



Stability and restoring timescales of the glacial Atlantic MOC

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Coupled climate models show widely varying responses in the Atlantic meridional overturning circulation (MOC) during the Last Glacial Maximum (LGM). However, they are remarkably consistent in the response of the overturning freshwater transport into the Atlantic basin (and in the response of the other terms of the Atlantic freshwater budget). The overturning transport is found to increase in a range of models, including both GCMs and Earth system Models of Intermediate Complexity. Using model output from the archive of the Paleoclimate Modelling Intercomparison Project, we analyse why such a consistent increase occurs in the LGM climate as compared to the modern state.

As a second step, we perform a number of sensitivity experiments with an intermediate-complexity model for a range of modern and LGM states. These states differ in the value of the overturning freshwater transport, which is associated with a basin-scale salinity overturning feedback. Its sign is found to determine the existence of a monostable or bistable regime as well as restoring timescales after a freshwater pulse to the northern Atlantic. These experiments confirm the increase in the overturning transport term for the LGM state and show its implications for the MOC stability and transient behavior during the LGM.