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Arctic response to changing atmospheric blocking

Giacomo Masato (1), Tim Woollings (2), and Brian J Hoskins (3)

(1) University of Reading, Department of Meteorology, Earley Gate, Reading, United Kingdom (g.masato@rdg.ac.uk), (2) Atmospheric Physics Clarendon Laboratory, Department of Pyhysics, Oxford, UK, (3) The Grantham Institute for Climate Change, Imperial College London, UK

The Arctic response to changing atmospheric blocking is analysed under a strong CO_2 emission scenario. Two main blocking types are considered; the Atlantic (or Greenland) blocking and the European blocking. Under enhanced CO_2 forcing, the models have negative correlations of Greenland blocking with winter Arctic temperatures. Greenland blocking is closely associated with the negative phase of the NAO, so these correlations are consistent with the occurrence of positive NAO years (with low Greenland blocking) bringing warmer air to the Barents-Kara Sea region. Positive correlations of European blocking with winter Arctic temperatures are instead observed, although these are weaker, less consistent throughout the models, and their significance limited to a small area.

European blocking can be subdivided in two "blocking regimes", characterised respectively by the dominance of warm and cold air extrusions. In this case, the results show a marked increase in the sensitivity of Arctic temperatures to blocking in the future, with notable negative and positive anomalies associated with cold and warm European blocking events, respectively. The latter relationship in particular, seems to be caused by a net eastward shift and amplification of the blocking anticyclone, which strengthens the warm air advection from lower latitudes and across the Atlantic Ocean.