Kay McMonigal (he/him or they/them)
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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

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

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

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 student first author

[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

PUBLICATIONS - IN REVIEW

[2] Larson, S., **K. McMonigal,** Y. Okumura, D. Amaya, A. Capotondi, K. Bellomo, I. Simpson, A. Clement, Ocean realism shapes sea surface temperature variability in a CESM2 coupled model hierarchy. In review with *Journal of Advances in Modeling Earth Systems*.

[1] **McMonigal, K.**, S. Larson, S. Hu, R. Kramer, Historical change in wind driven ocean circulation can accelerate global warming. In review with *Geophysical Research Letters.*

PUBLICATIONS - IN PREPARATION

[2] **McMonigal, K.**, Talia Evans, et al (14 authors). Navigating gender at sea, in prep for submission to AGU Advances.

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

INVITED TALKS

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

2022 *The role of the wind driven ocean circulation in climate*
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

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

FUNDED GRANTS

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

2019 **K. McMonigal**: Mary Roche Scholarship. University of Miami. $10,000

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

SUBMITTED GRANTS

2022 NASA, *Quantifying the effect of trends in wind stress driven ocean dynamics on the pattern of ocean heat content warming*
PI: Sarah Larson. I am science PI and named postdoc. I led scientific content and proposal writing. Not funded.

AWARDS & SCHOLARSHIPS

2019 Mary Roche Scholarship, University of Miami
2018 Best physical sciences presentation, Graduate Student Research Symposium, UM
2017 RSMAS Career Development Award, University of Miami
2015 - 2020 University of Miami Graduate School Fellowship
2015 Scymour Schlanger Undergraduate Earth Science Award, EPS
2012 Academic All-Big Ten Student Athlete

SEAGOING EXPERIENCE

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

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

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

Mentoring

Madhi Hasan, PhD student, NCSU
I meet with Mahdi weekly to discuss science results, monitor his progress, and mentor him.

Sam Michlowitz, MS student, NCSU
I meet with Sam weekly. I taught her to use NCSU's HPC system.

Hawke Woznick, undergraduate student, University of Wisconsin-Madison
I mentored Hawke as they applied to graduate programs. They are starting as an MS student at Utah State in Fall 2022.

Lauren Pressley, undergraduate student, NCSU
Lauren worked for 1 semester on understanding the drivers of wintertime tropical instability waves.

Jenna Wilkie & Michael Fredericks, MS students, NCSU statistics department
Jenna and Michael did a statistical consulting project with our group. I was involved in scientific question generation for the project.

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

Reviewer for *Geophysical Research Letters*, *Scientific Reports*, *Journal of Geophysical Research: Oceans*, *Journal of Climate, Atmosphere*, *Ocean Sciences*, *Nature Climate Change, Nature, 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 - present
Geosciences Education & Mentorship Support 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