

Variability of the western Pacific ITCZ over the past three glacial-interglacial cycles

YI LIU^{1,2}, LI LO^{2,3}, ZHENG GUO SHI⁴, KUO-YEN WEI², CHUNG-CHE WU², HORNG-SHENG MI⁵, CHIH-KAI CHUANG², HIROSHI AMAKAWA^{2,6}, CHUAN-CHOU SHEN^{2*}

¹ School of Earth and Space Science, University of Science and Technology of China, Hefei, China

² HISPEC, Department of Geosciences, National Taiwan University, Taipei, Taiwan ROC

³ Department of Earth Sciences, University of Cambridge, Cambridge, UK

⁴ Institute of Earth Environment, Chinese Academy of Sciences, Xi'an, China

⁵ Department of Earth Sciences, National Taiwan Normal University, Taipei, Taiwan ROC

⁶ JAMSTEC, Yokosuka, Japan

Few direct long-term records, especially in the Pacific, limit our understanding of long-term natural variability of the Intertropical convergence Zone (ITCZ). Here we present a tropical precipitation record from the Southern Hemisphere covering the past 282,000 years, inferred from rare earth elements (REEs) to Ca ratios in the planktonic foraminifer *Globigerinoides ruber* shell calcite, of a Pacific marine sedimentary core MD05-2925 (9°20.60'S, 151°27.54'E; water depth 1661 m), collected off the eastern coast of Papua New Guinea. Unlike the precession paradigm expressed in its East Asian counterpart, our record shows that the western Pacific ITCZ migration over the past three glacial-interglacial cycles was influenced by combined precession and obliquity changes. Geochemical records and model simulations suggest the obliquity forcing could be primarily delivered by a cross-hemispherical thermal/pressure contrast, resulting from the asymmetric continental configuration between Asia and Australia in a coupled East Asian-Australian circulation system. Our finding highlights that the obliquity forcing may play a more important role in global hydroclimate cycles than previously thought.