

Isabela Le Bras

Physical Oceanography Department, Woods Hole Oceanographic Institution
266 Woods Hole Road, MS#21 Woods Hole, MA 02543
email: ilebras@whoi.edu, phone: (508) 289-2819
website: ilebras.github.io

RESEARCH INTERESTS

I am an observational physical oceanographer studying the large scale ocean circulation. My recent research focus has been on better understanding how deep waters are formed and spread into the deep North Atlantic, and how Arctic freshwater impacts the Atlantic's overturning circulation.

EDUCATION

Ph.D. in Physical Oceanography 2011–2017
Massachusetts Institute of Technology – Woods Hole Oceanographic Institution Joint Program
“Dynamics of North Atlantic Western Boundary Currents”
Thesis adviser: John M. Toole

B.A. in Physics, Minor in Mathematics 2006–2010
University of California, Berkeley
Highest honors in physics and general scholarship

APPOINTMENTS

Assistant Scientist 2020–present
Woods Hole Oceanographic Institution
tenure-track position

Postdoctoral Scholar 2017–2020
Scripps Institution of Oceanography
Postdoctoral adviser: Fiamma Straneo

Postdoctoral Investigator Jan-Aug 2017
Woods Hole Oceanographic Institution
Postdoctoral adviser: John M. Toole

Graduate Research Assistant 2011–2017
Woods Hole Oceanographic Institution
Graduate supervisor: John M. Toole

SUBMITTED PUBLICATIONS

1. F. Li, Y. Fu, M. S. Lozier, **I. A. Le Bras**, M. Fe. de Jong, Y. Wang, A. Sanchez-Franks, “Deep circulation variability through the eastern subpolar North Atlantic”, **submitted to Journal of Climate**, (2023). *Role: Contributed to the interpretation of results and manuscript editing. Corresponded with Feili Li and helped develop ideas about the storage of dense waters in the*

PEER-REVIEWED PUBLICATIONS

26. F. W. Goldsworth, H. L. Johnson, D. P. Marshall, **I. A. Le Bras**, “Saturation of destratifying and restratifying instabilities during down-front wind events: a case study in the Irminger Sea”, *Journal of Geophysical Research: Oceans* doi.org/10.1029/2023JC020365, 129, e2023JC020365 (2024).
Role: Contributed to the formulation of research questions, interpretation of results, and manuscript editing. Met with Fraser Goldsworth periodically, provided observational constraints from which to initialize and force model runs, and provided feedback on the connection between the model output and the observations.
25. N. Beaird, F. Straneo, **I. A. Le Bras**, R. Pickart, W. Jenkins, “Glacial Meltwater in the Current System of Southern Greenland”, *Journal of Geophysical Research: Oceans* doi.org/10.1029/2023JC019658, 128, e2023JC019658 (2023). *Role: Contributed to the interpretation of results and manuscript editing. Prepared mooring data for analysis and met with Nick Beaird periodically to discuss how to incorporate the moored observations.*
24. **I. A. Le Bras**, “Labrador Sea Water spreading and the Atlantic Meridional Overturning Circulation”, *Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences* doi:10.1098/rsta.2022.0189, **381**: 20220189 (2023).
23. D. G. Evans, N. P. Holliday, S. Bacon, **I. A. Le Bras**, “Mixing and air-sea buoyancy fluxes set the time-mean overturning circulation in the subpolar North Atlantic”, *Ocean Science* doi:10.5194/os-19-745-2023, 19 (3) (2023).
Role: Contributed to the interpretation of results and manuscript editing. Met with Gwyn Evans periodically and pointed out the role of mixing in altering the water mass structure.
22. **I. A. Le Bras**, J. Willis, I. Fenty,, “The Atlantic meridional overturning circulation at 35N from deep moorings, floats, and satellite altimeter”, *Geophysical Research Letters* doi:10.1029/2022GL101931, 50, e2022GL101931 (2023).
21. H. Palevsky, S. Clayton and coauthors (including **I. A. Le Bras**), “OOI Biogeochemical Sensor Data: Best Practices & User Guide. Version 1.1.1. (peer-reviewed, GOOS endorsed practice)”, *Ocean Observatories Initiative, Biogeochemical Sensor Data Working Group, 135pp* doi:10.25607/OBP-1865.2, (2023).
Role: Attended the scoping workshop and contributed to the oxygen section (chapter 2) including worked examples of oxygen calibration procedures.
20. A. Arroyo, M. L. Timmermans, **I. A. Le Bras**, A. Proshutinsky, W. Williams, S. Zimmerman, “Declining O₂ in the Canada Basin halocline consistent with physical and biogeochemical effects of Pacific Summer Water warming”, *Journal of Geophysical Research: Oceans* doi:10.1029/2022JC019418, 128 (4) (2022).
Role: Contributed to the interpretation of results and manuscript editing. Met with graduate student Ashley Arroyo periodically and provided feedback on the framing of her results.

