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Jet sensitivity to sea ice in an AGCM with idealised topography.

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Arctic sea ice loss is a robust feature of observations and of climate model projections, yet possible mechanisms by which this may influence the atmospheric circulation remain unclear despite much recent work on the subject. While the physical system features strong coupling between the cryosphere, atmosphere and ocean, there is much merit in breaking into this coupled system to improve our understanding of the mechanisms involved.

Results will be presented from experiments in a hierarchy of atmosphere-only configurations of HadGAM1, focusing on the extent to which sea ice anomalies may impact features of the large-scale atmospheric circulation. Lower boundary conditions for these experiments develop from a zonally asymmetric "aquaplanet" to a semi-idealised framework with representative land masses. In each case, a series of model runs are performed with a fixed SST pattern and a polar sea ice "cap" over a range of realistic extents.

The dominant response to ice removal is an equatorward shift of the jet and storm tracks, consistent with previous work. However, this response is moderate in magnitude for ice latitudes poleward of 65°. Equatorward of this, the response is strongly non-linear in magnitude but retains the same qualitative features. Analysis of eddy fluxes shows that wave activity provides a partial but incomplete explanation of this behaviour; this presentation will further discuss the dynamics of the response.

Asymmetries at the lower boundary, in particular a North-America-like continent with semi realistic orography, affect the strength and latitude of the modelled jet in the North Atlantic region. The resulting different background atmospheric state is likely to respond differently to an imposed sea ice forcing. Preliminary results will be presented from experiments in such a framework in order to probe the extent to which the processes diagnosed in the symmetric experiments are robust in this more realistic configuration.