

US AMOC PI meeting abstract 2012

Are SSTs useful for detecting changes in the Atlantic meridional overturning circulation?

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It is likely to take several decades to detect an anthropogenic weakening of the Atlantic meridional overturning circulation (AMOC) using transport observations alone. Previous work has shown that detection times may be improved by making use of targeted hydrographic observations that are physically linked to changes in the AMOC (Roberts and Palmer, 2012). In addition, several modelling studies have demonstrated significant relationships between the AMOC and large-scale patterns of North Atlantic sea-surface temperatures (SSTs). However, it is not clear if patterns identified using model control simulations can be reliably used to estimate AMOC changes in the presence of external climate forcings. We explore the relationship between SSTs and the AMOC in several simulations within a state-of-the-art earth system model (HadGEM2-ES) and compare the utility of SST-based fingerprints with those derived using other ocean variables.

References

Roberts and Palmer (2012), Detectability of changes to the Atlantic meridional overturning circulation in the Hadley Centre Climate Models, *Climate Dynamics*, DOI: 10.1007/s00382-012-1306-3.