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AMOC Evolution at 47°N in the Last Decades in Observations and a High-Resolution Ocean Model

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The Atlantic Meridional Overturning Circulation (AMOC) plays an important role for the climate system of Europe and the Arctic. It is responsible for the northward transport of warm and saline water in the upper water column and the southward transport of cold and fresh water in the deep.

Since the early 2000s, observations from ship-based measurements and moorings are available which allow estimates of the individual components of the AMOC. However, the spatial resolution of mooring measurements is coarse and ship-based surveys are mostly done only once a year, adding to the uncertainty of these measurements. Earlier observational studies in the subpolar North Atlantic have found decadal trends of individual AMOC components. However, whether the entirety of the AMOC exhibits a trend remains unclear. Due to the observational limitations, most knowledge about the recent AMOC development is based on model simulations. Comparing these model simulations with observations remains an important task to understand the changes in the AMOC strength in the last decades and improve model representations of the AMOC.

We analyze a realization of the high-resolution VIKING20X ocean model from 1980 to 2019 offering a large overlap with the available observations. We compare it to measurements of the NOAC array at 47°N and sections obtained from repeated ship surveys. We aim to merge observations and model simulation to better estimate recent AMOC changes and increase our understanding of the underlying processes.