



Climatic Events in the North Atlantic and Arctic during the 20th Century: Internal versus External Variability

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A prominent climatic event in the North Atlantic/Arctic region was the 'Early 20th century warming' with its largest amplitude in the Arctic region where temperatures were at the same level as presently. Part of this is possibly due to internally generated variations in the meridional overturning circulation connected to the 'Atlantic Multi-decadal Oscillation' (AMO).

In the present work, we investigate this in a longer-term context. We use a 'perfect model approach', i.e. we analyse results from two different runs of 500 year length each with the coupled climate model ECHAM4/OPYC3, one forced run with time-varying external forcing from solar variations, volcanoes and greenhouse gases and one control run with the external forcing kept constant.

From the control run we find the signatures in sea surface temperatures and sea ice extent and -thickness from internally generated variability, primarily the AMO. This then allows us, using the forced run results, to quantify the magnitudes of contributions from internally versus externally generated changes and variations.