19. **I. A. Le Bras**, J. Callies, T.C. Biló, F. Straneo, J. Holte, H. L. Johnson, “Slantwise Convection in the Irminger Sea”, *Journal of Geophysical Research: Oceans* doi:10.1029/2022JC019071, 127, (2022). Editor highlight in EOS magazine
18. T.C. Biló , F. Straneo, J. Holte, **I. A. Le Bras**, “Arrival of New Great Salinity Anomaly Weakens Convection in the Irminger Sea”, *Geophysical Research Letters* doi.org/10.1029/2022GL098857, (2022).
Role: Quality controlled and calibrated the first four years of Cape Farewell mooring data and established the methodology. Contributed to the interpretation of results and manuscript editing.
17. D. Atamanchuk, J. Palter, H. Palevsky, **I. A. Le Bras**, J. Koelling, and D. Nicholson., “Linking Oxygen and Carbon Uptake with the Meridional Overturning Circulation Using a Transport Mooring Array”, *Oceanography*, doi.org/10.5670/oceanog.2021.supplement.02-03, (2021).
Role: Led the Irminger Sea portion of the project to add biogeochemical sensors to the OSNAP array and contributed to manuscript editing.
16. B. Berx, and coauthors (including **I. A. Le Bras**), “Climate-Relevant Ocean Transport Measurements in the Atlantic and Arctic Oceans”, *Oceanography* doi.org:10.5670/oceanog.2021.supplement.02-04, (2021).
Role: Participated in large-scale ocean observing projects such as OSNAP and the Beaufort Gyre Observing System. Contributed to manuscript editing.
15. F. Li, M. S. Lozier, N. P. Holliday, W. Johns, **I. A. Le Bras**, B. Moat, S. Cunningham, M. F. de Jong, “Observation-based estimates of heat and freshwater exchanges from the subtropical North Atlantic to the Arctic”, *Progress in Oceanography* doi:10.1016/J.POCEAN.2021.102640, (2021).
Role: Met and corresponded with Feili Li and provided feedback about the budget framework and interpretation of the results. Assisted with manuscript editing.
14. A. Pacini, R. S. Pickart, **I. A. Le Bras**, F. Straneo, and N. P. Holliday, “Cyclonic eddies in the West Greenland Boundary Current System”, *Journal of Physical Oceanography* doi:10.1175/JPO-D-20-0255.1, 2087–2102 (2021).
Role: Met with graduate student Astrid Pacini periodically and provided feedback on the framing of her results. Provided a higher temporal resolution OSNAP Cape Farewell moored dataset for this study and contributed to manuscript editing.
13. F. Li, and coauthors (including **I. A. Le Bras**), “Subpolar North Atlantic western boundary density anomalies and the Meridional Overturning Circulation”, *Nature Communications* doi:10.1038/s41467-021-23350-2, (2021).
Role: Provided the calibrated OSNAP Cape Farewell moored dataset and participated in discussions at OSNAP project meetings. Contributed to manuscript editing.
12. **I. A. Le Bras**, F. Straneo, M. Muilwijk, L. H. Smedsrud, F. Li, M. S. Lozier, and N. P. Holliday, “How much Arctic fresh water participates in the subpolar overturning circulation?”, *Journal of Physical Oceanography* doi:10.1175/JPO-D-20-0240.1, 955–973 (2021).
11. A. Pacini, R. S. Pickart, F. Bahr, D. J. Torres, A. Ramsey, J. Holte, J. Karstensen, M. Oltmanns, F. Straneo, **I. A. Le Bras**, G. W. K. Moore, M. F. de Jong, “Mean Conditions and Seasonality of the West Greenland Boundary Current System near Cape Farewell”, *Journal*

of *Physical Oceanography* doi:10.1175/JP0-D-20-0086.1, 2849–2871 (2020).

