

## MADELEINE K. YOUNGS

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### EDUCATION

MIT - WHOI Joint Program in Oceanography  
**PhD in Physical Oceanography** 2015-2020  
*Dissertation Title: Residual Overturning Circulation and Its Connection to Southern Ocean Dynamics*  
Awarded the CG Rossby Thesis Award by MIT-EAPS

California Institute of Technology  
**B.S. in Applied and Computational Mathematics with Honors** 2011-2015

### RESEARCH INTERESTS

Southern Ocean Dynamics, Data Science, Geophysical Fluid Dynamics, Storm Tracks and Climate

### PROFESSIONAL EXPERIENCE

**Postdoctoral Researcher, UCLA** January 2023 -  
Advised by Professors Andrew Stewart and Andrew Thompson

**Postdoctoral Researcher, NYU** September 2022 - January 2023  
Advised by Professor Edwin Gerber

**NOAA Climate and Global Change Postdoctoral Fellow, NYU** September 2020 - August 2022  
*Project Title: Northern Hemisphere Climatological Storm Tracks Under Climate Change: A Dynamical Systems Perspective*  
Advised by Professor Edwin Gerber

**Graduate Student Researcher, MIT** September 2015 - August 2020  
Advised by Professor Glenn Flierl

**Geophysical Fluid Dynamics Fellow, Woods Hole Oceanographic Institution** June 2017 - August 2017  
Advised by Dr. Joseph Pedlosky

**Staff Researcher, Caltech** June 2015 - August 2015  
Advised by Professor Andrew Thompson

**Student Researcher, Caltech** January 2012 - June 2015  
Advised by Professor Andrew Thompson

**Hollings Scholar Intern, NOAA/PMEL** June 2014 - August 2014  
Advised by Dr. Gregory Johnson

### PUBLICATIONS

*In Preparation*

13. Youngs, M. K., and A. L. Stewart, Thickness-Weighted Velocities for Lagrangian Particle Tracking. *Journal of Physical Oceanography*, *in prep.*

12. Youngs, M. K., A. L. Stewart, A. F. Thompson, Y. Si, and M. Schodlok, Ice Shelf Melt Feedbacks in a Circumpolar Model. *Geophysical Research Letters*, *in prep.*

11. O. Pauluis, M. K. Youngs, and E. P. Gerber, Dynamical structure of the Southern Baroclinic Annular Mode. *Journal of Atmospheric Sciences*, *in prep.*

10. Youngs, M. K., E. P. Gerber, and O. Pauluis, Baroclinic Annular Mode under Climate Change. *Journal of Atmospheric Sciences*, *in prep.*

9. Youngs, M. K., E. P. Gerber, and O. Pauluis, Eddy Heat Flux Driven Variability of the Baroclinic Annular Mode. *Geophysical Research Letters*, *in prep.*

Submitted/Published

8. Youngs, M. K., N. Lovenduski, and M. Freilich, 2023. Carbon Outgassing Hotspots in a Southern Ocean-Like Channel. *Geophysical Research Letters*.
7. Youngs, M. K., and G.R. Flierl, 2023. Connecting Residual Overturning Theory with the Topographically Localized Overturning in the Southern Ocean. *Journal of Physical Oceanography*.
6. Youngs, M. K., R. Ferrari and G.R. Flierl, 2020. Basin-Width Dependence of Northern Deep Convection. *Geophysical Research Letters*, **47**, e2020GL089135, doi:10.1029/2020GL089135
5. Youngs, M. K., G.R. Flierl, and R. Ferrari, 2019. Role of Residual Overturning for the Sensitivity of Southern Ocean Isopycnal Slopes to Changes in Wind Forcing. *Journal of Physical Oceanography*, **49**, 2867-2881, doi:10.1175/JPO-D-19-0072.1
4. Youngs, M. K., A. F. Thompson, A. Lazar, and K. J. Richards, 2017: ACC Meanders, Energy Transfer, and Mixed Barotropic- Baroclinic Instability. *Journal of Physical Oceanography*, **47**, 1291-1305, doi:10.1175/JPO-D-16-0160.1.
3. Youngs, M. K., and G. C. Johnson, 2015: Basin-wavelength Equatorial Deep Jet Signals Across Three Oceans. *Journal of Physical Oceanography*, **45**, 2134-2148, doi:10.1175/JPO-D-14-0181.1.
2. Youngs, M. K., A. F. Thompson, M. M. Flexas, and K. J. Heywood, 2015: Weddell Sea export pathways from surface drifters. *Journal of Physical Oceanography*, **45**, 1068-1085, doi:10.1175/JPO-D-14-0103.1.
1. Thompson, A. F., and M. K. Youngs, 2013: Surface exchange between the Weddell and Scotia Seas. *Geophysical Research Letters*, **40**, 5920-5925, doi:10.1002/2013GL058114.

