. The offshore currents caused shelf anoxia. Westward retreat of upwelling system during early regression allowed shelf carbonate deposition. The alongshore currents, however, still prevented northward deltaic progradation, causing juxtaposition of carbonate and deltaic systems indicated by a 150-m-wide conglomerate-sandstone zone, similar to the Mahakam Delta in Java Sea. Syndepositional topography also affected the transition. Complete withdrawal of the upwelling system in late regression removed the barrier, thus, thick (10-50 m) Elgin deltas prograded 20 km shelfward, overwhelming several minor cycles. Interplay of eustasy, oceanic upwelling, sediment supply, and topography caused the unique Oread stratigraphic architecture.