



Application and Evaluation of McICA Cloud-Radiation Framework in the GCM of the National Climate Center

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McICA, a new cloud-radiation framework that can easily define the sub-grid cloud structure, is incorporated into the National Climate Center's Global Climate Model, called BCC_AGCM 2.0.1. As random noise is inevitably introduced by the scheme, it's important to evaluate and estimate how the noise behaves and whether the modeled climate will be degraded by the noise. Results here showed a minor perturbation of modeled climate within McICA samples, and the modeled climate fields are impacted very little by McICA noise, with global mean bias at the order of 0.01% compared to the reference ICA results. Good agreement between McICA and ICA results is also illustrated from zonal mean, vertical, and domain distributions of variables. So, it's highly reliable to use the McICA cloud-radiation scheme in BCC_AGCM 2.0.1 to do climate researches. Because random noises have little impact on the modeling, the modeling ability of BCC_AGCM 2.0.1 still depends on its physical parameterization and dynamic framework improvements. Considering that cloud and radiation processes are separately coded in the new scheme, it's now technically simple to make improvement and progress in both cloud and radiation codes themselves, which facilitates and allows more space for the further development of the model.