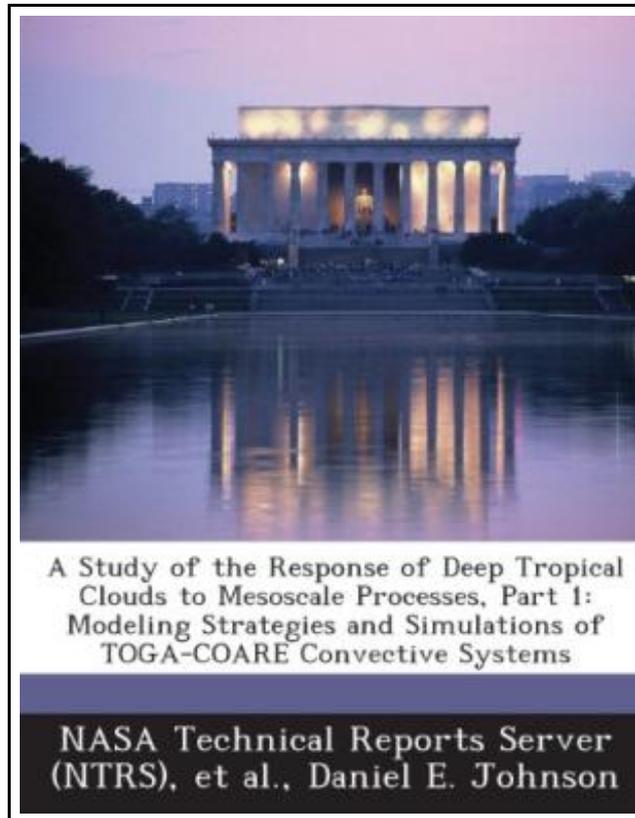


A Study of the Response of Deep Tropical Clouds to Mesoscale Processes, Part 1: Modeling Strategies and Simulations of Toga-Coare Convective Systems



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(Ms. Ora Buckridge)

A STUDY OF THE RESPONSE OF DEEP TROPICAL CLOUDS TO MESOSCALE PROCESSES, PART 1: MODELING STRATEGIES AND SIMULATIONS OF TOGA-COARE CONVECTIVE SYSTEMS



Bibliogov, United States, 2013. Paperback. Book Condition: New. 246 x 189 mm. Language: English . Brand New Book ***** Print on Demand *****.Interactions between deep tropical clouds over the western Pacific warm pool and the larger-scale environment are key to understanding climate change. Cloud models are an extremely useful tool in simulating and providing statistical information on heat and moisture transfer processes between cloud systems and the environment, and can therefore be utilized to substantially improve cloud parameterizations in climate models. In this paper, the Goddard Cumulus Ensemble (GCE) cloud-resolving model is used in multi-day simulations of deep tropical convective activity over the Tropical Ocean-Global Atmosphere Coupled Ocean-Atmosphere Response Experiment (TOGA COARE). Large-scale temperature and moisture advective tendencies, and horizontal momentum from the TOGA-COARE Intensive Flux Array (IFA) region, are applied to the GCE version which incorporates cyclical boundary conditions. Sensitivity experiments show that grid domain size produces the largest response to domain-mean temperature and moisture deviations, as well as cloudiness, when compared to grid horizontal or vertical resolution, and advection scheme. It is found that a minimum grid-domain size of 500 km is needed to adequately resolve the convective cloud features. The control experiment shows that the atmospheric heating and moistening is primarily a response to cloud latent processes of condensation/evaporation, and deposition/sublimation, and to a lesser extent, melting of ice particles. Air-sea exchange of heat and moisture is found to be significant, but of secondary importance, while the radiational response is small. The simulated rainfall and atmospheric heating and moistening, agrees well with observations, and performs favorably to other models simulating this case.

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