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Thermal variations at the Southern Margin of the Western Pacific Warm Pool over the past 340 kyrs

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The global climate change is strongly influenced by the evolution of Western Pacific Warm Pool (WPWP), which is one of the most important sources of heat and moisture to the mid- to high-latitude regions. However, the detailed glacial-interglacial dynamics of the WPWP and the driving forcings are still not clear. For better understanding the mechanism, we measured Mg/Ca ratios of planktonic foraminifera, Globigerinoides ruber (250-300 μm) of a sediment core MD05-2925 (9˚20.61'S, 151˚27.61'E) over the past 340 thousand years in the southern margin of the WPWP (SMWP). Low ratios of Al/Ca and Mn/Ca and a shallow water depth of 1642 m indicate no detectable high magnesium contamination from ferromanganese oxide and clay minerals, little dissolution effect, and corroborate the validity of Mg/Ca thermometry. The determined G. ruber Mg/Ca record shows an averaged low glacial value of 3.4-3.6 mmol/mol and high interglacial value of 4.8-5.0 mmol/mol. The glacial-interglacial variation is about 1.3-1.6 mmol/mol. The Mg/Ca-inferred SST data show the glacial SST of 24-25 ˚C, 3-4 ˚C lower than the interglacial temperature of 27-28 ˚C. A maximum SST, 28-29 ˚C, was observed at the MIS 5e. Compared with the records of the central warm pool (CWP) (Lea et al., 2000), remarkable features are: (1) the averaged SST difference between the CWP and SMWP is 2.5 ˚C during the glacial period while the difference is only $\sim$1.0 ˚C during MIS 1, 5, and 7; (2) at the MIS 5e, SMWP SST was 1 ˚C higher than that in the Holocene and no SST gradient is found between CWP and SMWP; and (3) the SMWP SST record is characterized with a clear 21-kyr periodicity. Accordingly, we speculate that the WPWP could evolve with an interglacial expansion and a glacial contraction, associated with the variability of northern solar insolation.