Geophysical Research Abstracts, Vol. 7, 09194, 2005
SRef-ID: 1607-7962/gra/EGU05-A-09194

European atmospheric circulation types and their links with sea-surface temperature

D. Fereday (1), J. Knight (1), A. Scaife (1), C. Folland (1), A. Philipp (2), J. Jacobeit (2), P. Della-Marta (3)

(1) Hadley Centre, Met Office, UK, (2) University of Augsburg, Germany, (3) University of Bern, Switzerland

Cluster analysis of North Atlantic and European mean sea level pressure (mslp) has been performed using a newly developed algorithm that employs the technique of simulated annealing. This improves on previous approaches by removing the dependence of the final clusters on the initial cluster partitioning. The algorithm assigns each field to a cluster, and aims to minimise the sum of the within-cluster variances by exchanging fields between different clusters. The number of clusters to use has to be chosen beforehand; the issue of the optimum number of clusters to choose is discussed. The robustness of the clusters is examined by comparing different sets of clusters generated from the same data.

Daily and pentad pressure fields from a new daily dataset for 1850-2003, produced in the EC-funded EMULATE project, are analysed using this clustering technique. For each two-month season (JF,MA,MJ,JA,SO,ND) we produce a classification of European weather types, which compare well with previously published analyses. In addition, we produce mslp clusters from an ensemble of six HadAM3 simulations forced with observed sea surface temperatures (SSTs) and the major climate forcings for theperiod 1950-2002. The clusters derived from the model generally compare well with those from observations; however, the agreement varies slightly with the season.

Links between circulation patterns and SSTs are explored by calculating cluster mean SSTs. This is achieved by averaging the SST fields from the HadISST data set corresponding to each mslp field in the cluster. The significance of the SST composite fields produced is assessed using a Monte Carlo method. The results show a strong connection between SST and certain clusters, such as the previously established win-

ter North Atlantic Oscillation-SST tripole link. Links with other circulation patterns and for other seasons will also be discussed.