

## A Simple Climate System Model development based on BCC\_CSM1.1 for Integrated Assessment Model

Xueli Shi (1), Guoquan Hu (1), Changyi Liu (2), Qiufeng Liu (1), Yunwei Dai (3), Wenyan Zhou (1), and Chao Wei (1)

(1) National Climate Center, China Meteorological Administration, Beijing 100081, China., (2) Global Energy Interconnection Development and Cooperation Organization, Beijing 100031, China., (3) Huafeng Meteorological Media Group, China Meteorological Administration, Beijing 100081, China.

As necessary and effective tools for global climate change studies, series of numerical models have been developed to serve for different IPCC Assessment Report Working Groups (WG). The complicated climate system models (CSM) in WGI majorly focus on the natural processes, the integrated assessment model (IAM) in WGIII mostly deal with processes related to human activities. The two kind models are different but interdependent, i.e. the climate (change) is one module in the IAM, while the GHG emission scenario simulated by IAM is necessary input for CSM. Because of great differences between the two kind models, the climate modules in IAMs are generally much simplifier than the CSMs.

In order to develop a simple earth system model suitable for IAM but with the basis of complex CSM. We established a simplified climate system model based on the Beijing Climate Center Climate System Model (BCC\_CSM1.1), validated key parameters with its CMIP5 emission-driven simulation results as inputs datasets and econometric regressions. The simple model initiated from given carbon emissions, and included processes of the global carbon cycle processes in atmosphere-land-ocean, the radiation forcing and temperature changes. Projection analysis and sensitive experiments with the simple climate model show that it is robust to reproduce results of original BCC\_CSM1.1 simulations, therefore is suitable for describing climate modules in the China's Climate Model Integrated Assessment Modeling (C3IAM).

Key words: simple climate model; IAM; BCC\_CSM1.1; CMIP5