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Mechanisms and impacts of decadal-scale fluctuation events in the Atlantic Meridional Overturning Circulation in unforced climate model simulations

Lesley Allison[†]; Ed Hawkins; Tim Woollings
[†] NCAS-Climate, University of Reading, United Kingdom
Leading author: l.c.allison@reading.ac.uk

Variations in the strength of the Atlantic Meridional Overturning Circulation (AMOC) have the potential to influence various aspects of climate, particularly in the regions surrounding the Atlantic basin. Understanding the mechanisms behind decadal-scale AMOC variability in atmosphere-ocean general circulation models (AOGCMs) is likely to be important for making future predictions of climate variability, may also help us to understand possible mechanisms for a large abrupt weakening of the circulation, and could help explain the difference in AMOC stability between AOGCMs and lower-complexity models. As part of the RAPID-WATCH RAPIT (Risk Assessment, Probability and Impacts Team) project, we examine the largest decadal-scale natural fluctuations in AMOC strength within a variety of coupled AOGCM control integrations. The eventual aim is to generate a time-varying fingerprint of precursors to, and climate impacts of, these fluctuation events, which is robust across different climate models. First we wish to identify the characteristics of events that lead to appreciable climatic impacts. To do this we examine the relationships between the magnitude and duration of an event and its associated impacts. We then search within this set of climatically-relevant events to look for common precursors and possible mechanisms.