Geophysical Research Abstracts, Vol. 8, 06546, 2006
SRef-ID: 1607-7962/gra/EGU06-A-06546

The role of Dynamical Vegetation processes under the CO2 increase and global warming with a newly coupled LPJ-MIROC AGCM

R. O'oishi (1), A. Abe-Ouchi (1), S. Sitch (2) and I. C. Prentice (3)

(1) Center for Climate System Research, The University of Tokyo, 5-1-5 Kashiwanoha, Kashiwa, Japan 277-8568 (2) Department of Global Change and Natural Systems, Potsdam Institute for Climate Impact Research, P.O. Box 601203, 14412 Potsdam, Germany (3) Dept. of Earth Sciences, University of Bristol, Wills Memorial Building, Queen's Road, BRISTOL BS8 1RJ, UK

The LPJ-DGVM developed in Sitch et al. (2005) is coupled to the Atmospheric component of the MIROC AOGCM in a simple method such that the DGVM obtain the temperature, precipitation and cloud cover from the AGCM and the predicted vegetation map is handed from DGVM to the land submodel of the AGCM. It is enable to represent the vegetation change along with a climate change relative to the present state in the AGCM. In the first part of this study, the impact of the dynamic vegetation upon the atmosphere in the equilibrium state is explored under the preindustrial CO_2, doubled CO_2 and quadrupled CO_2 conditions using the coupled model (DYNVEG experiments). The equilibrium AGCM experiments with fixed vegetation distribution (FIXVEG experiment) for same CO_2 conditions as DYNVEG are also done to identify the effect of the dynamic vegetation to the atmosphere. The transient warming experiment is performed using the CO_2 scenario (increase 1% a year) and an idealized climate change which is obtained by interpolating the equilibrium climate of the Preindustrial and the quadrupled CO_2. The DYNTRANS (FIXTRANS) experiment adopts the climate scenario from equilibrium climate of quadrupled CO_2 DYNVEG (FIXVEG) experiment. It is shown that the warming due to increased CO_2 concentration is amplified by the increase of NPP and the shift of the biome. The equilibrium carbon storage becomes smaller in DYNVEG experiment than FIXVEG experiment under quadrupled CO_2, which corresponds to the 20% of the total warming due to CO_2 change. The difference is mainly due to the accelerated soil carbon decompo-

sition due to the enhanced warming by the dynamic vegetation in northern mid and high latitudes. The transient warming experiments also show that the period that the land biosphere works as the carbon sink is shorter in DYNTRANS than FIXTRANS. The dynamical change of the Biome due to the global warming not only enhances the warming but also accelerates the carbon emission from the land to the atmosphere.