Geophysical Research Abstracts, Vol. 9, 00160, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-00160

High-resolution Climate Simulation of the Last Glacial Maximum

Seong-Joong Kim (1), Thomas J. Crowley (2), David Erickson (3), Bala Govindasamy (4), Phillip B. Duffy (4), Bang Yong Lee (1)

(1) Korea Polar Research Institute, KORDI, KOREA, (2) Duke University, USA, (3) Oak Ridge National Laboratory, USA, (4) Lawrence Livermore National Laboratory, USA (seongjkim@kopri.re.kr / Fax: +82-32-260-6236/ Phone: +82-32-260-6232)

The climate of the last glacial maximum (LGM) is simulated with a high-resolution atmospheric general circulation model of NCAR CCM3 at spectral truncation of T170, corresponding to a grid cell size of roughly 75 km. The purpose of the study was to both assess the role of topography in steering weather patterns and to determine whether a better understanding of synoptic-scale systems can be derived from the higher resolution simulation. The LGM simulations were forced with modified CLIMAP sea surface temperatures and sea ice distribution, ice sheet topography, reduced CO2, and orbital parameters. A parallel T42 run was made to assess whether there were significant benefits with the higher resolution run. The high-resolution model captures modern climate reasonably well, in particular the distribution of heavy precipitation in the tropical Pacific. For the ice age case, the response of the Asian summer monsoon can be much more clearly linked to local geography in the high-resolution model than in the low-resolution model; this distinction should enable more confident validation of proxy data with the high resolution model. In other regions, the upper air ridge-trough pattern is amplified over the ice sheet, leading to poleward heat transport greater than present north of 60°N in the northeastern Pacific. The wave number perturbation leads in turn to much colder temperatures over Eurasia. A substantial part of the Amazon and Congo Basins are simulated to be substantially drier in the ice age - consistent with many (but not all) paleo data. Tropical cooling on land is also amplified - again in agreement with paleo data. These results suggest that considerable benefits can be derived from further inspection of regional climate responses in this simulation.