

Sequence Stratigraphy and Depositional Environment of Kopili Sediments of Upper Assam South Block, India: Evaluating the Relationship with Diagenetic Events

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Abstract

The sequence stratigraphic analysis of the area was carried out based on the vertical relationship of the lithofacies associations, electronic well-logs, palynological and foraminiferal data and the existing stratigraphic framework of the Kopili Formation of Assam and Assam Arakan Basin. In this paper an approach has been made to integrate diagenesis and sequence stratigraphy in order to unravel and discuss the spatial and temporal distribution of diagenetic alterations in sandstones. The Formation consists of alternations of shales and sandstone with a number of thin limestone or calcareous bands and marls. Based on biostratigraphic evidence, inner shelf paleoenvironment (upto 20 - 30 m bathymetry) prevailed during the deposition of the lower Kopilis and subtidal- intertidal environment (5- 10 m bathymetry) during the deposition of the upper Kopilis. Four types of data were used for the study, specifically, electronic well-log, lithologic, palynological and foraminiferal data. The data have been synthesized after studying approximately 800 subsurface cutting samples along with well logs from 10 representative wells of Kopili and upper part of Sylhet formations. The sandstone's of this formation generally contain higher amount of matrix and rock-fragments and as such are classified as sublith- and lithic arenite to lithic greywacke. A total of seven diagenetic facies have been identified within Kopili Formation. In this formation extensive quartz replacement by calcareous cement is observed. The siliceous and ferruginous cements are sometimes found to occur around the detrital

components. Dissolution and replacement of rock fragments are also noticed. The replacement of lithic fragments by the calcite cements is observed. Paragenetic sequence includes early calcite cementation and its immediate dissolution in eodiagenetic stage, subsequent dissolution of feldspar and precipitation of kaolinite and quartz cements, followed by patchy calcite cementation in mesodiagenetic stage. Ratio of marine and non-marine species, palynological marine index (PMI), dinoflagellate species diversity as well as foraminiferal frequency along with well log characteristics and log motifs have formed the basis for identification of four third order sequences and T/R cycles in the studied area. Precipitation of diagenetic minerals and formation of pseudomatrix, mechanical clay infiltration and intragranular porosity show a systematic distribution in sandstones lying in the vicinity of sequence boundaries (SB) and parasequence boundaries (PB), transgressive surfaces (TS) and maximum flooding surfaces (MFS) and in sandstones of the lowstand (LST), transgressive (TST) and highstand (HST) systems tracts.