



Trends in frequency, persistence, and seasonality of atmospheric circulation types in COST733 classifications in European regions

M. Cahynova (1), C. Beck (2), A. Philipp (2), R. Huth (1,3)

(1) Institute of Atmospheric Physics, Academy of Sciences of the Czech Republic, Department of Climatology, Praha 4, Czech Republic (cahynova@ufa.cas.cz, +420 272763745), (2) Institute for Geography, University of Augsburg, Germany, (3) Department of Physical Geography and Geoecology, Charles University, Prague, Czech Republic

The aim of this study is to quantify changes of atmospheric circulation over Europe using several parallel classifications of circulation types that were collected and developed within the COST733 Action “Harmonisation and Applications of Weather Types Classifications for European Regions”. Circulation changes over Europe were studied in terms of changing seasonal frequency, persistence, and “seasonality” (annual course) of daily circulation types in the period 9/1958–8/2002. The extensive collection of both subjective and objective (computer-assisted) catalogues of circulation types in European regions “COST733cat” served as a platform for comparison of different classification methods, varying numbers of circulation types, sequencing of input sea-level pressure data, and spatial scale of circulation processes. Comparing tens of computer-assisted, scalable circulation type classifications, we observed major discrepancies: (i) some classifications are not able to properly describe geographical variations of circulation such as continentality, (ii) interannual variations of mean persistence and seasonality differ greatly between individual classifications, and (iii) there are no clear similarities between circulation types from different classifications that bear significant long-term trends (no overall pattern of change of neither frequency, nor persistence and seasonality was detected). It therefore remains debatable whether a single circulation classification is a proper representation of reality, and whether our comparative approach brings an improvement. The most prominent trend found in some classifications – winter increase in the frequency of days with westerly and southwesterly flow over large parts of Europe – clearly reflects the strengthening of the North Atlantic Oscillation. We have detected inhomogeneities – sudden shifts of persistence of synoptic situations in the subjective classifications (German Hess-Brezowsky and Hungarian Péczely), while the objective ones did not show any such sudden changes.