MATTHEW R. ARCHER

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Research interests*:* boundary currents; submesoscale/mesoscale eddies; near-inertial waves; eddy-mean flow interaction; remote sensing (HF radar, satellite altimetry)

EDUCATION

2010 – 2016 **Ph.D. in Meteorology and Physical Oceanography**
University of Miami, Rosenstiel School of Marine & Atmospheric Sciences, USA
Advisor: Lynn K. Shay

Thesis Title*:* "The Florida Current: Mean Jet Structure, Meandering and Velocity Fluctuations Observed using HF Radar"

2006 - 2009 **B.Sc. in Ocean Science** (1st Class Honors)
University of Plymouth, UK
Advisor: Daniel Conley

Thesis title: "HF radar measurements of wind direction in the South Atlantic Bight"

RESEARCH EXPERIENCE

Nov 2018 – *present* **Postdoctoral Research Scientist**
Jet Propulsion Laboratory, Pasadena, CA, USA
Supervisor: Lee-Lueng Fu

- Working toward the upcoming SWOT wide-swath altimetry mission and CalVal campaign

Jun 2016 – Jul 2018 **Postdoctoral Research Fellow**
School of Mathematics and Statistics, University of New South Wales, Australia
Supervisors: Moninya Roughan and Shane Keating

- Research: East Australian Current structure and variability and its influence on shelf circulation, based on observations from moorings, HF radar, drifters, and satellite imagery
- Project Management: deployment of two new radar sites, from site permits, to installation, and data processing. Inter-organizational planning: use of Slack and conference calling to plan activities between 4 institutions over multiple time zones
- Fieldwork: Led the physical oceanography 'Blue Team' tracking eddies onboard the R/V Investigator during 19d cruise "The Whole Enchilada: From predation to production in Tasman Sea's ecosystems". Obtained 26 drifters from NOAA and Pacific Gyre and deployed in a targeted study to investigate cross-shelf transport driven by an eddy dipole

Aug 2010 – Apr 2016 **Graduate Research Assistant**
Upper Ocean Dynamics Laboratory, RSMAS, University of Miami, USA
Supervisor: Lynn K. Shay

- Analysis of HF radar, satellite imagery, ADCP, and CTD data to study mesoscale and submesoscale variability in the Florida Current
- Fieldwork: regular radar maintenance at three operational sites in South Florida
- Modeling: ran a 2-layer QG model to study effects of a bottom slope on baroclinic instability (class project)

Apr - Aug 2014 **Project Manager | Chief Scientist**
WHARF Experiment (Wave Heights And Currents in the Florida Straits)
Principle Investigator: Lynn K. Shay

- Experiment based around the Student Equipment Grant I was awarded by NortekUSA: the deployment of a subsurface mooring in the Straits of Florida to measure in-situ wave height and current velocity profiles
- Played a key role in the experimental design and writing the proposal manuscript submitted to SECOORA end of 2013
- Collaborated with mooring specialists to design a mooring for 4-month deployment
- Leadership role as Chief Scientist aboard two research cruises onboard the R/V Walton Smith in the Straits of Florida

Apr 2012 **Consultant (**Subcontract to UM)
US Pacific Command: Ship Tracking East of the Philippines Archipelago
Program Manager: Andy Wood | Principle Investigator: Pierre Flament

- Worked in a small consulting team to develop a real-time long-range ship tracking system in the South China Sea.
- Successfully identified dozens of ships, verified by our collaborator Lockheed Martin's aerial unmanned vehicles
- Fieldwork: deployed 16 MHz HF radar system in remote Zambales region of Philippines

Jul - Sep 2009 **Research Intern**
Department of Oceanography, University of Hawaii at Manoa, USA
Supervisor: Pierre Flament

- Processed and analyzed HF radar current and wind data to quantify seasonal patterns in oceanic and atmospheric conditions off the coast of Panay, Philippines.
- Research cruise: 5 days aboard R/V Kilo Moana (*Hawai'i Ocean Time-series*)

Jun - Aug 2008 **Research Intern**
Skidaway Institute of Oceanography, USA
Supervisor: Dana Savidge

- Applied HF radar to map wind direction over the South Atlantic Bight
- Research cruise: 4 days aboard R/V Savannah

TEACHING + MENTORING

2018 **Advisor** to Quentin Baumard (intern at UNSW)

