

The Bias of South China Sea Summer Monsoon Precipitation Associated With Physical Processes in Global Climate Models: The Multi-year Hindcast Approach

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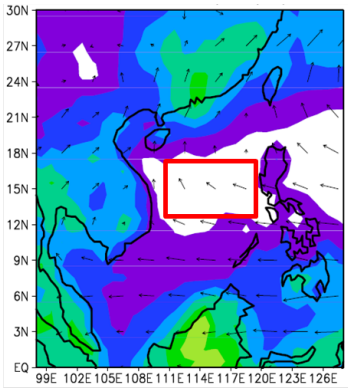
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The multi-year hindcasts, initialized from the ERA-Interim reanalysis, allow for evaluating the simulated monsoon system given a well-constrained large-scale state at the exact period surrounding the abrupt onset each year over the South China Sea (SCS), a key precursor of the overall East Asia summer monsoon onset. With this experiment, one can better attribute model biases to interactions among parameterizations of fast physical processes, such as the boundary layer turbulence, shallow and deep convective parameterizations. Compared with the observation data, Community Atmospheric Model v.5 simulates excess convective precipitation over SCS and the western Pacific during the pre-onset period, where the environment is mostly suppressed by subsidence of the subtropical high ridge but with high sea surface temperature. The moisture tendency budget analysis reveals the existence of a wet tendency bias in the lower troposphere caused by the interactions among the fast physical processes. We hypothesize that this moist bias enhances the convective instability and produces the precipitation bias, hence the early onset of SCS monsoon. In the future, idealized cloud resolving model simulations will be carried out using the pre-onset, suppressed conditions, and the statistics from cloud resolving model simulations can then be compared with outputs of physical parameterizations in the global climate model to identify potential areas for improvement.

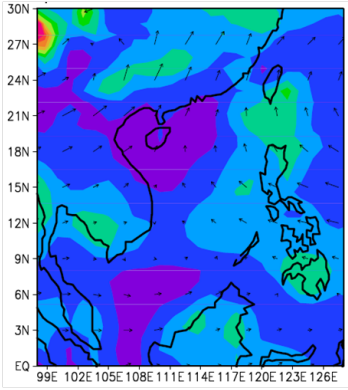
Keywords: precipitation, monsoon, GCM, CRM

Pre-onset bias: Day2 → Day3 → AMIP

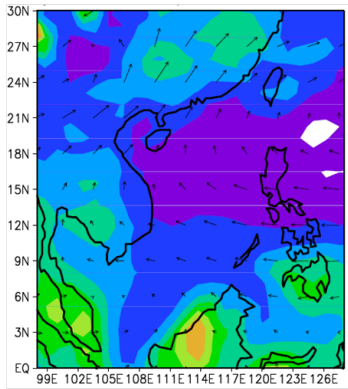
OBSERVATION



CAM5 AMIP



CAPT Day 2



CAPT Day 3

