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Long term (Oligocene-Pleistocene) climatic variability and depositional environments from sediment cores of Northern South China Sea

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South China Sea archives significant records of climatic and tectonic interactions of land and sea through time. Organic geochemical, elemental and stable isotopic studies of Oligocene to Pleistocene sediments from sites U1501C and U1499A in Northern SCS have been carried out to infer 1) the sources of carbonates and organic matter, 2) sedimentary provenance and depositional environments, 3) correlation of these with East Asian monsoonal variability. Geochemical data is constrained using shipboard sedimentology and biostratigraphy. Carbonate content in cores ranges from 0.16 to 6.81 wt%, while TOC varies between 0.12 to 1.13 wt%. $d^{13}C_{VPDB}$ and $d^{18}O_{SMOW}$ signatures of sedimentary carbonates vary from -4.89 ‰ to 1.98 ‰, and 23.40 ‰ to 32.65 ‰, respectively, and d^{13}Corg lies between -24.66‰ to -28.13‰. A colder climate since late Oligocene and in certain intervals from Pliocene to Pleistocene is suggested by the dominance of C3 plant inputs. Enriching trend of geochemical proxies, witnessed during late Miocene resulted from the biogenic bloom in equatorial Pacific. Dissolution event of Pliocene and early to middle Pleistocene led to a low to moderate carbonate content. Enhanced winter monsoon with increased terrigenous input during glacial low sea levels significantly influenced middle to late Pleistocene carbonate depositions.

LREE/HREE, La/Yb and REE abundances indicate mixed sediment source contribution, primarily from the Hainan Islands. Cerium anomaly indicates the Oligocene depositions in oxygen minimum zone, while since late Miocene, oxic water conditions prevailed, which is also corroborated by U/Th, V/Cr, V/(V+Ni), and Ni/Co ratios. The Oligocene-Miocene basalt and intermediate eruptions contributed to negative Europium anomalies, with rapid depositions in shelf-slope region. The late Miocene witnessed the fluxes of Aeolian sediments and fluvial deposition due to the Tibetan Plateau uplift, whereas Pliocene and Pleistocene mark the loess, lacustrine, and marine glacial-interglacial sequential depositions. Chemical weathering index and Na/Ti , Ca/Ti, Al/Ti, Al/N, Th/Sc, and La/Sm proxies suggest reduced chemical weathering intensity since the early Miocene. A strong impact of East Asian winter monsoon since Oligocene is inferred with the studied proxies from the sediment cores in NSCS.