

ANNUAL ACHIEVEMENTS REPORT REQUEST – RESEARCH GRANTS

Reporting Period: Q4, 2020/21

Dear Colleague

This is the final biannual reporting for your grant.

Please find attached a template to report on the outcomes and impacts of the NERC Highlight Topic grant for which you are the lead Principal Investigator. Please email your completed report to reporting@nerc.ukri.org.

Please provide narrative under the following headings:

- *Key achievements (please try to keep within 200 words each)*
- *Overall progress with the project (100-200 words as a guide)*
- *Any notable issues encountered (if any and remedial actions undertaken, if needed)*
- *Any newsworthy activity planned or known about in the next 12 months*

If you require further help in completing the report, please do not hesitate to contact us reporting@nerc.ukri.org.

Research Grant Reference	NE/T00858X/1, NE/T00858X/2 (NOC) NE/T008938/1 (SAMS)		
Grant Title	UK-OSNAP-Decade: 10 years of observing and understanding the overturning circulation in the subpolar North Atlantic		
Completed by	NP Holliday, S. Cunningham	Date	23 April 2021

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Key achievements
<p>5 papers published: <i>Petit et al., 2020.</i> Atlantic deep water formation occurs primarily in the Iceland Basin and Irminger Sea by local buoyancy forcing. <i>Geophysical Research Letters</i>. doi.org/10.1029/2020GL091028</p> <p><i>Desbruyères, et al. 2020</i> Importance of boundary processes for heat uptake in the Subpolar North Atlantic. <i>Journal of Geophysical Research Oceans</i>, . doi.org/10.1029/2020JC016366</p> <p><i>Le Bras et al., 2021,</i> How much Arctic fresh water participates in the subpolar overturning circulation? <i>Journal of Physical Oceanography</i>, doi.org/10.1175/JPO-D-20-0240.1</p> <p><i>Pacini et al., 2021,</i> Cyclonic eddies in the West Greenland Boundary Current System. <i>Journal of Physical Oceanography</i>. doi.org/10.1175/JPO-D-20-0255.1</p> <p><i>Tsubouchi et al., 2021.</i> Increased ocean heat transport into the Nordic Seas and Arctic Ocean over the period 1993–2016. <i>Nature Climate Change</i> https://www.nature.com/articles/s41558-020-00941-3</p> <p>3 papers accepted: <i>Li et al., 2021.</i> Subpolar North Atlantic western boundary density anomalies and the Meridional Overturning Circulation. <i>Nature Communications</i></p> <p><i>Kostov et al., 2021,</i> Contrasting sources of variability in subtropical and subpolar Atlantic overturning. <i>Nature Geosciences</i>.</p> <p><i>Gould and Cunningham, 2021.</i> "Global-scale surface salinity change since the 1870s. Implications for the hydrological cycle." <i>Nature Communications and Environment</i></p> <p>4 papers submitted and in review</p> <p>Mooring Data: Data for the 2018-2020 deployments submitted to OSNAP Data Working Group in Feb 21</p> <p>Glider Data: Since the mission profile was reconfigured to monitor the European Slope Current on the Scottish Continental Shelf we have achieved 319-mission days (from 2 missions) with mission 3 ongoing. We have made 50 separate realisations of the shelf edge current. Typically, each mission spends 6 weeks in transit (3 out, 3 back) and 14 weeks in the slope current. Bad weather delayed recoveries by 14 and 18 days. Data quality has been good to excellent. The present mission has lost 17 days to a cyber-attack on the University of Highlands and Islands systems which meant that for safety reasons we parked the Glider in virtual mooring mode by the EBW1 mooring.</p>

Overall progress
Overall progress is good for this period, as demonstrated by increasing numbers of high quality papers.

Notable issues (if any)
<p>i) The NOC OSNAP researcher left NOC in February. A new researcher has been recruited and will start at NOC on 1 August 2021, giving a 6-month pause in research progress.</p> <p>ii) Three OUC-owned (Ocean University China) gliders are currently sitting unused at WHOI. SAMS has a MOU with OUC, and we are in discussion with WHOI and OUC about transferring the Gliders to SAMS to augment the Ellett Array. Extra resource would be required to bring these gliders into operation, but they would represent a considerable capital gain for the Array (circa £500k)</p> <p>iii) OSNAP researchers have experienced reduced productivity over the past 12 months because of the Covid-19 crisis. We expect this to lead to future papers taking slightly longer than expected to publish.</p>
Upcoming newsworthy activities
Release of the second OSNAP data set (2014-2018) upon publication of a Nature Communications paper. We are working on writing a news story.