- Undergraduate student at Le Cnam Intechmer, Cherbourg, France
- Project title: "*Quantifying the hydrokinetic energy resource of the East Australian Current using in situ and remote measurements of the ocean current field*"
- I outlined the research project for Quentin based on his interests in ocean engineering and ocean renewable energy. He presented his work as a poster at the Australian Coastal and Oceans Modelling and Observations Workshop

2017-18 **Lecturer** "Topics in Australian Marine Science" at Sydney Institute of Marine Science

- 2 semesters of the Master's degree course. I taught the physical oceanography component (four 1 hour lectures each followed by a 2.5 hour data analysis lab)
- Lectures consisted of introductory physical oceanography topics and data analysis
- I updated the course and created new content, including new datasets to analyze, and the final exam questions

2012-13 **Teaching Assistant** "MSC 243 Weather Forecasting" at University of Miami

- 2 semesters of the Undergraduate degree course with Professor Sharan Majumdar
- Helped prepare homework, gave 2 lectures, graded all homework and exam questions, and answered student questions

KEY SKILLS

Computing:

- *Operating Systems*: Windows, Linux, and Mac.
- *Coding*: Matlab, Python (experienced); Git, FORTRAN, GIS, PERL (familiar)
- *Website*: HTML, CSS
- *Visualization*: the combination of Matlab and PowerPoint has allowed me to make some high quality visualizations (schematics and 3D plots). I am making the switch to Python and Illustrator.

Fieldwork:

In addition to the open ocean research cruises and HF radar installations/maintenance listed under 'Research Experience': numerous day coastal excursions during my bachelor's degree aboard University of Plymouth's R/V Catfish. Experience with side scan sonar, CTD and ADCP deployment. Ex-RYA certified: VHF radio, powerboat handling and sea survival. In my own time I have sailed five trips between Miami and the Bahamas, and once from Panama to Colombia.

Communication:

I am committed to improving my communication of science in all forms – especially publications and oral presentations - and actively seek out opportunities to learn.

- *Writing*: Dallas Murphy Workshop, Nature Masterclass Scientific Writing, MetOcean Solutions Workshop, UNSW Climate Change Research Center Scientific Paper Writing Workshop
- *Oral*: Consortium for Ocean Science Exploration and Engagement (COSEEE) Presentation Bootcamp (standard and advanced)

SERVICE

Reviewer: Journal of Geophysical Research (Oceans), Journal of Physical Oceanography, Journal of Marine Systems

Session Chair at Australian Meteorological and Oceanographic Society (AMOS) Annual Meeting 2018 in Sydney, NSW, Australia. Session Title: "*Ocean Variability on Timescales from Days to Decades*"

Outreach: Gave a talk on oceanography and science at the elementary school Powers Hall Academy to an assembly of 5-11 year olds (2018).

Committee Chair for the Student Travel Fund (2012-2016) **–** Work with the Marine Science Graduate Student Organization (MSGSO) to obtain funds to distribute to unfunded students for travel relating to research

Committee Member for RSMAS Student Seminar Series (2013-2014) **–** Organize and facilitate voting by faculty and students to determine the best annual student seminar and distribute prizes for exceptional presentations

Technical Advisor for National Ocean Sciences Bowl (2012-2013) **–** Physical Oceanography Question Reviewer in Washington DC. I was a judge during the 2013 Miami Ocean Sciences Bowl.

AWARDS + ACTIVITIES

- *Australian Meteorological and Oceanographic Society Annual Meeting 2017* – Scholarship for travel and registration to present
- *IEEE/OES CWTM 2015 Student Award* **–** Scholarship for travel to and registration for the workshop
- *Graduate Student Association Scholarship* – To attend the Dallas Murphy Writing Workshop
- *PICES 2013 Summer School***–** Ocean Observing Systems and Ecosystem Monitoring Summer School. Travel award to Hatfield Marine Science Center, Newport, OR
- *Nortek Student Equipment Award 2013* **–** Awarded an AWAC (Acoustic Wave and Current Profiler) for a 3-month deployment. Travel grant to present at an international conference
- *Harry D. Vernon Scholarship 2013* – For excellence in oceanographic research
- *2012 Ocean Sciences Meeting* (TOC/ AGU/ ASLO) **–** Outstanding Student Presentation Award
- *Weather (Wx) Challenge 2011/ 2012* **-** Graduate Student City Winner
- *Fugro & IMAREST Undergraduate Award 2009***–** Best Student Dissertation

PROFESSIONAL MEMBERSHIPS

American Association for the Advancement of Science (*member since* 2015), American Geophysical Union **(***member since 2014*), The Oceanography Society (*member since 2011*), The Institute of Marine Engineering, Science & Technology (2009 s*tudent member 8008477*)

