

Cluster analysis of mean sea level pressure fields and multidecadal variability

David FEREDAY, Jeff KNIGHT, Adam SCIAFE, Chris FOLLAND
Hadley Centre for Climate Change, Met Office, Exeter, UK

Daily mean sea level pressure (MSLP) fields for the North Atlantic and European region are partitioned into distinct circulation types using cluster analysis. The year is divided into six two-month seasons and clusters are produced for each season. An important question is whether clusters are genuinely present within the data. It is shown that alternative sets of clusters exist that are of almost equal quality but which partition the MSLP fields quite differently. Additionally, examination of the stability of different numbers of clusters shows no clear optimum number. We therefore conclude that genuine clusters do not exist in the MSLP data.

Nevertheless, cluster analysis provides a useful way of partitioning the data into distinct circulation types. Ten clusters are produced for each season; each cluster has an associated frequency time series based on the number of occurrences of the cluster in each year. Analysis of the time series shows that circulation types exist in all seasons that display substantial multidecadal variability. Links between different circulation patterns and sea surface temperature on multidecadal time scales are discussed.