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Atmospheric blockings as extreme events in a future climate

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Various Global Climate Models (GCM's) show a general agreement in the prediction of standard meteorological parameters for the future climate (IPCC, AR4). However, the prediction or even detection of specific meteorological or climatological phenomena is still a major task for these models. In this respect atmospheric blocking acts as a prominent feature with considerable impacts on the Euro-Atlantic climate. Its large spatial extent and long temporal existence can be responsible for an extreme climate in terms of dry and cold conditions at its core (severe droughts in summer, e.g. summer 2003) and anomalous wet conditions around the block. In this study an ensemble of ECHAM5 GCM-runs sets the basis to detect a temporal and spatial highly resolved two-dimensional representation of atmospheric blocks. The comparisons of the modeled blocks with the climatology of the ERA-40 blocking climatology (1958-2002) show good agreement in respect to frequency and location. Ensemble blocking simulations for the A1B-scenario for the 2070-2100 period indicate a significant change in blocking frequency compared to the ERA-40 period. These changes are also manifested in extreme values of e.g. temperature and precipitation over Europe which are detected using suitable extreme indices. Finally comments are made on the importance of the foregoing results and their relevance to climate change.