

NICHOLAS P. FOUKAL

Skidaway Institute of Oceanography, University of Georgia
10 Ocean Science Circle, Savannah, GA, 31411
Nicholas.Foukal@uga.edu · (912) 598-2320

EDUCATION

Ph.D. in Earth and Ocean Sciences, Duke University Nicholas School of the Environment, 2018

Advisor: M. Susan Lozier

Thesis: Ocean heat transport from the subtropical gyre to the subpolar gyre in the North Atlantic

M.S. in Oceanography, University of Maine School of Marine Sciences, 2013

Advisor: Andrew C. Thomas

Thesis: Biogeography and phenology of satellite-measured phytoplankton seasonality in the California Current

A.B. in Engineering Sciences modified with Economics, Dartmouth College, 2010

Advisor: Daniel R. Lynch

POSITIONS HELD

Skidaway Institute of Oceanography, University of Georgia Department of Marine Sciences

Assistant Professor (2024-present)

Woods Hole Oceanographic Institution Physical Oceanography Department

Assistant Scientist (2021 – 2024)

Postdoctoral Investigator (2018 – 2020):

Advisor: Robert S. Pickart

Research topics: Storm-driven downwelling at the Beaufort Sea shelfbreak; Pathways of freshwater along the continental shelf of Greenland

RESEARCH INTERESTS

Coastal circulation and shelf-basin exchange; Meltwater inflow from the Arctic to the North Atlantic; Understanding variability in the Atlantic Meridional Overturning Circulation and its connection to climate variability; Dynamics of the North Atlantic subpolar gyre; Gulf Stream dynamics and the subtropical-to-subpolar exchange in the North Atlantic; Air-sea coupling at high latitudes; Spreading pathways of Pacific water in the Arctic; Lagrangian methods; Combining observations with models and remote sensing; Developing new instruments to measure and understand ocean circulation.

FUNDING

NASA Surface Water and Ocean Topography (SWOT) Science Team funded program: “Examining the circulation on the Northwest Atlantic Shelf: along-shelf connectivity and hot spots of shelf-basin exchange”, PIs: Nicholas P. Foukal, Svenja Ryan, and W. Gordon Zhang, \$919k, 2024-2028.

NSF Ocean Sciences Division Physical Oceanography Program funded program: “Transport and Fate of the Labrador Coastal Current”, PIs: Nicholas P. Foukal, Amy S. Bower, & Daniel J. Torres. \$1.9M, 2021-2024.

NSF Ocean Sciences Division Physical Oceanography Program funded program: “Collaborative Research: Pathways and fate of fresh water near the southern tip of Greenland”, PIs: Nicholas P. Foukal, Renske Gelderloos, and Robert S. Pickart, \$1.03M, 2021-2024.

WHOI Independent Study Award from the Andrew W. Mellow Foundation Endowed Fund; PI: Nicholas P. Foukal, \$65k internal award, 2021-2023.

AWARDS

Named an Endowed Early Career Scientist Fellow at WHOI, 2024

Awarded the “SailDrone Award”, providing 30 days of SailDrone time, 2020.

Offered a NASA Postdoctoral Program Fellowship at NASA GISS, 2018-2020 (declined)

Accepted to the Physical Oceanography Dissertation Symposium, 2018

Presented with the Division of Earth and Ocean Sciences outstanding graduate student award, 2017

Awarded a NASA Earth and Space Science Graduate Fellowship, 2012-2015.

Won “Best talk” at the University of Maine School of Marine Sciences Graduate Symposium, 2013

Selected for the Stifler Family Grant for Undergraduate Research at Dartmouth, 2010

PUBLICATIONS (* STUDENT AND ° POSTDOC AUTHORS)

In review:

- ° Duyck, E., **N. P. Foukal**, & E. Frajka-Williams (submitted) Circulation of Baffin Bay and Hudson Bay waters over the Labrador Shelf and into the subpolar North Atlantic, *Ocean Science*.
- Reverdin, G., F. Bonjean, L. Kilian, J. Boutin, S. Guimbard, J. Vergely, **N. P. Foukal**, M. F. de Jong, E. Duyck, C. A. Stedmon, D. Khvorostyanov (in review) Sea surface salinity variability from satellite and in situ observations around Greenland, *Journal of Atmospheric and Oceanic Technology*.
- ° Terhaar, J., * L. Vogt, & **N. P. Foukal** (in review) Recent Atlantic overturning inferred from air-sea heat fluxes indicates decadal variability dominates long term trends, *Nature Communications*.
- * Coquereau, A. C., **N. P. Foukal**, & K. Våge (in review) Extreme wind events responsible for an outsized role in shelf-basin exchange around the southern tip of Greenland, *Science Advances*.

