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Mid-20th Century Atlantic Circulation informed by Modern Observations and Models

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The Atlantic Meridional Overturning Circulation (AMOC) is a driving force in the redistribution of heat on our planet and has a particularly large impact on the climate of the Northern Hemisphere and Europe. Since the 1980s, it has been predicted that the anthropogenic increase in atmospheric CO₂ concentration will weaken the AMOC. This change in AMOC intensity will lead to changes in European climate and extreme weather events. It is therefore essential to understand how AMOC responds to climate change.

In order to study the variations of AMOC during the 20th century, we have developed simple layered models based on a limited number of time series. These models take into account the Ekman transport and the Florida Strait, as well as the density time series of the Thermocline, Antarctic Intermediate Waters (AAIW), Upper North Atlantic and Lower North Atlantic Deep Waters (UNADW, LNADW). These models, using the deep AMOC branches, are trained with modern RAPID measurements at 26N and compared to each other.

Since lack of prior data can occur for the reconstruction, it is important to identify the crucial layers or data for the AMOC reconstruction. In this study, we investigate the importance of each layer of the models in the reconstruction of AMOC strength over time. Our goal is to provide, with direct observations, an answer to the drivers of the short- and long-term variability of the AMOC.

Topic

Observational priorities –what should we measure?

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