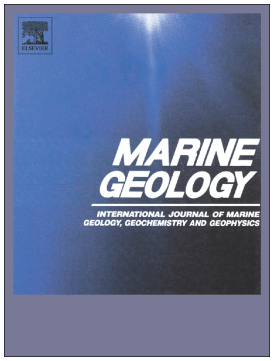

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Detrital zircon ages and elemental characteristics of the Eocene sequence in IODP Hole U1435A: implications for rifting and environmental changes before the opening of the South China Sea

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Abstract:

The pre-Oligocene sediment succession including shipboard lithological Units II (77.65-275.54 mbsf) and III (275.54-300 mbsf) from International Ocean Discovery Program (IODP) Hole U1435A in the northern South China Sea is characterized by greenish to dark gray sandstone and siltstone of coastal marine facies with age previously undetermined due to a lack of age-diagnostic fossils. Detrital zircon U-Pb ages (9 samples) and thin sections (76 samples) from these two units, together with geochemical elements (197 samples) from Units I to III were analyzed to distinguish provenance, tectonic setting, and depositional age and environment. Petrographic study reveals that most samples are fine sandstones, mainly composed of subangular quartz (70-80%) and alkaline feldspar (10-15%; mostly K-feldspar), indicating a near proximal provenance. Discrimination diagrams, element ratios and chondrite-normalized rare earth element patterns suggest a relatively stable source of felsic rocks. Detrital zircon U–Pb dating results reveal a dominance of Mesozoic ages with a pronounced Early Cretaceous peak at ~110 Ma. Fourteen zircon grains from 7 samples yield much younger ages between ~65 and 38 Ma, indicating middle to late Eocene deposition, broadly corresponding to the lacustrine-shallow neritic Enping-Wenchang Formations of the Pearl River Mouth Basin. Comparison amongst various elemental proxies from the Eocene sediments in Hole U1435A and in offshore industrial wells confirms a continental island arc setting in the Cretaceous when the zircons were produced.