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Analysis of automated circulation classifications in CMIP5 GCM projections for the British Isles

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The research aims at evaluating future changes in winter atmospheric circulation over the British Isles projected by an ensemble of twenty-five CMIP5 GCMs. To achieve this, eight distinct automated circulation classification methods were used to define circulation types (CTs) in daily mean sea level pressure patterns by five atmospheric reanalyses. Furthermore, all these CTs were projected onto outputs of historical runs of the GCMs. Unsurprisingly, the validation shows that the GCM ensemble median overestimates (underestimates) the frequency of cyclonic (anticyclonic) CTs and CTs with advection from the western (eastern) quadrant. However, the results also indicate that the size of the biases can considerably differ classification to classification for CTs with a very similar shape. In the next step, the plan is to project all the CTs onto outputs of GCM projections made under the RCP 8.5 scenario. In addition to CT frequency, also the trends in CT persistence and flow strength will be analysed, separately for three 30-year windows over 2010–2100. The multi-method approach is expected to minimize the negative effect of method selection on results and their interpretation. Some of the questions on which we plan to focus are whether the trends increase in time, whether the greatest trends appear in CTs that had also the greatest errors, and whether there is a correlation between the extent of GCMs' errors and the magnitude of projected changes.