Dr. Kay McMonigal (he/him or they/them)
Assistant Professor
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EDUCATION

2020 **Ph.D.**, University of Miami (UM) Rosenstiel School of Marine and Atmospheric Sciences (RSMAS)
Meteorology and Physical Oceanography
Dissertation: *Estimating a time-series of South Indian Ocean heat transport*
Advisor: Lisa Beal

2015 B.A., Northwestern University
Earth and Planetary Sciences, Math, Integrated Sciences, minor: Gender Studies

EMPLOYMENT

2023 - Assistant Professor of Oceanography
University of Alaska Fairbanks, College of Fisheries and Ocean Sciences

2023 - Adjunct Assistant Professor with Graduate Faculty Affiliation
MEAS, North Carolina State University

2020 - 2023 Postdoctoral Scholar
MEAS, North Carolina State University. Advisor: Sarah Larson

2022 Visiting Instructor
Duke University, course: *The Climate System*

2015 - 2020 Graduate Research Assistant
University of Miami RSMAS

2014 - 2015 Undergraduate Research Assistant
Northwestern University Earth and Planetary Sciences (EPS)

PUBLICATIONS - PEER REVIEWED

*NCSU or UAF student first author

[15] Larson, S., **K. McMonigal**. Wind Driven Ocean Circulation Variability Delays the Time of Emergence of Externally Forced Sea Surface Temperature Signals. Accepted by *Geophysical Research Letters*.

[14] **McMonigal, K.**, Larson, S., Gervais, M., Wind driven ocean circulation changes alter the future evolution of the North Atlantic warming hole. Accepted by *Journal of Climate*.

[13] Hasan, M.*, S.L. Larson, **K. McMonigal**, W. Robinson, A. Aiyyer (2024). Hemisphere-dependent Impacts of ENSO and Atmospheric Eddies on Hadley Circulation. *Journal of Climate*. http://doi.org/10.1175/JCLI-D-24-0112.1

[12] Zhang, Y., C. Chen, S. Hu, G. Wang, **K. McMonigal**, S. Larson (2024). Summer westerly wind intensification weakens Southern Ocean seasonal cycle under global warming. *Geophysical Research Letters*. http://doi.org/10.1029/2024GL109715

[11] Larson, S. M., **K. McMonigal**, Y. Okumura, D. Amaya, A. Capotondi, K. Bellomo, I. R. Simpson, and A. C. Clement (2024). Ocean complexity shapes sea surface temperature variability in a CESM2 coupled model hierarchy, *Journal of Climate*. https://doi.org/10.1175/JCLI-D-23-0621.1

[10] Fu, S., S. Hu, X.-T. Zheng, **K. McMonigal**, S. Larson, Y. Tian (2024). Unfolding the role of wind-driven ocean circulation in the historical Pacific warming pattern. Nature Communications, 15, 1562. https://doi.org/10.1038/s41467-024-45677-2

[9] **McMonigal, K**., N. Evans, D. Jones, J. Brett, R.C. James, M.C. Arroyo, A.Y. Gong, E.C. Miller, C. Kelly, J. Middleton, C. Spear, W. Holmes, D. Lane (2023). Navigating gender at sea, *AGU Advances,* 4. https://doi.org/10.1029/2023AV000927
Featured as an editors highlight

[8] **McMonigal, K**., Larson, S., Hu, S., & Kramer, R. (2023). Historical changes in wind-driven ocean circulation can accelerate global warming. *Geophysical Research Letters*, 50, e2023GL102846. https://doi.org/10.1029/2023GL102846
Highlighted as AAAS Editors' Choice In Other Journals: https://www.science.org/doi/10.1126/science.adh4769

[7] Hasan, M.*, S. Larson, **K. McMonigal** (2022). Hadley cell edge modulates the role of Ekman heat flux in a future climate, *Geophysical Research Letters*. http://doi.org/10.1029/2022GL100401

[6] Gunn, K.L., **K. McMonigal**, L.M. Beal, S. Elipot (2022). Decadal and Intra-annual Variability of the Indian Ocean Freshwater Budget, *Journal of Physical Oceanography.* https://doi.org/10.1175/JPO-D-22-0057.1

[5] **McMonigal, K.**, K.L. Gunn, L.M. Beal, S. Elipot, & J.K. Willis (2022). Reduction in Meridional Heat Export Contributes to Recent Indian Ocean Warming, *Journal of Physical*

Oceanography, *52*(3), 329-345. https://journals.ametsoc.org/view/journals/phoc/52/3/JPO-D-21-0085.1.xml

[4] **McMonigal, K.**, S. Larson (2022). ENSO explains the link between Indian Ocean Dipole and ocean meridional heat transport, *Geophysical Research Letters, 49.* DOI: 10.1029/2021GL095796.