Role: Met with graduate student Astrid Pacini periodically and provided feedback on the framing of her results. Provided the calibrated OSNAP Cape Farewell moored dataset and contributed to manuscript editing.

10. **I. A. Le Bras**, F. Straneo, J. Holte, M.F. de Jong, and N. P. Holliday , “Rapid export of waters formed by convection near the Irminger Sea’s western boundary”, *Geophysical Research Letters* doi.org/10.1029/2019GL085989, (2020). Editor highlight in EOS magazine
9. **I. A. Le Bras**, M. Sonnewald, and J.M. Toole, “A barotropic vorticity budget for the subtropical North Atlantic based on observations”, *Journal of Physical Oceanography* doi: 10.1175/JP0-D-19-0111.1, (2019).
8. E. Frajka-Williams, and coauthors (including **I. A. Le Bras**), “Atlantic Meridional Overturning Circulation: Observed transports and variability”, *Frontiers in Marine Science* **6**, (2019).
Role: Wrote section 1.4 of the supplementary information. Contributed to manuscript editing.
7. J. Hopkins, N. P. Holliday, D. Rayner, L. Houpert, **I. A. Le Bras**, F. Straneo, C. Wilson, and S. Bacon, “Transport variability of the Irminger Sea Deep Western Boundary Current from a mooring array”, *Journal of Geophysical Research: Oceans* **124**, (2019).
Role: Gridded the CTD and LADCP data (Figure 7) during a stay at the National Oceanography Centre working with Penny Holliday. Contributed to the interpretation of results and manuscript editing.
6. M. S. Lozier, F. Li, and coauthors (including **I. A. Le Bras**), “A sea change in our view of overturning– first results from the Overturning in the Subpolar North Atlantic Program”, *Science* **363**, 516–521 (2019).
Role: Provided the calibrated OSNAP Cape Farewell moored dataset and participated in discussions at OSNAP project meetings. Contributed to manuscript editing.
5. **I. A. Le Bras**, F. Straneo, J. Holte, and N. P. Holliday , “Seasonality of Freshwater in the East Greenland Current System from 2014 to 2016”, *Journal of Geophysical Research: Oceans* **123**, (2018).
4. **I. A. Le Bras**, S. Jayne, and J. M. Toole, “The interaction of recirculation gyres and a deep boundary current”, *Journal of Physical Oceanography* **48**, 573-590 (2018).
3. J. M. Toole, M. Andres, **I. A. Le Bras**, T. Joyce and M. McCartney, “Moored observations of the Deep Western Boundary Current in the NW Atlantic: 2004-2014”, *Journal of Geophysical Research: Oceans* **122**, 7488-7505 (2017).
Role: Contributed to data preparation (I was a graduate student working with much of the same data and helped to identify issues). Produced figures 2, 4, and 6, and contributed to manuscript editing.
2. **I. A. Le Bras**, I. Yashayaev, and J. M. Toole, “Tracking Labrador Sea Water property signals along the Deep Western Boundary Current”, *Journal of Geophysical Research: Oceans* **122**, 5348-5366 (2017).
1. **I. A. Le Bras** and T. Karin (co-first authors), A. Kehlberger, K. Singer, N. Daniilidis, and H. Haeffner, “Transport of charged particles by adjusting RF voltage amplitudes”, *Applied Physics B* **106**, 117-125 (2012).

