

Paleoenvironments and depositional sequence stratigraphy of the early Jurassic Datta Formation, Chichali Nala, Surghar Range, Pakistan

Shuja Ullah^{1,2}; Muhammad Tahir^{1,2}; Adnan Mumtaz¹; Suleman Khan¹; Nowrad Ali^{1,2}; Yasir Iqbal¹ and Mashood Ahmad Khan¹

¹Department of Geology, University of Peshawar

*²National Centre of Excellence in Geology, University of Peshawar
shujageo@gmail.com*

Abstract

The Chichali Nala, preserves a record of the early Jurassic deltaic to marine sedimentation. The Datta Formation in Chichali Nala section is predominantly composed of medium to coarse grained sandstone interbedded with carbonaceous clays and limestone at places. On the basis of outcrop data and facies analysis, four lithofacies and five microfacies were identified. The lithofacies include: 1) Thick bedded sandstone (DLF-1), representing deposition in a delta front setting, 2) Channelized sandstone and alternate black shale (DLF-2), deposited in a delta plain setting, 3) Carbonaceous clays (DLF-3), indicating deposition in pro delta setting, and 4) Laterite (DLF-4) representing prolonged exposure of the platform under oxidizing conditions. The microfacies include: 1) Bioclastic wackestone (DMF-1), deposited in middle ramp setting, 2) Peloidal wackestone (DMF-2), representing deposition in distal middle to outer ramp setting, 3) Mudstone (DMF-3), representing deposition in outer ramp setting, 4) Siliciclastic grainstone (DMF-4), indicative of inner ramp setting, and 5) Dolomite (DMF-5), which show deposition in tidal flat setting. The lithofacies and microfacies indicate four transgressive and three regressive episodes of the sea level and represent deposition in a third order cycle. Based on the facies synthesis a depositional model is presented, which suggests nine repeated exposure cycles of platform (SB1-SB9 sequence boundaries), represented by the laterite facies (DLF4). Such exposures can be attributed to the intense tectonics induced sea level fluctuations or the consistent shifts of the distributary channels over the exposed shelf.