[3] **McMonigal, K.**, L.M. Beal, S. Elipot, K. Gunn, T. Morris, J. Hermes, A. Houk (2020). The impact of meanders, deepening and broadening, and seasonality on Agulhas Current temperature variability, *Journal of Physical Oceanography,* **50** (12). DOI: 10.1175/JPO-D-20-0018.1

[2] Gunn, K.L., L.M. Beal, S. Elipot, **K. McMonigal**, A. Houk (2020). Mixing of subtropical, central and intermediate waters driven by shifting and pulsing of the Agulhas Current, *Journal of Physical Oceanography,* **50** (12). DOI: 10.1175/JPO-D-20-0093.1

[1] **McMonigal, K.**, L.M. Beal, and J.K. Willis (2018). The seasonal cycle of the south Indian Ocean subtropical gyre circulation as revealed by Argo and satellite data, *Geophysical Research Letters*, **45** (17). DOI: 10.1029/2018GL078420

PUBLICATION - SUBMITTED

[1] **McMonigal, K.**, S. Larson, M. Gervais, J. Klavans, C. He, K. Bellomo, M. Cane, S. Corti, A. Clement. Fingerprints of AMOC Decline are Sensitive to External and Mechanistic forcing. Submitted to *Geophysical Research Letters*.

PUBLICATIONS - IN PREPARATION

[2] Yen-Chi Wu, Yu-Chiao Liang, Sarah Larson, **K. McMonigal**, and Yu-Heng Tseng. Varying Wind-driven Ocean Circulation Causes Arctic Ocean Cooling.

[1] Gunn, K.L., **K. McMonigal**, L.M. Beal, S. Elipot, Eddy heat fluxes within the Agulhas Current.

PUBLICATIONS - NON PEER REVIEWED

[2] Weissman JL, Chappell CR, Francesco Rodrigues de Oliveira B, Evans N, Fagre AC, et al. [including **McMonigal, K**] (2024) Queer- and trans-inclusive faculty hiring—A call for change. PLOS Biology 22(11): e3002919. https://doi.org/10.1371/journal.pbio.3002919

[1] **McMonigal, K**. "Aerosols hold the key to recent and future Pacific Warming Patterns." *Proceedings of the National Academy of Sciences*, vol. 121, no. 6, 26 Jan. 2024, https://doi.org/10.1073/pnas.2322594121.

INVITED TALKS

2025 *Using a climate model hierarchy to quantify the role of wind driven ocean circulation in climate variability and change*
Woods Hole Oceanographic Institute, Woods Hole, MA

2023 *The role of wind driven ocean circulation changes in climate*
UW Applied Physics Lab, Seattle, WA

2022 *Using observations and models to understand the role of the ocean circulation on climate change*
University of Alaska Fairbanks, Fairbanks, AK

2022 *Using observations and models to understand the role of the wind driven ocean circulation on climate change*
Lamont-Doherty Earth Observatory Ocean and Climate Physics Seminar series (virtual)

2022 *Combining observations and models to understand the role of the ocean in climate*
University of Maine School of Marine Sciences, Orono, ME

2022 *Combining observations and models to understand the role of the ocean in climate*
URI Graduate School of Oceanography, Narragansett, RI

2022 *Why is the Indian Ocean warming so rapidly?*
NOAA AOML, Miami, FL (virtual)

2021 *Estimating a time series of South Indian Ocean heat transport*
Physical Oceanography Dissertation Symposium, HI

2021 *Why is the Indian Ocean warming so rapidly?*
George Mason University, Fairfax, VA (virtual)

2021 *Convergence Indian Ocean heat transport drives recent warming*
CASPO seminar, Scripps Institute of Oceanography, San Diego, CA (virtual)