MENTORING

Postdoctoral scholars

Leo Middleton: 2023-present (co-advised by Tom Farrar)

MIT-WHOI Joint Program Ph.D. students

Hiroki Nagao: 2022-present

Marta Faulkner: 2023-present (co-advised by Mike Spall)

Ph.D. thesis committees

Ashley Arroyo (Yale): 2020-present

Ellen Park (MIT-WHOI Joint Program): 2022-present

Undergraduate students

Megan Knight (WHOI SSF): 2021

Nash Keyes (Yale): 2021 (co-advised by Mary-Louise Timmermans)

INVITED PRESENTATIONS

Consortium for the Advancement of Marine Arctic Sciences (CAMAS) “Arctic Ocean budgets of volume, mass, and freshwater (2003-2020)”	Feb 2024
University of Rhode Island Graduate School of Oceanography PO seminar “Slantwise convection in the Irminger Sea”	Sep 2023
US CLIVAR summit POS panel presentation (virtual) “Observing the Atlantic Meridional Overturning Circulation”	Aug 2023
CLIVAR Workshop on Meeting AMOC Observation Needs in a Changing Climate (virtual) “The AMOC at 35N from deep moorings, floats, and satellite altimeter”	Jul 2023
European Geoscience Union (virtual) “The AMOC at 35N from deep moorings, floats, and satellite altimeter”	Apr 2023
Royal Society AMOC meeting (virtual) “Labrador Sea Water spreading and the Atlantic Meridional Overturning Circulation”	Dec 2022
NOAA GFDL formal seminar (virtual) “Slantwise convection in the Irminger Sea”	Nov 2022
University of Rhode Island, physical oceanography seminar (virtual) “How much Arctic fresh water participates in the subpolar overturning circulation?”	Mar 2021
NASA Goddard Institute for Space Studies, sea level rise seminar (virtual) “How much Arctic fresh water participates in the subpolar overturning circulation?”	Mar 2021
CLIVAR POS panel webinar (virtual)	Oct 2020

“How much Arctic fresh water participates in the subpolar overturning circulation?”	
Woods Hole Oceanographic Institution seminar “Seasonality of Freshwater in the East Greenland Current System”	Mar 2019
Lamont Doherty Earth Observatory, Ocean and Climate Physics Seminar “Seasonality of Freshwater in the East Greenland Current System”	Nov 2018
Ocean Sciences Meeting, Portland, Oregon “Observing and Modeling the Deep Western Boundary Current”	Feb 2018

LEAD AUTHOR PRESENTATIONS

WHOI physical oceanography seminar “Slantwise convection in the Irminger Sea”	Nov 2022
AGU OOI-OSNAP special session (virtual presentation) “Boundary Current Ventilation in the Irminger Sea”	Dec 2021
Arctic and Subarctic Ocean Fluxes (virtual presentation) “Revisiting the Arctic freshwater budget from 2004 to 2010”	Oct 2021
WHOI physical oceanography seminar “How much Arctic fresh water participates in the subpolar overturning circulation?”	Mar 2021
Ocean Carbon Biogeochemistry Meeting (virtual poster) “Boundary Current Ventilation in the Irminger Sea”	Jun 2021
European Geoscience Union (virtual Pico presentation) “How much Arctic fresh water participates in the subpolar overturning circulation?”	Apr 2021
Arctic and Subarctic Ocean Fluxes (ASOF) (virtual presentation) “How much Arctic fresh water participates in the subpolar overturning circulation?”	Oct 2020
Caltech oceanography group seminar “Freshwater, Convection, and Overturning in the Irminger Sea”	Jan 2020
Ocean Sciences Meeting, San Diego, CA (oral presentation) “Rapid export of waters formed by convection near the Irminger Sea’s western boundary”	Feb 2020
U Mass Dartmouth seminar “The East Greenland Current System: Seasonality of Freshwater and Boundary Current - Convection Interactions”	Oct 2019
Ocean Obs’19, Honolulu, HI (poster) “Observing the link between convection and deep water export”	Sep 2019
Applied Physics Laboratory - University of Washington seminar “Seasonality of Freshwater in the East Greenland Current System”	Jun 2019
EGU Meeting, Vienna, Austria (poster presentation)	Apr 2019