## STUDENTS ADVISED/MENTORED

Ruth Moorman, PhD Student	July 2023-
Jackson Wilke, Undergraduate	April-September 2023

## TEACHING EXPERIENCE

<b>Undergraduate Physical Oceanography UCLA</b> <i>Guest Lecturer 2 lectures - Global Overturning Circulation and Southern Ocean Dynamics</i>	Fall 2023
<b>Graduate Physical Oceanography UCLA</b> <i>Guest Lecturer - Residual Mean Circulation of the Southern Ocean</i>	Spring 2023
<b>Water Sourcing and Delivery in an Era of Climate Change - NYU Wagner</b> <i>Guest Lecturer - Climate Models</i>	Fall 2021
<b>Introduction to Atmos., Ocean, and Climate Dynamics, MIT 12.003</b> <i>Teaching Assistant</i>	Fall 2018
<b>Partial Differential Equations and Transforms, MIT-WHOI Joint Program Math Review</b> <i>Instructor (6 hours total instruction time)</i>	Summer 2016
<b>Partial Differential Equations, Caltech ACM 95/100c</b> <i>Teaching Assistant</i>	Spring 2014
<b>Complex Analysis, Caltech ACM 95/100a</b> <i>Teaching Assistant</i>	Fall 2013

## FUNDED GRANTS

NCAR/CISL University Large Allocation Grant (2.2 M Core-hours)	October 2018-September 2022
Unfunded-Collaborator for NSF OCE-1536515	September 2020-September 2021
American Geophysical Union Travel Grant to Attend Fall Meeting 2014	August 2014

## CRUISE EXPERIENCE

<b>Thwaites Cruise</b> Deployment and recovery of Seagliders and SOCCOM Floats in Southern Ocean on <i>NBP</i>	January-March 2020
<b>OSMOSIS (Ocean Surface Mixing, Ocean Submesoscale Interaction Study)</b> Recovery of Seagliders at Porcupine Abyssal Plain site on RRS <i>James Cook</i>	September 2013

## HONORS AND AWARDS

C-G Rossby Award - MIT-PAOC Thesis Award	September 2021
NOAA Climate and Global Change Postdoctoral Fellowship	September 2020 - August 2022
Geophysical Fluid Dynamics Summer School Fellow	Summer 2017
NDSEG Fellow	September 2017- August 2020
NSF-GRFP Recipient	April 2017
Hertz Fellowship Finalist	March 2016
Norman C. Rasmusen MIT-Earth Atmospheric and Planetary Sciences Fellowship	2015-2016
American Meteorological Society Graduate Fellowship	2015-2016
NOAA - Student Science and Education Symposium - Outstanding Presentation Award	July 2014
Fritz B. Burns Award in Geology - Caltech	June 2014
NOAA - Hollings Scholar	2013-2015

