Session: C9 Poster: M100B

Towards a risk assessment for a collapse of the Atlantic Meridional Overturning Circulation: Initial results from the RAPIT project

Lesley Allison[†]; Adam Blaker; Laura Jackson; Daniel Williamson; Peter Challenor
[†] NCAS-Climate, University of Reading, United Kingdom
Leading author: l.c.allison@reading.ac.uk

The Risk Assessment, Probability and Impacts Team (RAPIT) project forms part of the UK RAPID-WATCH programme, and aims to produce a risk assessment for a possible collapse of the Atlantic Meridional Overturning Circulation (AMOC) in the coming century. Evidence from palaeoclimate records suggests that the AMOC has undergone large changes in the past, and there is concern that anthropogenic forcing could induce an abrupt weakening of the circulation in the future, with severe climatic consequences. When atmosphere-ocean general circulation models (AOGCMs) are forced by reasonably likely future greenhouse gas projections, they tend not to show an abrupt AMOC collapse; the models used in the IPCC fourth assessment report suggest that the AMOC is likely to gradually weaken over the 21st century, but not collapse abruptly. However, these experiments do not take into account model parameter uncertainty, meaning that certain types of behaviour could be missed, particularly in a complex nonlinear system such as the AMOC. This project will assess the risk of abrupt AMOC change by using a very large (~10,000 member) perturbed physics ensemble of HadCM3, forced with a range of idealised CO2 scenarios. Such a large ensemble of a complex AOGCM is made possible through the distributed computing system of climateprediction.net. State-of-the-art emulation techniques are employed to search parameter space for regions in which a collapse is more likely, and to produce a risk assessment that takes into account the realism of the model's past and present climate across parameter space. The results will also be used to enhance understanding of the mechanisms and impacts associated with AMOC changes of varying magnitude and duration. Initial results from the ongoing project will be presented.