“Convection and deep water export in the Irminger Sea”	
Scripps Institution of Oceanography, CASPO Seminar “Seasonality of Freshwater in the East Greenland Current System”	Jan 2019
AGU Fall Meeting, Washington D.C. (poster) “Freshwater budgets for the ocean east of Greenland”	Dec 2018
Oregon State University, College of Earth, Ocean and Atmospheric Sciences seminar “Seasonality of Freshwater in the East Greenland Current System”	Oct 2018
Ocean Sciences Meeting, Portland, OR (oral presentation) “Seasonality of Freshwater in East Greenland Current System”	Feb 2018
Irminger Sea Workshop, Southampton, UK (oral presentation) “Seasonality of Freshwater in East Greenland Current System”	Nov 2017
Scripps Institution of Oceanography, CASPO Seminar “Advection and Stirring of the Deep Western Boundary Current”	Oct 2017
Bjerknes Center, GFI seminar, Bergen, Norway “Observing and modeling stirring of the Deep Western Boundary Current”	May 2017
USAMOC meeting, Santa Fe, NM (oral presentation) “Labrador Sea Water property changes along the Deep Western Boundary Current”	May 2017
Oregon State University, College of Earth, Ocean and Atmospheric Sciences seminar “Stirring in the Deep Western Boundary Current”	Mar 2017
EGU meeting, Vienna, Austria (poster) “A vorticity budget for the Gulf Stream”	Apr 2017
Ocean Sciences Meeting, New Orleans, LA (poster) “Line W Measurements of the Deep Western Boundary Current reflect changes in Labrador Sea Convection”	Feb 2016
Ocean Sciences Meeting, New Orleans, LA (poster) “Clubes de Ciencia: Intensive science workshops in Mexico provide a unique opportunity for teaching, scientific and cultural exchange”	Feb 2016
Series of seminars in Germany	
1. GEOMAR, Kiel; 2. Marum, Universität Bremen; 3. Universität Hamburg “Observing and Modeling Stirring of the Deep Western Boundary Current”	Jan 2016
RAPID-USAMOC International Science Meeting, Bristol, UK (oral presentation) “A decade of Line W observations of the Deep Western Boundary Current”	Jul 2015
Graduate Climate Conference, Pack Forest, WA (poster) “Deep western boundary current exchange with the interior”	Oct 2014
Ocean Sciences Meeting, Honolulu, HI (poster) “Testing classic theories of western boundary currents in the North Atlantic”	Feb 2014

PROFESSIONAL ACTIVITIES

WHOI committees: PO website committee (2020-2022), CDEI subcommittee for faculty hiring (2020-2022), PO ad hoc hiring committee (2021)

Panel member: US CLIVAR Processes, Observations, and Phenomena (POS) Panel (2020-2022)

Reviewer: National Science Foundation; Nature; Journal of Physical Oceanography; Geophysical Research Letters; Science Advances; Journal of Geophysical Research: Oceans; Journal of Climate; Nature Scientific Reports; Ocean Modelling; Ocean Science Discussions; Earth System Science Data Discussions (ESSDD)

Session chair: EGU meeting 2019, Ocean Circulation and Climate Open Session; Graduate Climate Conference 2013, Physical Oceanography session

Steering committee member: Mentoring Physical Oceanography Women to Increase Retention (2016-2020)

MEDIA

- ECCO website featured publication, “Deep Ocean Slowdown? Yes and no, as ECCO helps to show.”, <https://ecco-group.org/storymaps.htm?id=88>, (2023).
- Derouin, S, “When winds and currents align, ocean mixing goes deep”, *Eos*, <https://doi.org/10.1029/2022E0220515> (2022).
- Showstack, R., “Waiting on the next freshwater flush”, *Oceanus*, <https://www.whoi.edu/oceanus/feature/waiting-on-the-next-freshwater-flush/> (2022).
- Interview with I. A. Le Bras, B. Keisling, and B. Ludka, “A conversation on building safe spaces for the LGBTQ+ community in the geosciences”, *Nature Communications* **12**, 4058 (2021).
- Pratt, S.E., “Larger role for shallow intermediate waters in ocean circulation”, *Eos* **101**, <https://doi.org/10.1029/2020E0141674> (2020).
- Le Bras, I.A., “Detours on the Oceanic Highway”, *Oceanus*, <https://www.whoi.edu/oceanus/feature/deep-western-boundary-current/> (2014).

