



NATIONAL SCIENCE FOUNDATION
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NSF 19-076

Dear Colleague Letter: Understanding the Overturning Circulation in the North Atlantic Ocean

August 6, 2019

Dear Colleagues:

Example content.

The overturning circulation in the North Atlantic Ocean is critically important for a wide range of processes including general circulation of the global ocean, climate dynamics, regional weather patterns, and biogeochemistry. Significant international investments in measuring it directly in the last couple of decades have revealed that we still do not fully understand the extent, nature, and drivers of its variability so that the fidelity of its representation in climate models remains uncertain. This letter serves to express NSF's continued interest in research on this topic and to highlight opportunities for collaborations with researchers in the United Kingdom (UK).

The Rapid Climate Change-Meridional Overturning Circulation and Heatflux Array (RAPID/MOCHA) array, deployed in partnership between the UK and US through parallel projects funded by their respective science agencies, directly measured the overturning circulation across 26.5°N and found high variability on subannual timescales, implying that our previous hydrographic estimates were highly aliased and could not capture any trends. More recently, high variability was also found at subpolar latitudes by another similarly funded international project (Overturning in the Subpolar North Atlantic-OSNAP). Early results from OSNAP also showed that processes east of Greenland dominate the overturning circulation, which is counter to the contemporary paradigm that emphasizes processes in the Labrador Sea.

These recent results highlight the need to better understand the dynamics of the overturning circulation and its interaction with other components of the earth system over seasonal to decadal scales. The RAPID time series has been sustained for over 14 years. OSNAP is currently funded through year 6 of the observations, but NSF has a strong interest in continuing the OSNAP measurements for 10 years as originally conceived. All of these data

sets are publicly available within 2 years after collection and can be combined with modeling methods and theoretical insights to answer many science questions.

The UK's Natural Environment Research Council (NERC) and NSF's Division of Ocean Sciences (OCE) are interested in broadening the successful collaborations between the US and UK for these kinds of research. The [Lead Agency Opportunity](#) between NSF's Directorate for Geosciences and NERC allows science teams from the US and UK to collaborate under a single proposal. Such a proposal is reviewed by one of the agencies, and if it is successful, each national component is supported by its own funding agency. The OCE Physical Oceanography program welcomes proposals in all areas of physical oceanography and encourages proposals that aim to understand the overturning circulation in the North Atlantic, its connections to variability in the subpolar ocean, its consequences for air-sea interaction or exchanges with the Arctic, implications for climate dynamics, and the representation of such processes in climate or earth system models. Proposals with collaborators in the UK may be submitted to the program under the [Lead Agency Opportunity](#). We also encourage our colleagues to be alert to any solicitations NERC may announce on similar topics and take advantage of any collaboration opportunities for US researchers.

Sincerely,

William E. Easterling
Assistant Director for Geosciences