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An analysis of past, present and future ECHAM5 pressure fields using a classification of circulation patterns

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Several both subjective and objective methods for the classification of circulation patterns into categories have been developed over the past century. In this study, using the automated classification Jenkinson-Collison (JC) method, based on Mean Sea Level Pressure (MSLP), we finally obtain 8 directional, 2 vorticity and 1 unclassified categories. These circulation types are used to examine past, present and future trends in circulation patterns above Western and Central Europe. First of all, the ECMWF – ERA40 reanalysis dataset is used to evaluate the occurring JC weather types within the newly developed ECHAM5-MPI/OM model for the period 1961-2000. Secondly, long-term trends are investigated for the period 1860-2100 using MSLP fields of the ECHAM5-MPI/OM IPCC SRES A1B climate simulation. Our evaluation of the ECHAM5-MPI/OM 40 year integration shows that the model is capable of reproducing the overall circulation patterns for most of the autumn and winter period. For the remaining of the year, there are some significant differences in eastern and western circulation types. Therefore, future A1B scenario pressure fields are investigated for the autumn and winter season only. For the period 1860-2100, we found a significant increase in western circulation and anticyclonic types over Western and Central Europe, counteracted by a decrease in eastern circulation and cyclonic weather types.