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Vegetation and carbon cycle dynamics in Holocene

R. Rachmayani (1), M. Prange (1,2), M. Schulz (1,2)

(1) Faculty of Geosciences, University of Bremen, Klagenfurter strasse, D-28334 Bremen, Germany, (2) MARUM - Center for Marine Environmental Sciences, University of Bremen, Leobener strasse, D-28359 Bremen, Germany

Holocene climate has been relatively well investigated with global climate models. Ruddiman suggested that the growth of atmospheric carbon dioxide during the Holocene recorded in the Taylor Dome ice core is a result of profound human impact on climate due to slash-and-burn agricultural practice during the Neolithic period. A series of numerical time slice experiments using the comprehensive global climate model CCSM3 (Community Climate System Model, version 3) has been carried out to study orbitally driven climate variability during the Holocene. The importance of biogeophysical feedbacks between vegetation and climate as well as the role of terrestrial carbon storage in atmospheric carbon dioxide dynamics will be analyzed. The results will be compared to other climate models in order to address some aspects of the Ruddiman hypothesis on exceptional long-term atmospheric carbon dioxide increase during the Holocene. To this end, the land model component of CCSM3 has been improved. The improvements lead to a better simulation of global forest cover and net primary production.

Key words Climate, CCSM3, Holocene, Vegetation