Along-Strike Traction Flow of Muddy Sediments - Key to Understanding Depositional Processes of Shallow Marine Argillaceous Mudrocks: A Comparison of the Quaternary Amazon-Derived Shallow Marine Sediments with Haynesville and Mancos Shales

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Key to accurately predicting facies in shallow marine, argillaceous mudrocks is the understanding of physical processes responsible for their deposition. Past studies of mud-rich shallow marine environments coupled with recent laboratory investigations show that mud can be a dynamic sediment controlled by the same lateral/traction transport processes that affect coarser sediment particles. Observations made within the 1600 km long shallow marine Amazon dispersal system (ADS; northeast South America) are used to interpret significant sedimentary processes forming many of the sedimentary structures and some of the deposition facies within strata of the Haynesville (Upper Jurassic) and the Mancos (Cretaceous) shales. It is notable that many laminations and scour surfaces found in the shallow marine sediments of the ADS are similar to features found in the deepwater Barnett Shale (Mississippian). In the Barnett, however, such features are created in deep water by high density flows driven by gravity, while in the ADS such features are formed by fluid-mud pushed by wave and tide driven alongshore currents. The ADS shares shallow marine indicators, such as bioturbated strata, with the shallow marine Haynesville. But unlike the Haynesville where bioturbation is common, within the ADS bioturbated sediments are only found in the more distal offshore edge of the coastal mud wedge or in nutrient-rich ebb tidal deposits of local estuaries. ADS strata resemble the Mancos shale of the Western Interior Seaway, both on the small-scale of sedimentary layers and on the large-scale of facies distribution. Some examples of correlative small-scale features within both ADS and Mancos strata are discontinuous and graded laminations, current ripples, and “soupground” deformation features. An example of a large-scale correlative depositional facies pattern is the juxtaposition of coastal derived sands, marine sands, and shallow carbonates within a predominantly argillaceous mudstone sequence. Within the ADS, variations in sediment input from the Amazon combined with fluctuations in sea level created a depositional facies pattern that is dominated by fine-grained, argillaceous sediments but also contains estuarine ebb delta sands, shelfal shallow marine sands, and isolated lenses of carbonates. Similar facies patterns present in the Mancos of eastern Utah can also be explained by similar processes that include lateral transport of mud as a critical component.