Geophysical Research Abstracts
Vol. 19, EGU2017-16186, 2017
EGU General Assembly 2017

The effect of model bias on Atlantic freshwater transport and implications for AMOC bi-stability

Jennifer Mecking (1), Sybren Drijfhout (1), and Laura Jackson (2)

(1) Ocean and Earth Science, National Oceanography Centre, University of Southampton, Southampton, UK, (2) Met Office, Exeter, UK

Evidence from paleo-proxy records suggests that the Atlantic Meridional Overturning Circulation (AMOC) can be in both an AMOC on state, the AMOC as we observe it today, and an AMOC off state, where the AMOC becomes extremely weak or even collapses. The freshwater transport due to the AMOC (Mov) at 34S in the Atlantic has often been used as an indicator for bi-stability, with a positive Mov suggesting a mono-stable AMOC and a negative Mov suggesting a bi-stable AMOC. Often studies have shown that the sign of the divergence of the Mov might be a good indicator of AMOC bi-stability. In this study we investigate how model bias affects the sign of Mov across all latitudes in the Atlantic basin, through a detailed analysis of the CMIP5 model ensemble. Mov, in the CMIP5 models is generally too positive in the southern Atlantic due to a salinity bias, while in the subtropical North Atlantic the values of Mov are influenced by a combination of velocity and salinity biases. We compare these results to observations, reanalysis products and HadGEM3-GC2, a current generation coupled model which exhibits a stable AMOC off state, and discuss the differences that can lead to the possibility of a bi-stable AMOC as opposed to a mono-stable AMOC.