Meeting AMOC Observation Needs in a Changing Climate



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Meridional Connectivity of a 25-year Observational AMOC Record at 47°N

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The Atlantic Meridional Overturning Circulation (AMOC) plays a vital role in the climate system of Europe and the Arctic by redistributing heat and freshwater in the Atlantic. Since climate model studies project a decline of the AMOC in the 21st century, monitoring AMOC changes remains essential. While on longer than decadal timescales AMOC variability is expected to be coherent across latitudes, connectivity on interannual and seasonal timescales is less clear. Model studies and observational estimates disagree on the regions and timescales of meridional connectivity and AMOC observations at multiple latitudes are needed to study its connectivity. We calculate basin-wide AMOC volume transports (1993-2018) from measurements of the North Atlantic Changes (NOAC) array at 47°N, combining data from moored instruments with hydrography and satellite altimetry. The mean NOAC AMOC is 17.2 Sv, exhibiting no long-term trend. We find substantial variability on monthly timescales, while the variability on longer timescales is similar to the RAPID-MOCHA-WBTS AMOC at 26°N. Both the unfiltered and low-pass filtered NOAC AMOC show a significant correlation with the RAPID AMOC when the NOAC AMOC leads by about one year. Our findings highlight the importance of long-term observations to evaluate model results and study the physical processes responsible for meridional connectivity.

Topic

Value of AMOC observing -what have we learned?

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