

# **Influence of Paleoclimate and Paleodepositional Environment on Organism's flourishing: A Case Study on the Cenozoic Sediments From the Kachchh Region, Western India**

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The multiproxy approach on 86 m-thick Cenozoic sedimentary succession in western Kachchh was undertaken to determine the depositional environments and the degree of climatic controls over the entire Cenozoic depositional processes. Besides, the role of depositional setting and other geological factors, which controls fossil preservation and organisms' flourishing, are assessed. Based on age diagnostic nannoplankton and foraminiferal species found across the studied core envisage four different units corresponding to Naredi, Fulra, Maniyara fort and Chhasra formations, respectively. Major element geochemical data and their correlation reveal that the sediments came from an active continental margin to passive margin settings with the decomposition signature of K-feldspar indicative of moderate weathering conditions. XRD, clay mineralogy and different weathering indices (like CIA, ICV, PIA, CIW, CIX) reveal the source area of the sediments that form Naredi, Fulra and Maniyara fort formations is in the high precipitation zone and signifies high terrestrial influx with subsequent increased physical weathering. Major oxide geochemical data, show rising values of SiO<sub>2</sub>, Al<sub>2</sub>O<sub>3</sub>, Fe<sub>2</sub>O<sub>3</sub> and clay minerals in specific horizons that influence organism preservation and prohibit degradation. The enrichment factors (EF) of trace elements reveal increase in nutrients like Ba, Zn, V, U, Cu and Cr, which act as biominerals that incorporate during the organism's shell-forming process and their flourishing. The redox indices (U/Th, V/Cr, Ni/Co and V/(V+Ni)) values and relationship with TOC from the studied shale samples showed that primarily oxic- sub oxic conditions suitable for shallow shelf dweller species with few locally transient semi-restricted environment, units prevailed during deposition. REE data indicates that REE was not scavenged out and no signature of post-depositional diagenesis and recrystallization were present in the sediments. REE data corroborates that the signature of significant inputs from Deccan basalt are present within the studied samples, providing enough nutrients for biogenic bloom. Synthesizing geochemical data like sediment routing, rainfall ( $\alpha^{Al}Mg$  and  $\alpha^{Al}Ca$ ), productivity indices ( $Ba_{bio}$ ,  $Cu_{bio}$  and  $Ni_{bio}$ ) and climate proxies (PCA) from core samples also trace the signatures of global events like ETM-2, MECO, MMCO.