A 18,000-year lacustrine high-resolution record of past temperature and hydroclimate dynamics from the Indo-Pacific Warm Pool

RIENK H SMITTENBERG *[12], KWEKU A YAMOAH [123], FREDERIK SCHENK [12], AKKANEEWUT CHABANGBORN [124], SAKONVAN CHAWCHAI [124] AND BARBARA WOHLFARTH [12]

[1] Department of Geological Sciences, Stockholm University, Stockholm, Sweden (*correspondence: rienk.smittenberg@geo.su.se)

[2] Bolin Centre for Climate Research, Stockholm University, Stockholm, Sweden

[3] now at Department of Geosciences, National Taiwan University, No. 1, Sec. 4, Roosevelt Road, Taipei 106, Taiwan

[4] now at Department of Geology, the Faculty of Science, Chulalongkorn University, Bangkok 10330, Thailand

Deep convection in the Indo-Pacific Warm Pool (IPWP) is a major source of latent heat for the higher latitudes, and therefore plays a key role for climate dynamics. The IPWP is also a main moisture source for the East Asian and Australasian Monsoons. Lastly, it forms a key node in the dynamics of the El Nino Southern Oscillation (ENSO). Despite its importance, relatively little is known about the spatiotemporal evolution of IPWP (hydro)climate over longer timescales; only few high-resolution records exist. Here we present a new 18,000-year long hydroclimate record from Southern Thailand, based on the hydrogen isotopic composition of leaf waxes (δDwax), combined with a biomarker-based proxy record of past temperature. The dataset clearly shows that changes in orbital forcing exert a primary control on mean temperature and thereby on atmospheric convection in the region over decadal to millennial timescales. However, clear excursions from this general behavior can be observed during the last glacial termination (18-11 ka BP). The temperature proxy record indicates that our site was several degrees colder during most of this period, rising only significantly between 11.5-10.5 ka BP, when also the Sunda shelf became completely inundated. Maximum temperatures and greatest convective activity were reached in the mid-Holocene (6-4 ka BP) with a subsequent decrease. Our results add an important piece of the puzzle of the spatiotemporal evolution of the IPWP hydroclimate, providing a good testbed for ongoing climate modeling efforts.