Geophysical Research Abstracts, Vol. 9, 02778, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-02778

Changes in storm track and cyclone activity in three SRES ensemble experiments with the ECHAM5/ MPI-OM1 GCM

J.G. Pinto(1), U. Ulbrich(2), G.C. Leckebusch(2), T. Spangehl(2), M. Reyers(1), S. Zacharias(1)

(1) Institut für Geophysik und Meteorologie, Universität zu Köln, Kerpener Str. 13, 50923 Köln, Germany; (2) Institut für Meteorologie, Freie Universität Berlin, Carl-Heinrich-Becker-Weg 6-10, 12165 Berlin, Germany; (Email: jpinto@meteo.uni-koeln.de)

Synoptic activity over the Northern Hemisphere is evaluated in ensembles of ECHAM5/MPI-OM1 simulations for recent climate conditions (20C) and for three climate scenarios (following SRES A1B, A2, B1). A close agreement is found between the simulations for present day climate and the respective results from reanalysis. Significant changes in the winter mid-tropospheric storm tracks are detected in all three scenario simulations. Ensemble mean climate signals are rather similar, with particularly large activity increases downstream of the Atlantic storm track over Western Europe. The magnitude of this signal is largely dependent on the imposed change in forcing. However, differences between individual ensemble members may be large. With respect to the surface cyclones, the scenario runs produce a reduction in cyclonic track density over the mid-latitudes, even in the areas with increasing mid-tropospheric activity. The largest decrease in track densities occurs at subtropical latitudes, e.g. over the Mediterranean Basin. An increase of cyclone intensities is detected for limited areas (e.g. near Great Britain and Aleutian Isles) for the A1B and A2 experiments. The changes in synoptic activity are associated with alterations of the Northern Hemisphere circulation and background conditions (blocking frequencies, jet stream). The North Atlantic Oscillation index also shows increased values with enhanced forcing. With respect to the effects of changing synoptic activity, the regional change in cyclone intensities is accompanied by alterations of the extreme surface winds, with increasing values over Great Britain, North and Baltic Seas, as well as the areas with vanishing sea ice, and decreases over much of the subtropics.