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Impacts of SST warming and CO_2 increase on summer blocking events in the North Hemisphere

Marie Drouard (1), Tim Woollings (2), and Rob Chadwick (3)

(1) University of Oxford, AOPP, Physics, Oxford, United Kingdom (marie.drouard@physics.ox.ac.uk), (2) University of Oxford, AOPP, Physics, Oxford, United Kingdom (tim.woollings@physics.ox.ac.uk), (3) Met Office, Exeter, United Kingdom (robin.chadwick@metoffice.gov.uk)

This study aims to better understand changes in summer blocking events in climate model projections of future climate change and to attribute them to components of global warming (e.g. the direct effect of increased CO_2, the uniform SST warming...). To do that, we use timeslice and coupled experiments performed with HadGEM2-ES. Two algorithms are used to identify blocking events. Both are 2D blocking indices, one looks for persistent strong positive anomalies in the 500hPa-geopotential field and the other one is searching for persistent large-scale meridional overturning of the 500hPa-geopotential gradient.

Our first results show that blocking event frequency decreases over the whole Northern Hemisphere north of 60ºN and increases more locally between 20 and 60ºN. The high-latitude decrease is in good agreement with a high-latitude strengthening of the zonal wind. The decrease in blocking event frequency seems to be mainly due to the uniform SST warming and to the quadrupling of the CO_2 concentration. On the contrary, the lower-latitude increase appears to be mostly due to the quadrupling of the CO_2 concentration.
Other features (such as a low-frequency wave train in the meridional wind field and its relation to blocking event frequency), changes in blocking event statistics (e.g. the duration and the number of events per season) and differences between the two blocking event detection methods have also been investigated.