SELECTED SCIENTIFIC PRESENTATIONS

2024 *Fingerprint of Atlantic Meridional Overturning Circulation is blurry under moderate forcing*
AGU annual meeting, Washington, DC (poster)

2024 *Sea surface temperature anomaly persistence depends on ocean complexity in a CESM2 model hierarchy*
AGU annual meeting, Washington, DC

2024 *Ocean complexity shapes sea surface temperature variability in a CESM2 model hierarchy*
CESM Meeting, Boulder, CO (presented virtually)

2024 *Wind Driven Ocean Circulation Changes Exacerbate Tropical Pacific SST Trend Biases in CESM2, Leading to Amplified Global Warming*
Ocean Sciences Meeting, New Orleans

2024 *Navigating gender at sea*
Ocean Sciences Meeting, New Orleans

2023 *Future evolution of the North Atlantic warming hole is impacted by wind driven ocean circulation changes*
American Geophysical Union annual meeting, San Francisco

2023 *How do changes to wind driven ocean circulation alter global warming?*
SANCOR seminar, University of Cape Town, South Africa

2023 *Effect of Indian Ocean Dipole on meridional ocean heat transport depends on ENSO*
European Geophysical Union, Vienna, Austria

2023 *The role of wind driven ocean circulation changes in climate change in CESM2*
Climate and Global Dynamics Seminar, NCAR (virtual)

2022 *Wind driven ocean redistribution of heat leads to increased anthropogenic surface warming over 1979-2014 in CESM2*
American Geophysical Union (Chicago, IL)

2022 *Drivers of Atlantic SST variability in a coupled model hierarchy (poster)*
Atmospheric and Oceanic Fluid Dynamics conference (Breckenridge, CO)

2022 *Anthropogenically forced wind driven ocean redistribution of heat leads to increased warming over the historical period (poster)*
CLIVAR pattern effect workshop (Boulder, CO)

2022 *What role do wind driven ocean circulation trends play in the rate of global warming?*
NCSU MEAS department symposium (Raleigh, NC)

2022 *ENSO explains the link between Indian Ocean Dipole and meridional heat transport*
Ocean Sciences Meeting (virtual): YouTube

2022 *ENSO explains the link between Indian Ocean Dipole and meridional heat transport*
Climate Variability and Change Working Group (virtual)

2022 *Why is the Indian Ocean warming so rapidly?*
South African Network for Coastal and Oceanic Research seminar (virtual)

2022 *Why is the Indian Ocean warming so rapidly?*
Woods Hole Oceanographic Institute seminar series (virtual)

2022 *Why is the Indian Ocean warming so rapidly?*
Northwestern University Earth and Planetary Sciences seminar (virtual)

2021 *Drivers of Indian and Pacific Ocean heat transport*
International Workshop for Air-sea Interactions (virtual poster)

2020 *Estimating a time series of meridional heat transport of the Indian Ocean at 34°S*
Ocean Sciences Meeting, San Diego, CA

2020 *Variability in Agulhas Current temperature and freshwater transports, with implications for Agulhas Leakage fluxes*
Gateways to the Ocean Symposium, San Diego, CA

2019 *The time varying temperature transport of the Agulhas Current*
IUGG Assembly, Montreal, Canada

2018 *The seasonal cycle of the South Indian Ocean subtropical gyre as revealed by Argo and satellite data*
National Oceanography Centre, Southampton, UK

2018 *The seasonal cycle of the South Indian Ocean subtropical gyre as revealed by Argo and satellite data*
University of Cape Town, South Africa

2018 *The seasonal cycle of the South Indian Ocean subtropical gyre (poster)*
Statewide Graduate Research Symposium, Florida State University

2018 *The seasonal cycle of the South Indian Ocean subtropical gyre*
University of Miami, Graduate Research Symposium

2017 *Meridional heat transport of the Indian Ocean across 34°S based on high resolution Agulhas Current hydrography, satellite, and Argo data*
IAPSO-IAMAS-IAGA Joint Assembly, Cape Town, South Africa

2014 *Calcite rafts-rapid deposition of transgressive infill cave sequences as a new paleo sea level proxy (poster)*
Geological Society of America, Vancouver, CA

FUNDING

2024 NSF Ocean Sciences Division, **PI**. *EMBRACE-OCE-Seed: Variability and trends in Agulhas Current water mass properties*. $199,999. Award #2409411

2024 NOAA Climate Variability and Predictability, **Co I**. Cloud-SST feedback strength as a source of multi-year to decadal SST predictability in the Pacific. $91,216 (UAF sub award). Recommended for funding.