OUTREACH

2023: Panelist for WHOI Ocean Encounters virtual event “The Arctic: Our planet on thin ice”. Over 500 people in attendance.

2021: Panelist for Boston College SACNAS chapter (Society for Advancement of Chicanos/Hispanics and Native Americans in Science) career path discussion.

2020: Two presentations to summer undergraduate students from underrepresented backgrounds “Chimneys into the deep ocean: measuring the ocean circulation around Greenland.”

2018, 2020: Organized LGBTQ+ networking event at Ocean Sciences Meeting.

2019: Talked about science careers and did experiments with groups of underrepresented sixth graders from San Diego on the Scripps Pier in collaboration with Birch Aquarium.

2018: Did experiments with students at Ocean Beach Elementary School for their “Science Night”.

2015-2016: Judge for Falmouth High School Science Fair.

2014: Submerge! New York City marine science festival. Manned booth of hands-on activities for WHOI. Estimated more than 4000 people in attendance.

2014: Article for the general public: “Detours on the oceanic highway” Oceanus Magazine.

RESEARCH CRUISES

Fall 2021: Beaufort Gyre Observing System aboard CCGS Louis S. St Laurent

Responsible party for WHOI moorings and ice stations.

Chief Scientist: Sarah Zimmerman; Cambridge Bay, Canada. (30 days)

Summer 2020: Overturning in the Subpolar North Atlantic Program (OSNAP) cruise AR45.

Responsible party for cruise dissolved gas component and CTD watchstander.

Chief Scientist: Robert Pickart; Woods Hole, MA. (35 days)

Fall 2018: Overturning in the Subpolar North Atlantic Program (OSNAP) cruise AR30-06.

Cape Farewell mooring specialist and responsible party for CTD χ -pod measurements.

Chief Scientist: Robert Pickart; Reykjavik, Iceland (42 days)

July 2017: Sermilik fjord research expedition. CTD specialist.

Chief Scientist: Fiamma Straneo; Tassilaq, Greenland (14 days)

May 2014: Line W research cruise KN218. CTD watch leader.

Chief Scientist: John M. Toole; Woods Hole, MA (14 days)

Aug 2012: Line W research cruise KN208. CTD watch stander.

Chief Scientist: John M. Toole; Woods Hole, MA (14 days)

May 2012: WOCE/CLIVAR A22 hydrography cruise AT20-1A. CTD watch stander.

Chief Scientist: Ruth Curry; Woods Hole, MA - Bridgetown, Barbados (30 days)

TEACHING

October 2020: Guest lecture on ocean convection in Boston College Oceanography class (virtual). Professor Hilary Palevsky.

April 2018: Guest lecture on water mass analysis and the overturning circulation for ice-ocean interactions course, Scripps Institution of Oceanography, CA. Professor Fiamma Straneo.

September 2016: Teaching assistant for introductory course on github and python through the Software Carpentry program, Woods Hole, MA.

January 2016: Designed and taught 3 lectures of an undergraduate short-course entitled “Anthropocene”, Woods Hole, MA.

January 2015: Created curriculum and taught a week-long, all-day workshop on ocean physics to college and high school students using lab experiments and numerical simulations (in English and Spanish) at UABC in Ensenada, Mexico through Clubes de Ciencia program.

Spring 2014: Took course through MIT’s Teaching and Learning Laboratory on teaching methods culminating in MIT Teaching Certificate, Cambridge, MA.

Fall 2013: Teaching assistant for introduction to observational physical oceanography, MIT course 12.808 with Dr. Magdalena Andres and Dr. Jake Gebbie. MIT-WHOI Joint Program.

Summer 2013 and 2015: Short Course Instructor for graduate student math refresher. MIT-WHOI Joint Program.