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## **Excessive ITCZ but negative SST biases in the tropical Pacific simulated by CMIP5/6 models: The role of the meridional pattern of SST bias**

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In the state-of-the-art CMIP5/6 models, there is an apparent excessive rainfall bias with a negative SST bias in the tropical Pacific intertropical convergence zone (ITCZ). The regime of the excessive ITCZ but negative SST bias is inconsistent with the common positive rainfall–SST correlation. Using a two-mode model, we decomposed the rainfall bias into two components, and found that the surface convergence (SC) bias is the key factor forming the excessive ITCZ bias in the historical runs of 25 CMIP5 models and 23 CMIP6 models. A mixed layer model was further applied to connect the formation of the SC bias with the SST pattern bias. The results suggest that the meridional pattern of the SST bias plays a key role in forming the SC bias. In the CMIP5/6 models, the overall negative SST bias has two apparent meridional troughs at around 10°S and 10°N, respectively. The two meridional troughs in the SST bias drive two convergence centers in the SC bias favoring the excessive ITCZ, even though the local SST bias is negative.