Depositional setting and sequence stratigraphic analysis of Lakhra Formation, Lower Indus Basin, Pakistan

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The current study focuses on the paleoenvironmental and sequence stratigraphic analysis of the Upper Paleocene-Lower Eocene Lakhra Formation, exposed in Laki Range of the Lower Indus Basin, Pakistan. The formation is previously analysed for biostratigraphy, but has never been analysed for depositional setting and sequence stratigraphy. Based on filed and petrographic observations, two distinct lithofacies (i.e., bioclastic sandstone lithofacies and shale lithofacies) and one microfacies (i.e., foraminiferal bioclastic packstone MF-1) are identified. The lithofacies and microfacies suggest the formation to have been deposited in a middle ramp to outer ramp slope (turbidite) setting. The studied rock units show deposition in a total time period of 55-56 million years, which is comparable to the eustatic third-order cycle (2.1 Ma). The depositional sequence in the studied sections represents a partial cycle including lowstand system tract (LST) and transgressive system tract (TST). These facies represent depositional cyclicity and have preserved trackable sea level changes and associated facies variations, controlled by the local shift in sea level and the associated tectonics. The study provides valuable information regarding the depositional framework in the Lower Indus Basin and changes in the depositional pattern associated with the Himalayan orogeny in the proposed time interval.