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Performance of ICTP's RegCM4 in Simulating the Rainfall Characteristics over the CORDEX-SEA Domain

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The performance of the RegCM4 in simulating rainfall variations over the Southeast Asia regions was examined. Different combinations of six deep convective parameterization schemes, namely i) Grell scheme with Arakawa-Schubert closure assumption, ii) Grell scheme with Fritch-Chappel closure assumption, iii) Emanuel MIT scheme, iv) mixed scheme with Emanuel MIT scheme over the Ocean and the Grell scheme over the land, v) mixed scheme with Grell scheme over the land and Emanuel MIT scheme over the ocean and (vi) Kuo scheme, and three ocean flux treatments were tested. In order to account for uncertainties among the observation products, four different gridded rainfall products were used for comparison. The simulated climate is generally drier over the equatorial regions and slightly wetter over the mainland Indo-China compare to the observation. However, simulation with MIT cumulus scheme used over the land area consistently produces large amplitude of positive rainfall biases, although it simulates more realistic annual rainfall variations. The simulations are found less sensitive to treatment of ocean fluxes. Although the simulations produced the rainfall climatology well, all of them simulated much stronger interannual variability compare to that of the observed. Nevertheless, the time evolution of the inter-annual variations was well reproduced particularly over the eastern part of maritime continent. Over the mainland Southeast Asia (SEA), unrealistic rainfall anomalies processes were simulated. The lacking of summer season air-sea interaction results in strong oceanic forcings over the regions, leading to positive rainfall anomalies during years with warm ocean temperature anomalies. This incurs much stronger atmospheric forcings on the land surface processes compare to that of the observed. A score ranking system was designed to rank the simulations according to their performance in reproducing different aspects of rainfall characteristics. The result suggests that the simulation with Emanuel MIT convective scheme and BATs land surface scheme produces better collective performance compare to the rest of the simulations.