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## Past and future trends in large-scale atmospheric circulations over Europe: Assessment of the Jenkinson-Collison classification with reanalyses and CMIP6

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Circulation classifications are a simple tool given their ability to portray aspects of day-to-day weather. As we start facing a dynamical response in general circulation patterns due to anthropogenic global warming, circulation changes can enhance or mitigate regional and local behaviour of extreme weather events.

An automatic weather type (WT) classification, developed by Jenkinson-Collison, is used to evaluate past and future changes in seasonal frequencies of synoptic weather patterns over central and western Europe. A set of three reanalyses and eight Global Climate Models (GCMs) from the Coupled Model Intercomparison Project Phase 6 (CMIP6) are used, based on daily Sea Level Pressure (SLP) data.

Discrepancies are found in some of the model outputs as some fall short of capturing interannual variabilities when compared to reanalyses. Cyclonic and westerly circulations tend to be overestimated, whereas anticyclonic are underestimated.

Based on the historical data and Shared Socioeconomic Pathway 5 (SSP5-8.5) scenario, the evaluated trends suggest more robust signals during the summer half-years given their lesser synoptic-scale variability. During this season, increasing frequencies are found for the WT characterized by weak pressure gradients, mostly at the expense of decreasing frequencies of the westerlies. Our findings indicate that the time of emergence of these signals only occurs towards the end of the 21<sup>st</sup> century, even in such a high-emission scenario.