The advective feedback on the AMOC in GCMs

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Several studies have proposed that the transport of fresh water into the Atlantic by the Atlantic Meridional Overturning Circulation (AMOC) is a good indicator of the stability of the AMOC. The argument is that the sign of this index (Fov) indicates the sign of the advective feedback of fresh water, and hence whether a stable 'off' state of the AMOC can exist. Analysis is presented from different global climate models (GCMs) with both negative and positive values of Fov, and causes of model biases from observations are discussed.

We also explore whether the advective feedback between the AMOC and Fov is present in GCMs and how the role of the gyre transport of fresh water modifies this relationship. Results from idealised hosing experiments with HadCM3 show that Fov does indicate the sign of the advective feedback and that this feedback can significantly affect the recovery of the AMOC leading to a delay in recovery of ~100 years.