Session: C9 Poster: M101A

Understanding bistability of the Atlantic Meridional Overturning Circulation in an atmosphere-ocean general circulation model

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

Simple theories of the Atlantic Meridional Overturning Circulation (AMOC) suggest that it can exist in more than one stable state for certain sets of boundary conditions, with significant impacts on global climate. This bistable behaviour is commonly demonstrated in box models of the AMOC and in Earth System models of intermediate complexity (EMICs), but until recently had not been seen in much more complex, modern atmosphere-ocean general circulation models (AOGCMs). Complex AOGCMs have more potential feedback pathways and a greater range of inherent variability, especially in the atmosphere, and this complexity has been suggested as the reason for the apparent absence of AMOC bistability in these models. AMOC bistability has recently been demonstrated in FAMOUS (a lower resolution version of the widely used HadCM3 AOGCM) which includes physically-detailed representations of important evolving processes such as clouds, precipitation and atmosphere-ocean feedbacks, as well as internally generated temporal variability over periods from days to millennia. Here, we investigate the climate feedbacks that determine AMOC bistability in FAMOUS and compare them with the responses of other AOGCMs forced by freshwater perturbations.