Clay Mineralogy in Relation to Deltaic Sedimentation Patterns of Desmoinesian Cyclothems in Iowa-Missouri

L. F. Brown Jr., S. W. Bailey, L. M. Cline and Judith S. Lister

Bureau of Economic Geology, University of Texas, Austin, TX 78712, U.S.A.
Department of Geology and Geophysics, University of Wisconsin-Madison, Madison, WI 53706, U.S.A.
Arroyo Seco, NM 87514, U.S.A.

Abstract: Almost four decades of study of Desmoinesian strata of Middle Pennsylvanian age in south-central Iowa and north-central Missouri have provided the stratigraphic control required to test the variation of clay mineralogy vertically and laterally within various paralic clay and shale facies. Local and regional variations in clay mineralogy within Desmoinesian strata are generally predictable and are in agreement with current knowledge of deltaic deposition. A principal environmental variation within a deltaic system is the change from normal marine salinities in deltaic marine environments to brackish and fresh-water conditions in the marshy delta plains, in upper interdistributary bays, and within flanking interdeltaic embayments. Changes from marine to nonmarine facies coincide with a decrease in illite, and an increase in kaolin, mixed-layer clays, and in the percentage of expansible layers in the mixed-layer clay. The principal clay detritus entering the area was illite, which underwent various degrees of alteration in different aqueous and subaerial environments within deltaic and interdeltaic areas. Clay-mineral composition alone does not provide unique environmental answers. The distribution of clay-mineral suites within these systems, however, both supports the deltaic-interdeltaic depositional model and can be understood within the context of this framework.

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