

Structural biases affecting the AMOC?

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When quantifying the uncertainty in model based projections of the AMOC or any climate process it is important to identify and quantify the uncertainty introduced by structural deficiencies in the climate model. At a workshop in Durham in 2012 we identified a number of key processes affecting the AMOC that were thought to have structural biases in the climate model HadCM3. These included location and strength of the sub-polar and sub-tropical gyres, convection sites in the North Atlantic, the strength of the ACC transport, sea surface temperature patterns in the Southern Ocean and North Atlantic sea ice extent. In this investigation we explore these structural biases to see whether or not they really exist or whether they are artefacts of the choice of the model parameters. We use an unprecedented 20,000 member perturbed physics ensemble to identify models with more realistic representations of these key processes than the standard HadCM3 and use emulators to see whether there are parameter choices that would remove these biases altogether. We find that we can do better than the standard HadCM3 and that some of these "biases" are due to the parameter choices. We identify the extent of the remaining structural deficiencies.