## INVITED SEMINARS

<b>UCLA - AOS 270 Seminar</b> <i>Southern Ocean Circulation and Climate: The Localizing Effect of Topography</i>	October 2023
<b>University of Washington Physical Oceanography Seminar</b> <i>Southern Ocean Circulation and Climate: The Localizing Effect of Topography</i>	March 2023
<b>Cornell Atmospheric Sciences Seminar</b> <i>Baroclinic Annular Mode in the Southern Hemisphere</i>	November 2022
<b>GFD Summer School Seminar</b> <i>Baroclinic Annular Mode in the Southern Hemisphere</i>	July 2022
<b>Caltech - Visiting Seminar</b> <i>Southern Ocean Circulation and Climate: The Localizing Effect of Topography</i>	May 2022
<b>UCLA - AOS 271 Seminar</b> <i>Southern Ocean Circulation and Climate: The Localizing Effect of Topography</i>	May 2022
<b>Florida State University Physical Oceanography Seminar</b> <i>Southern Ocean Circulation and Climate: The Localizing Effect of Topography</i>	March 2022
<b>Rice University EEPS Seminar</b> <i>Southern Ocean Circulation and Climate: The Localizing Effect of Topography</i>	February 2022
<b>Physical Oceanography Dissertation Symposium (Lihue, HI)</b> <i>Overturing Circulation and its Connection to Southern Ocean Dynamics</i>	October 2021
<b>CLIVAR POS Summer Meeting</b> <i>Southern Ocean Circulation and Climate: The localizing effect of Topography</i>	August 2021
<b>University of Washington Physical Oceanography Seminar</b> <i>Localized Southern Ocean Overturing and Implications for Sensitivity</i>	March 2021
<b>NYU Courant Center for Atmosphere Ocean Science Colloquium</b> <i>Localized Southern Ocean Overturing and Implications for Sensitivity</i>	October 2020
<b>UChicago Geophysical Sciences Colloquium</b> <i>Role of Residual Overturing for the Sensitivity of Southern Ocean Isopycnal Slopes</i>	November 2019
<b>WHOI Physical Oceanography Seminar</b> <i>Role of Residual Overturing for the Sensitivity of Southern Ocean Isopycnal Slopes</i>	November 2019
<b>NYU Courant Center for Atmosphere Ocean Science Student Seminar</b> <i>Three Dimensional Residual Circulation of the Southern Ocean</i>	October 2019
<b>Yale Atmosphere, Ocean, and Climate Dynamics Seminar</b> <i>Three Dimensional Residual Circulation of the Southern Ocean</i>	October 2019

Stanford Climate Atmosphere and Ocean Dynamics Seminar <i>Three Dimensional Residual Circulation of the Southern Ocean</i>	August 2019
URI - Graduate School in Oceanography <i>ACC Meanders, Energy Transfer, and Mixed Barotropic- Baroclinic Instability</i>	October 2017
UCLA - Oceanography Seminar <i>ACC Meanders, Energy Transfer, and Mixed Barotropic- Baroclinic Instability</i>	June 2016
NASA - JPL Oceanography Seminar Series <i>Weddell Sea export pathways from surface drifters</i>	August 2013

## PROFESSIONAL MEMBERSHIPS

American Geophysical Union  
American Meteorological Society

## ORGANIZING AND CONVENING

Organizing Committee - NSF OPP Southern Ocean Physical Oceanography Fieldwork Workshop	April 2024
Session chair - Ocean Sciences Meeting 2024 New Orleans, LA	February 2024
Session chair - AGU Fall Meeting 2023 Global Meridional Overturning Circulation	December 2023
Organizing Committee CalGFD Workshop 2023	September 2023
Session chair - Ocean Sciences Meeting 2022 Honolulu, HI	February 2022
Session chair - Ocean Sciences Meeting 2020 San Diego, CA	February 2020
American Meteorological Society, Atmospheric and Oceanic Fluid Dynamics Committee	2017-2020
Graduate Climate Conference 2017 Co-Chair	2017
PAOC Colloquium Seminar Series Committee Member and Chair	2016-2018

