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AMOC projections driven by global warming and Greenland Ice Sheet melt

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The evolution of the Atlantic meridional overturning circulation (AMOC) is one of the key uncertainties of future climate projections. State-of-art climate models that took part in the CMIP5 project show that over the 21st century the AMOC might reduce by 20-30% under the intermediate RCP4.5 scenario and by 36-44% under the high end RCP8.5 scenario relative to preindustrial values. However, these projections neglect enhanced meltwater input from the Greenland Ice Sheet and lack a thorough uncertainty assessment.
We present results of a community effort to use state-of-the-science climate models to simulate the impact of the partial melt of the Greenland Ice Sheet on the AMOC under future global warming up to the year 2300 (AMOCMIP). A probabilistic uncertainty assessment is presented based on a physics-based AMOC emulator and includes uncertainties in the AMOC's sensitivity to temperature and salinity changes, as well as uncertainties of future global warming, regional temperature amplification and melt rates of the Greenland Ice Sheet.
We find that the impact of increased Greenland Ice Sheet melt on the AMOC strength is non-negligible, albeit strongly model dependent. The uncertainty analysis shows that the chance of an collapse of the AMOC is negligible if global temperature change remains below 2°C, but becomes more probable for larger warming.