

Online Supplementary Material

Does regional air–sea coupling improve the simulation of the summer monsoon over the western North Pacific in the WRF4 model?

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**This file includes:
Supplementary Texts and Figures S1–S2**

WRF4 model physical configurations

The following model physics were employed: the Noah multiphysics land surface model (Niu et al. 2011); the WRF single-moment 6-class (WSM6) microphysics scheme (Hong and Lim 2006); the Rapid Radiative Transfer Model for General Circulation Models (RRTMG) for longwave and shortwave radiation parameterizations (Iacono et al. 2008); the Yonsei University (YSU) planetary boundary layer scheme (Hong, Noh, and Dudhia 2006); the COARE ocean–atmosphere flux algorithm (Fairall et al. 2003); the cloud scheme proposed by Xu and Randall (1996); and the Tiedtke cumulus parameterization (Tiedtke 1989; Nordeng 1994).

Observational datasets

The following observational datasets were employed: (1) the satellite-retrieved 0.25° rainfall dataset of the Tropical Rainfall Measuring Mission (TRMM) 3B42 (Huffman et al. 2007); (2) the daily mean circulation field (e.g., u , v , q , w , h) with a $0.75^\circ \times 0.75^\circ$ grid derived from ERA-Interim; (3) the daily high horizontal resolution (0.25°) Optimal Interpolation Sea Surface Temperature (OISST) data derived from the National Oceanic and Atmospheric

Administration (Reynolds et al. 2007); (4) the monthly mean surface and top of the atmosphere solar and longwave radiation fluxes derived from Clouds and the Earth's Radiant Energy System (CERES) (Wielicki et al. 1996); (5) the sea surface latent and sensible heat fluxes derived from the Objectively Analyzed air-sea heat fluxes (OAFlux), version 3 (Yu, Jin, and Weller 2008); and (6) the daily mean surface radiation derived from the International Satellite Cloud Climatology Project (ISCCP) (Zhang et al., 2004).

References

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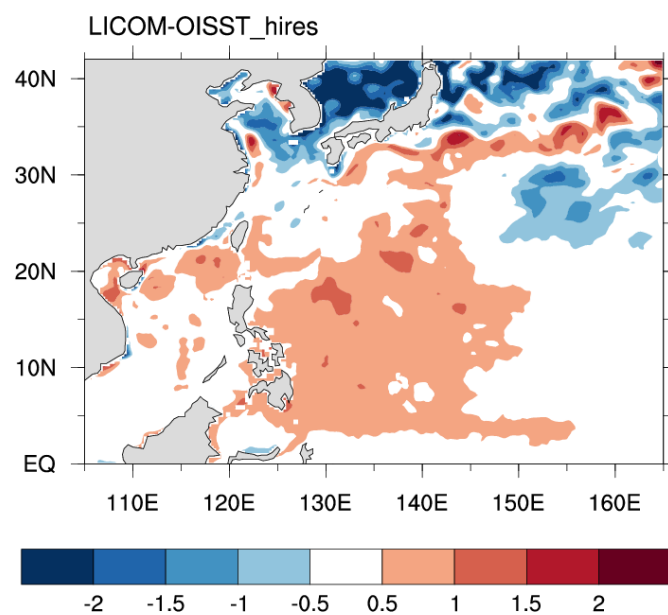


Figure S1. Spatial distribution of the biases of the simulated SST (units: $^{\circ}\text{C}$) by LICOM_np averaged from June to August 2005 over the WNP.

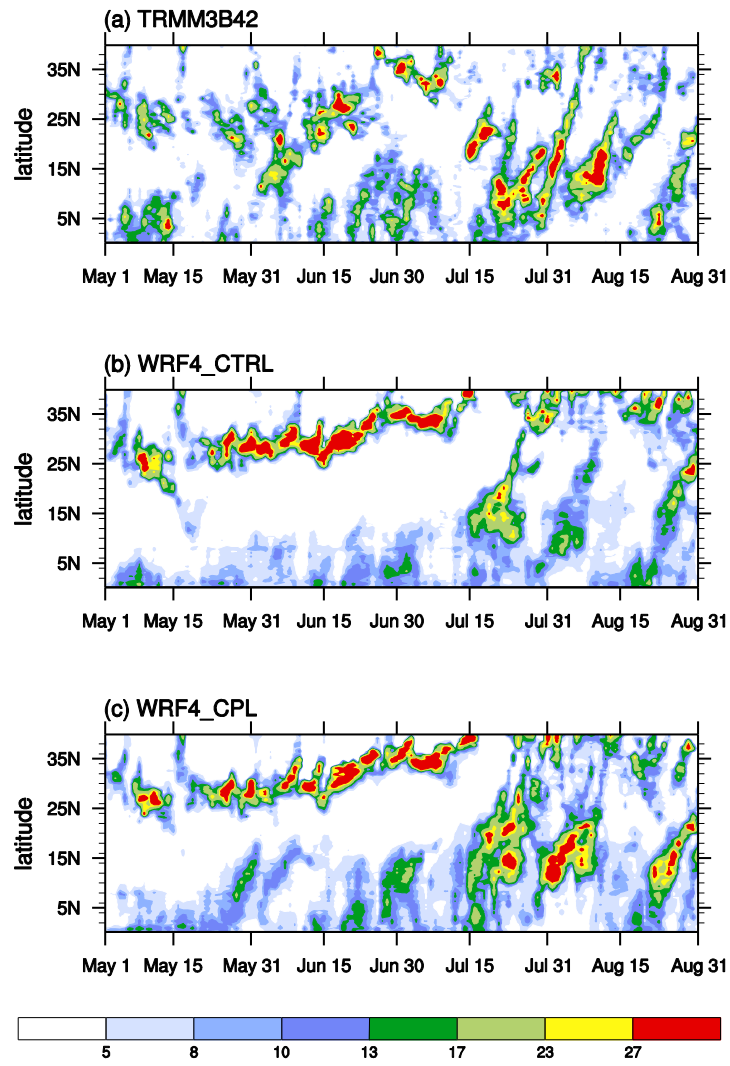


Figure S2. Time–latitude cross sections of the rainfall (shading; mm d^{-1}) averaged between 105°E and 140°E from 1 May to 31 August 2005 derived from (a) observation, (b) WRF4_CTRL, and (c) WRF4_CPL.