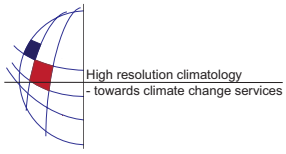
EMS Annual Meeting Abstracts
Vol. 7, EMS2010-695, 2010
10th EMS / 8th ECAC



Convective precipitation variability estimated by CAPE and CIN

K. Riemann-Campe (1,2), R. Blender (2), N. Dotzek (3), K. Fraedrich (2), and F. Lunkeit (2)

(1) Max-Planck-Institut für Meteorologie, IMPRS-ESM, Hamburg, Germany (kathrin.riemann@zmaw.de), (2) Meteorologisches Institut, Universität Hamburg, Hamburg, Germany, (3) Deutsches Zentrum für Luft und Raumfahrt (DLR) - Institut Physik der Atmosphäre, Oberpfaffenhofen, Germany

The variability of convective precipitation is relevant for its prediction on short and long time scales. On short time scales severe weather events are relevant for forecasting, on long time scales convection anomalies affect wetness and droughts. Since convective precipitation requires parameterization in numerical models, CAPE (convective available potential energy) and CIN (convective inhibition) are applied to estimate the variability in terms of trends and memory.

During the last decades CAPE (100 hPa mixed layer) and CIN reveal trends in ERA-40 re-analysis data (1979-2001, T106 resolution, 6h time step) which are reproduced by simulations with the coupled atmosphere-ocean general circulation model ECHAM5/MPIOM for the corresponding period (simulation 20C, 1900-2001, T63 resolution). Future changes in CAPE and CIN are investigated on the basis of the scenario A1B (2001-2100) revealing similar changes for small, mean, and large magnitudes. A global pattern is found of increasing magnitudes in CAPE and CIN over most regions of the continents and northern hemispheric ocean basins, while decreasing magnitudes are found over the southern ocean. However, temperature and humidity, which form the basis of CAPE and CIN, reveal almost only positive trends in the future. Correlations between CAPE, CIN and ENSO, NAO yield a similar global pattern explaining the negative trends. Furthermore, these teleconnections influence the distribution of global memory on long time scales.