Published:

- Foukal, N. P.**, & L. Chafik (2024) Consensus around a common definition of Atlantic overturning will promote progress, *Oceanography*, 37, 3, doi:10.1038/s41467-023-37846-6.
- * Tooth, O. J., **N. P. Foukal**, W. E. Johns, H. L. Johnson, & C. Wilson (2024) Lagrangian Decomposition of the Meridional Heat Transport at 26.5°N, *Geophysical Research Letters*, 51, doi:10.1029/2023GL107399.
- Furey, H. H., **N. P. Foukal**, A. Anderson, & A. S. Bower (2023) Investigation of the source of Iceland Basin freshening: virtual particle tracking with satellite-derived geostrophic surface velocities, *Remote Sensing*, 15, 24, 5711, doi:10.3390/rs15245711
- * Coquereau, A. & **N. P. Foukal** (2023) Evaluating altimetry-derived surface currents on the south Greenland shelf with surface drifters, *Ocean Science*, 19, 5, doi:10.5194/os-19-1393-2023.
- Frajka-Williams, E., **N. P. Foukal**, & G. Danabasoglu (2023) Should AMOC observations continue: How and why?, *Philosophical Transactions A*, doi:10.1098/rsta.2020.0568.

- Foukal, N. P.** & R. S. Pickart (2023) Moored observations of the West Greenland Coastal Current along the Southwest Greenland Shelf, *Journal of Physical Oceanography*, 53, 11, 2619-2632, doi:10.1175/JPO-D-23-0104.1.
- ° Huang, J., R. S. Pickart, **N. P. Foukal**, P. Lin & M. Spall (2023) Structure and variability of the Barrow Canyon outflow from two high-resolution shipboard surveys in 2018, *Journal of Geophysical Research - Oceans*, doi:10.1029/2023JC019640.
- * Catunda, M. C. A., A. Bahr, S. Kaboth-Bahr, X. Zhang, **N. P. Foukal**, & O. Friedrich (2021) Subsurface heat channel drove sea surface warming in the high-latitude North Atlantic during the Mid-Pleistocene Transition, *Geophysical Research Letters*, doi:10.1029/2020GL091899.
- ° **Foukal, N. P.**, R. Gelderloos, & R. S. Pickart (2020) A continuous pathway for fresh water along the East Greenland shelf, *Science Advances*, doi:10.1126/sciadv.abc4254.
- ° **Foukal, N. P.**, R. S. Pickart, G. W. K. Moore, & P. Lin (2019) Shelfbreak downwelling in the Alaskan Beaufort Sea, *Journal of Geophysical Research – Oceans*, doi:10.1029/2019JC015520.
- Bower, A., M. S. Lozier, A. Biastoch, K. Drouin, * **N. P. Foukal**, M. Lankhorst, S. Rühls, & S. Zou (2019) Lagrangian Views of the Pathways of the Atlantic Meridional Overturning Circulation, *Journal of Geophysical Research - Oceans*, doi:10.1029/2019JC015014
- * **Foukal, N. P.** & M. S. Lozier (2018) Examining the origins of ocean heat content variability in the eastern North Atlantic subpolar gyre, *Geophysical Research Letters*, doi:10.1029/2018GL079122
- * **Foukal, N. P.** & M. S. Lozier (2017) Assessing variability in the size and strength of the North Atlantic subpolar gyre. *Journal of Geophysical Research - Oceans*, doi:10.1002/2017JC012798
- * **Foukal, N. P.** & M. S. Lozier (2016) No inter-gyre pathway for sea-surface temperature anomalies in the North Atlantic, *Nature Communications*, doi:10.1038/ncomms11333
- * **Foukal, N. P.** & A. C. Thomas (2014) Biogeography and phenology of satellite-measured phytoplankton seasonality in the California Current. *Deep-Sea Research*, doi:10.1016/j.dsr.2014.06.008