## SERVICE AND OUTREACH

Reviewer for Journal of Physical Oceanography, Geophysical Research Letters, Journal of Atmospheric Sciences, Nonlinear Dynamics	2016-present
Women in Course XII Board Member	2016-2018
Women in Course XII Treasurer	2016-2017
Volunteer for Cambridge Science Festival	2016, 2018
National Ocean Sciences Bowl	2012, 2017, 2018

## SELECTED CONFERENCE PRESENTATIONS

- Youngs, M. K., et al., *Ice-Shelf Melt Feedbacks in a Southern Ocean Model*. CalGFD Meeting, La Jolla, CA. September 2023, **talk**.
- Youngs, M. K., et al., *Ice-Shelf Melt Feedbacks in a Southern Ocean Model*. SOCCOM Annual Meeting, Princeton, NJ. June 2023, **talk**.
- Youngs, M. K., et al., *Carbon Outgassing Hotspots in a Southern Ocean-Like Channel*. SOCCOM Annual Meeting, Princeton, NJ. June 2022, **talk**.
- Youngs, M. K., *Mixed-Shear Instability: What sets the momentum fluxes and why they matter*. Ocean Mixing Gordon Research Seminar 2022, South Hadley, MA. June 2022, **Invited talk**.
- Youngs, M. K., Flierl G.R. *Three-dimensional Overturning Circulation Localized by Topography in the Southern Ocean*. Ocean Mixing Gordon Research Conference 2022, South Hadley, MA. June 2022, **Poster**.
- Youngs, M. K., Flierl G. R. *Three-dimensional Overturning Circulation Localized by Topography in the Southern Ocean and Its Implications*. Ocean Sciences 2022, Honolulu, HI. February 2022, **talk**.
- Youngs, M. K., Gerber E. P. *Exploring the Mechanism(s) of the Baroclinic Annular Mode in a Hierarchy of Models*. AMS Annual Meeting, Houston, TX. January 2022, **talk**.
- Youngs, M. K., et al., *Role of Residual Overturning for the Sensitivity of Southern Ocean Isopycnal Slopes to Changes in Wind Forcing*. American Meteorological Society Atmospheric and Oceanic Fluid Dynamics Meeting, Portland, ME. June 2019, **talk**.
- Youngs, M. K., et al., *Carbon Outgassing Hotspots in a Southern Ocean-Like Channel*. Harvard Crimson Climate Conference, Cambridge, MA. May 2019, **talk**.
- Youngs, M. K., et al., *ACC Meanders, Energy Transfer, and Mixed Barotropic-Baroclinic Instability*. Ocean Sciences Meeting, Portland, OR. February 2018, **invited poster**.

Youngs, M. K., Ferrari R. *Salt's Role in the Basin-Width Dependence of Northern Deep Convection*. Ocean Sciences Meeting, Portland, OR. February 2018, **talk**.

Youngs, M. K., Ferrari R. *Basin Width and Convection Shut Off*. NCAR Southern Ocean Workshop, Boulder, CO. April 2017, **poster**.

Youngs, M. K., et al., *Eddy-Mean Flow Interactions in an ACC Meander*. Ocean Sciences Meeting, New Orleans, LA. February 2016, **poster**.

Youngs, M. K., Johnson, G. C. *Planetary Wave Signatures Across Three Oceans*. AGU Fall Meeting, San Francisco, CA. December 2015, **invited talk**.

Youngs, M. K., Johnson, G. C. *Planetary Wave Signatures Across Three Oceans*. American Meteorological Society Atmospheric and Oceanic Fluid Dynamics Meeting, Minneapolis, MN. June 2015, **poster**.

Youngs, M. K., Thompson, A. F. *Export from the Weddell Sea: Monitoring the surface circulation near the tip of the Antarctic Peninsula using drifters*. Ocean Sciences, Honolulu, HI. March 2014, **poster**.

Youngs, M. K., Thompson, A. F. *Export from the Weddell Sea: Monitoring the surface circulation near the tip of the Antarctic Peninsula using drifters*. Gordon Research Seminar: Polar Marine Science, Ventura, CA. March 2013, **poster**.