2024 Office of Naval Research, Center ICE Arctic Fellows Award. **PI**. $9975

2023 NSF, *NNA: Collaborative Research: ACTION - Alaska Coastal Cooperative for Co-producing Transformative Ideas and Opportunities in the North,* **Senior Personnel**. PI: C. Maio.

2023 BOEM, *Feasibility study for a novel instrumental technique to characterize subsurface currents and hydrography within the Alaska OCS.* $30,354, **PI**.

2023 NSF, *CR: US GO-SHIP 2021-2026 Repeat Hydrography, Carbon and Tracers.* $96,539.00 (UAF sub award from UCSD).

2022 NSF, *Determining the role of ocean dynamics in Atlantic sea surface temperature variations using a hierarchy of coupled models*
PI: M. Buckley. I was named postdoc and contributed to proposal writing.

2019 Mary Roche Scholarship. University of Miami. $10,000

2018 *Elevating diversity and inclusion at RSMAS.* University of Miami Career Development Fund. $2,500.

AWARDS & SCHOLARSHIPS

2025	CFOS 2025 Outstanding Researcher
2025	National Academy of Sciences Kavli Fellow
2024	R1 Faculty Award ($10,000)
2024	DBO Atlantic Travel Grant to attend Arctic Science Summit Week (1500 Euro)
2023	EPSCOR Travel Grant to attend IGNITE workshop ($600)
2019	Mary Roche Scholarship, University of Miami ($10,000)
2018	Best physical sciences presentation, Graduate Student Research Symposium, UM
2017	RSMAS Career Development Award, University of Miami ($2500)
2015 - 2020	University of Miami Graduate School Fellowship
2015	Seymour Schlanger Undergraduate Earth Science Award, EPS
2012	Academic All-Big Ten Student Athlete

SEAGOING EXPERIENCE

2024 Northern Gulf of Alaska LTER, RV Sikuliaq, Seward, AK to Seward, AK. Chief Scientist: Seth Danielson. 16 days. CTD and mooring operations

2023 GO-SHIP I05 hydrographic crossing from Fremantle, AUS to Cape Town, SA. Co Chief Scientist. Chief Sci: Brendan Carter. 55 days. CTD ops, drifters, floats.

2023 Arctic Chief Scientist Training Cruise, RV Sikuliaq, Seward, AK to Nome, AK. Chief Scientists: Emily Eidam and Laurie Juranek. 7 days. CTD and coring operations.

2020 FLOTSAM undergraduate cruises, RV Walton Smith, Florida Straits, Chief Scientist: Jim Happell. Two one day cruises. CTD operations and plankton tows.

2019 GO-SHIP I06S, RV Thomas G Thompson, Indian/Southern Ocean, Chief Scientist: Alex Orsi. 42 days. CTD operations, drifter and float deployment.

2018 Agulhas System Climate Array (ASCA), SA Agulhas, Indian Ocean, Chief Scientist: Lisa Beal. 14 days. Mooring recovery, CTD operations.

2016 ASCA, RV Algoa, Indian Ocean, Chief Scientist: Lisa Beal. 14 days. Mooring deployment, CTD operations.

TEACHING EXPERIENCE

Instructor of Record

2024 *Concepts in Physical Oceanography*, UAF
Undergraduate and graduate course for marine science and fisheries students

2024 *Physical Oceanography*, UAF
Graduate course for Oceanography students

2024 *Intro to Marine Science*, UAF
Undergraduate course for Marine Science majors

2022 *The Climate System*, Duke University
Graduate level for a professional Masters of Environmental Management

2019 *Basic Dynamical Oceanography,* University of Cape Town
Two week intensive course at Honours level (1 year degree post BS)

