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Millennial-to-orbital scale changes in the planktic foraminiferal assemblages and sea surface temperature in the South China Sea during the past 135 kya

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Recent progress in late Quaternary low-latitude Pacific paleoceanography has advanced our understanding on the reasons that the tropical oceans have coupled with or isolated from Northern Hemisphere high-latitude climate and the role that the tropics has played in modulating global climate. However, it remains unsolved how the internal feedback in the tropical atmosphere and ocean and the coupling between the low- and high-latitude systems may have produced instability or non-cyclic changes in the long-term climate evolution. Here we present high-resolution reconstruction of faunal and sea surface temperature based on high sedimentation rate IMAGES (International Marine Global Change Study) cores in the South China Sea (East-West: MD972142-MD012394; North-South: MD972148-MD972151). These records will be used to investigate land-sea climate linkages (e.g. terrestrial signatures: Dongge, Hulu, Sanbao caves) and any East Asian monsoon (EAM)-related mechanisms on abrupt climate events and millennial-to-orbital climate changes. Our results indicate that the precession-driven insolation variations would dominate the magnitude of the EAM since MIS 6, as inferred by east-west gradients (MD972142, MD012394) of faunal factors. We further suggest that the SCS variability of hydrographic gradients (E-W & N-S transects) for the last 135 kyr has been dominated by winter monsoon dynamics in response to geographic forcing controlled by the strength of the Australian summer monsoon in the South Hemisphere. As compared with millennial-scale climate records of the eastern equatorial Pacific (EEP; Core ODP 1240), SSTs at the SCS and EEP reveal profound coolings in Heinrich Event (HE) 3 and HE 6. We find that subpolar and/or EBC faunal factors at Site 1240 plays the major dominating role over the last 160 kya. It implied that southern high-latitude ocean circulations would be the major component and further influenced upper water structure around the EEP.