Abstract No: 17 ***Earth & Environmental Sciences***

LITHOSTRATIGRAPHY AND SEDIMENTOLOGY ACROSS THE CRETACEOUS-PALEOGENE (K-PG) BOUNDARY IN THE OFFSHORE MANNAR BASIN: UNRAVELING PALEOENVIRONMENTAL DYNAMICS IN THE EQUATORIAL MARGIN OF THE NORTHERN INDIAN OCEAN

S.S. Nawarathna[1], P.L. Dharmapriya[1,2*] A.U. Wijenayake[1,2] and E.K.C.W. Kularathna[3]

[1]Department of Geology, Faculty of Science, University of Peradeniya, Sri Lanka
[2]Postgraduate Institute of Science, University of Peradeniya, Sri Lanka
[3]Petroleum Development Authority, Sri Lanka
[*]prasannad@sci.pdn.ac.lk

The Mannar Offshore Basin, Sri Lanka, features a rich geological history marked by Precambrian metamorphic rocks overlain by extensive sedimentary sequences. This study examined the lithological characteristics of sedimentary sequences in the Mannar Basin from the Late Cretaceous to Early Paleocene, according to unpublished stratigraphic charts from Petroleum Development Authority Sri Lanka (PDASL) determined by micropaleontological, nano-paleontological, and palynological studies. Samples were available at 10-meter intervals from PDASL, derived from drill cuttings collected during basin exploration, providing insights into sedimentary dynamics across the K-Pg transition. Analysed 25 drill-cutting samples from the CLPL Dorado exploration well, spanning 2800 m to 3050 m. Petrographic and X-ray diffraction analyses revealed a diverse range of lithofacies, including quartz, carbonates (calcite, dolomite, aragonite), and clay minerals (montmorillonite, kaolinite, illite, chlorite). Throughout this period, the basin witnessed the deposition of five distinct lithofacies, encompassing calcareous clayey mixed shale, calcareous shale, clayey shale, siliceous rock, and clay siliceous mixed shale, each reflecting unique depositional environments and diagenetic processes. Of particular note is the occurrence of siliceous rock layers intercalated with feldspathic wacke sandstone during the late Maastrichtian to Early Paleocene transition, indicative of global late Maastrichtian Sea level regression and subsequent arid to semi-arid climatic conditions. The presence of reddish-brown shale samples from the Early to Late Maastrichtian sedimentary succession, characterised by abundant hematite, kaolinite, and chlorite clay minerals, alongside decreasing Total Organic Carbon (TOC) values, suggests an oxidising environment prevailing during this period. Moreover, the identification of montmorillonite and illite-rich black shale samples, along with the appearance of pyrite during the middle Maastrichtian period, underscores anoxic/reducing environmental conditions, persisting up to the Late Campanian period within the shale lithofacies.

Financial assistance from the PGIS Research grant (Grant No. PGIS/2020/03) is acknowledged

Keywords: Diagenesis, K-Pg boundary, Lithofacies, Mannar Basin, Paleoenvironment