Guest Lecturer

2025 *Being a transgender scientist*, SUNY Potsdam.
2025 *Marine Science and Society*, WWU. Instructor: Nina Whitney
2024 *Life at Sea*, St. Mary's College. Instructor: Christina Goethel
2024 *Marine Science and Society*, WWU. Instructor: Nina Whitney
2023 *Introduction to Physical Oceanography*, UAF. Instructor: Seth Danielson
2022 *Climate Predictability*, NCSU. Instructor: Sarah Larson
2022 *Introduction to Coastal Environments*, NCSU. Instructor: Christopher Osborne
2021 *Introduction to Coastal Environments*, NCSU. Instructor: Christopher Osborne
2019 *Climate Change*, UM. Instructor: Amy Clement

Teaching Assistant

2020 *Introduction to Physical Oceanography*, UM
In person instructor for hybrid course. Lead instructor: Lisa Beal
2018 *Environmental Oceanography*, UM. Instructor: Pamela Reid
2016 *Climate and Global Change*, UM. Instructor: Igor Kamenkovich

Other Teaching Experience

2019 University of Miami Teaching Academy
2016 - 2019 Tutor, Tutorial Resources. Math, sciences, English for grades 6-12

Graduate Student Committees (active)

Nawal O'Keefe, UAF Oceanography
Cece Borries-Strigle, UAF Atmospheric Sciences

Tia Ogus, PhD, NCSU Marine, Earth, and Atmospheric Sciences
Jackie Beight, PhD, UAF Oceanography (Chair)
Savannah Sandy, PhD, UAF Oceanography
Ava Meier, MS, UAF Oceanography (Co chair)

PUBLISHED DATASETS

CESM2 Mechanically Decoupled Model, publicly available on Earth System Grid. DOI: https://doi.org/10.26024/ffeq-wr08

Agulhas System Climate Array in situ volume, temperature, and salt transport twenty six month time series. https://beal-agulhas.earth.miami.edu/data-and-products/index.html

Agulhas System Climate Array cross sectional velocity, temperature, and salinity twenty six month time series. https://beal-agulhas.earth.miami.edu/data-and-products/index.html

SERVICE & OUTREACH

UAF Employee Experience Task Force, 2024
UAF CFOS Awards Committee, 2024
OSM Townhall: Best practices for successful gender-diverse field expeditions, 2024.
NSF reviewer, 2024
Reviewer for *Geophysical Research Letters*, *Scientific Reports*, *Journal of Geophysical Research: Oceans*, *Journal of Climate, Journal of Physical Oceanography, PNAS, Atmosphere*, *Climate Dynamics, Ocean Sciences*, *Nature Climate Change, Nature, Nature Reviews, Communications Earth & Environment*, *Geoscientific Model Development,* IPCC AR6 report.
Maintaining an Environment of Respect Aboard Ships (MERAS) committee member (UNOLS), 2021 - present
International Association for the Physical Sciences of the Ocean, Early Career Scientist working group, committee member, 2019 - 2023
Video “What is it like to be an oceanographer?” for Tacoma Public Schools Online high school students (2023)
Geosciences Education & Mentorship Support (GEMS) mentor
Unlearning Racism in Geosciences (URGE) Pod member, 2021
University of Miami RSMAS Student-Led Evaluations and Development, committee member
Ocean Sciences Bowl 2020 volunteer
Ocean Kids program 2019 volunteer

RESEARCH EXPERIENCE

CTD operations and sampling
Mooring deployment and recovery

Set up, calibration, quality control, and analysis of hydrographic data from CTDs, microCATs, CPIES, ADCPs, Nortek current meters
Interpolation of disparate data sources including mooring, Argo, and satellite
HPC usage
Programing with Matlab, python, cdo, NCL, shell, C++
Code modifications and running of climate models (CESM)
Processing of CCSM and CESM ocean, atmosphere, and sea ice output
Running CESM including coupler modifications and large ensembles
Writing workshop with Dallas Murphy, 2018
Mentoring workshop with Merlin Wahlberg, 2018

PROFESSIONAL MEMBERSHIPS

European Geophysical Union, member
American Meteorological Society, member
The Oceanography Society, member
American Geophysical Union, member

REFERENCES

Lisa Beal, Professor
lbeal@rsmas.miami.edu

Sarah Larson, Assistant Professor
slarson@ncsu.edu

Rana Fine, Professor Emeritus
rfine@rsmas.miami.edu

Brendan Carter, Research Associate
brendan.carter@noaa.gov