SEMINARS AND CONFERENCE PRESENTATIONS (* INVITED SEMINARS)

Lagrangian perspectives of the shelf circulation around southern Greenland

- Ocean Sciences Meeting, New Orleans, LA, Feb. 2024
- Poster at the Arctic-Subarctic Ocean Fluxes (ASOF) Annual Meeting, May 2023

The importance of subpolar continental shelves to the large-scale overturning circulation

- Poster at CLIVAR workshop “Meeting AMOC observing needs in a changing climate”, Jul. 2023

On the origins, pathways, and fate of fresh water near the southern tip of Greenland

- * Skidaway Institute of Oceanography, University of Georgia, Feb. 2024
- * Graduate School of Oceanography, University of Rhode Island, Oct. 2022
- Transatlantic Physical Oceanography Retreat (THOR), remote participation, Feb. 2023
- * Atmospheric and Oceanic Sciences Department, McGill University, Mar. 2023

AMOC Observing System Implementation and Evaluation

- * US AMOC Science Team Meeting, Apr. 2022

Moored observations of the West Greenland Coastal Current along the Southwest Greenland Shelf

- Poster at the Ocean Sciences Meeting, virtual event, Mar. 2022
- Arctic-Subarctic Ocean Fluxes (ASOF) Annual Meeting, May 2022

Pathways and fate of fresh water near the southern tip of Greenland

- * OOI Science Booth at the AGU Fall Meeting, virtual event, Dec. 2021

A continuous pathway for fresh water along the East Greenland Shelf

- OSNAP Early Career Virtual Workshop, Mar. 2021
- * Ocean, Earth and Atmospheric Sciences Department, Old Dominion University, Oct. 2020
- Arctic-Subarctic Ocean Fluxes (ASOF) Meeting and Workshop, Sep. 2020.
- Postdoc Symposium, WHOI, Oct. 2019

Shelfbreak downwelling in the Alaskan Beaufort Sea

- * Physical Oceanography Department, WHOI, Apr. 2020
- * School of Marine and Atmospheric Sciences, Stony Brook University, Apr. 2020
- * Marine Sciences Department, University of Connecticut, Mar. 2020
- Poster at the Ocean Sciences Meeting, San Diego, CA. Feb. 2020
- Postdoc Symposium, WHOI, Oct. 2018

Ocean heat transport from the subtropical gyre to the subpolar gyre in the North Atlantic

- Coastal Ocean Fluid Dynamics Lectures, WHOI, Oct. 2019
- * Climate, Atmospheric Sciences and Physical Oceanography, Scripps, May 2019
- Earth and Planetary Sciences, Massachusetts Institute of Technology, Feb. 2019
- * Graduate School of Oceanography, University of Rhode Island, Feb. 2019
- Thayer School of Engineering, Dartmouth College, Jan. 2019
- Earth and Ocean Sciences, Duke University, Mar. 2018
- Poster at the Ocean Sciences Meeting, Portland, OR. Feb. 2018
- Physical Oceanography Department, WHOI, Sept. 2017
- Rosentiel School of Marine and Atmospheric Sciences, University of Miami, Mar. 2017

Assessing variability in the size and strength of the North Atlantic subpolar gyre

- Poster at the EGU General Assembly, Vienna, AU. Apr. 2017

No inter-gyre pathway for sea-surface temperature anomalies in the North Atlantic

- Poster at the Ocean Sciences Meeting, New Orleans, LA. Feb. 2016
- AMOC meeting, Bristol, UK. Jul. 2015
- IUGG meeting, Prague, CZ. Jun. 2015
- North Carolina Research Triangle Physical Oceanography seminar series, Apr. 2015
- Poster at the AGU fall meeting, San Francisco, CA. Dec. 2014

Biogeography and phenology of phytoplankton seasonality in the California Current

- Ocean Sciences Meeting, Honolulu, HI. Feb. 2014.
- University of Maine School of Marine Sciences Graduate Symposium, Apr. 2013.
- Poster at the Eastern Pacific Ocean Conference, Mount Hood, OR. Sep. 2012

EDUCATIONAL ACTIVITIES

Teaching:

- Co-instructor of record "Introduction to Observational Physical Oceanography", MIT/WHOI Joint Program in Oceanography, Fall semesters 2021-2023
- Certificate in College Teaching, Duke University 2015-2017
- Teaching Assistant, Division of Earth and Ocean Sciences, Duke University 2015-2017
- Teaching Assistant, Thayer School of Engineering, Dartmouth College 2010

Advising:

Sara Vianco, MIT/WHOI Joint Program Master's Student, 2022-2024
Carlos Freiji, WHOI Graduate Guest Student from ENSTA Bretagne, 2023
Catherine Zhang, WHOI Undergraduate Summer Student Fellow from Yale University, 2023
Ryan Boyle, WHOI Undergraduate Guest Student from Dartmouth College, 2022-2023
Arthur Coquereau, WHOI Graduate Guest Student from University of Brest, 2022

PROFESSIONAL ACTIVITIES

Society membership: The Oceanography Society, American Geophysical Union

Community Activities: Member of Greenland Ice Sheet Ocean (GRISO) "Ice Forcing Ocean" working group (2022-pres.); Co-convenor of CLIVAR AMOC Workshop: "Meeting AMOC observing needs in a changing climate" in Hamburg, Germany (July 2023); Co-convenor of Ocean Sciences Meeting session "AI01 Air-Sea Interaction and Climate Variability in the Atlantic Ocean: Observations, Modeling, and Theories" (Feb. 2022).

Reviewer: Journal Reviewer: Nature Geoscience, Science Advances, Nature Communications, AGU Journal of Geophysical Research, AGU Geophysical Research Letters, EGU Ocean Science, Progress in Oceanography, Deep-Sea Research II, Climatic Change, Communications Earth and Environment, and Geosciences; Proposal reviewer: NSF Ocean Sciences Division

WHOI Committees: WHOI Physical Oceanography Diversity, Inclusion, and Equity Committee (2021-present), WHOI Physical Oceanography Department Website Committee (2022-present), MIT-WHOI Joint Program Physical Oceanography Admissions Committee (2022-present), WHOI AMOC Journal Club Coordinator (2019-present), WHOI Physical Oceanography Seminar Coordinator (2019-2021), WHOI Postdoc Association President (2019-2020), WHOI Physical Oceanography Reading Group Coordinator (2018-2020)

Media appearances: Interviewed on NPR "*All Things Considered*" and quoted in an NPR.org story (2023); Quoted in *Wired* and *Oceanus* Magazines (2023); Quoted in a PBS NOVA article (2022).

FIELD EXPERIENCE

2023 Chief Scientist on a mooring deployment and hydrographic survey cruise to the Labrador Shelf. Led the science team including five graduate students, three mooring and research technicians, and one journalist. Deployed seven moorings, six surface drifters, and conducted 70 CTD casts. 24 days on *R/V Endeavor*.

2022 Coordinated fieldwork for graduate student Arthur Coquereau to deploy 12 surface drifters and four profiling floats on the Southeast Greenland Shelf from an NSF Overturning in the Subpolar North Atlantic Program (OSNAP) research cruise. Nick did not sail due to birth of a child. Chief Scientist: Fiamma Straneo.

2021 Led a project deploying 38 surface drifters and four profiling floats on the Southeast Greenland Shelf. This project added two days to an existing NSF Ocean Observatories Initiative (OOI) Irminger research cruise. 24 days total on *R/V Armstrong*. Chief Scientist: John Lund.

2020 Served as a CTD watchstander on an NSF Overturning in the Subpolar North Atlantic Program (OSNAP) research cruise. 40 days on *R/V Armstrong*. Chief Scientist: Robert S. Pickart

2018 Led a team of three graduate students taking CTD-mounted Microrider and Aquadop measurements of fine-scale velocity and temperature variability on an NSF Arctic Observing

Networks (AON) research cruise in the Beaufort Sea. 24 days on *USCGC Healy*. Chief Scientist: Robert S. Pickart

2014 Served as a CTD watchstander on an NSF Overturning in the Subpolar North Atlantic Program (OSNAP) research cruise in Labrador and Irminger Seas deploying moorings, RAFOS floats, CTDs and XBTs. 28 days on *R/V Knorr*. Chief Scientist: Robert S. Pickart

2012 Served as a watchstander on an ONR physical oceanography and acoustics research cruise in the Gulf Stream off Cape Hatteras, NC. 18 days on *R/V Sharpe*. Chief Scientists: James F. Lynch and Glen G. Gawarkiewicz