REFEREED PUBLICATIONS

Archer, M. R., S. R. Keating, M. Roughan, W. E. Johns, R. Lumkpin, F. Beron-Vera, & L. K. Shay, 2018. The kinematic similarity of two western boundary currents revealed by sustained high-resolution observations. In: *Geophysical Research Letters*, 45. https://doi.org/10.1029/2018GL078429

Archer, M. R., Roughan, M., Keating, S. R., & Schaeffer, A., 2017. On the variability of the East Australian Current: Jet structure, meandering, and influence on shelf circulation. Journal of Geophysical Research: Oceans, 122, 8464–8481. https://doi.org/10.1002/2017JC013097

Archer, M. R., Shay, L. K., & Johns, W. E., 2017. The surface velocity structure of the Florida Current in a jet coordinate frame. Journal of Geophysical Research: Oceans, 122, 9189-9208. https://doi.org/10.1002/2017JC013286

Archer, M. R., L. K. Shay, B. Jaimes, & J. Martinez-Pedraja, 2015. Observing frontal instabilities of the Florida Current using high frequency radar, In: Coastal Ocean Observing Systems, Liu, Y., H. Kerkering, R. H. Weisberg, eds. Elsevier. https://doi.org/10.1016/B978-0-12-802022-7.00011-0

Oke, P. R., M. Roughan, P. Cetina-Heredia, G. S. Pilo, K. R. Ridgway, T. Rykova, **M. R. Archer**, R. C. Coleman, C. G. Kerry, C. Rocha, B. M. Sloyan, E. Vitarelli. Revisiting the circulation of the East Australian Current: path, separation and eddy field. *In Review: Progress in Oceanography*

Todd, R. E., F. P. Chavez, S. Clayton, S. Cravatte, M. Goes, M. Graco, X. Lin, J. Sprintall, N. V Zilberman, **M. R. Archer**, et al., (in review), Global Perspectives on Observing Ocean Boundary Current Systems. *In Review: Frontiers in Marine Science* (Special Edition for Ocean Observing '19)

In Prep: **Archer, M. R.,** R. Lumpkin, W. Johns, B. Jaimes & L. K. Shay. Space-time variability and eddy-mean flow interaction in the Florida Current. *Target journal: Journal of Physical Oceanography*

In Prep: **Archer, M. R.**, et al. Frontogenesis and submesoscale variability within the mesoscale eddy field of the Tasman Sea. *Target Journal: Journal of Physical Oceanography.*

NON-REFEREED PUBLICATIONS + GRANTS

Archer, M. R., 2016. The Florida Current: Mean Jet Structure, Meandering, and Velocity Fluctuations Observed with HF Radar. *Open Access Dissertations*: https://scholarlyrepository.miami.edu/oa_dissertations/1648

Archer, M. R., Shay, L. K., & Martinez-Pedraja, J., 2015. Evaluation of WERA HF Radar Observations: Currents, Winds and Waves. In: Current, Waves and Turbulence Measurements (CWTM), 2015 IEEE/OES 11th (pp. 1-9). https://doi.org/10.1109/CWTM.2015.7098148

Shay, L. K., **M. R. Archer**, B. K. Haus & F. Zifteh, 2013. Regional Coastal Ocean Observing System: Evaluating Significant Wave Heights from High Frequency Radars. Proposal to SECOORA for $60,000 (awarded)

Savidge, D., J. Amft, A. Gargett, **M. R. Archer**, D. Conley, G. Volgaris, L. Wyatt & K.-W. Gurgel, 2011. Assessment of WERA Long-Range HF-radar Performance from the User's Perspective. CWTM IEEE/OES 10th, pgs 31-38. https://doi.org/10.1109/CWTM.2011.5759520

Archer, M. R., 2008. WERA HF radar measurements of wind direction in the South Atlantic Bight, B.Sc Ocean Science Dissertation, Uni. Plymouth, 40 pages: https://pdfs.semanticscholar.org/05fa/46f232e385864006ee5dded44d0b911800ea.pdf

CONFERENCES + TALKS

Archer, M. R., 2018. *Observations of Submesoscale Instability in the East Australian Current System* @ Seminar at the University of East Anglia **[seminar]**

Archer, M. R., S.R. Keating, M. Roughan, R. Lumpkin, F. Beron-Vera, & L. K. Shay, 2018. *The similarity of two western boundary currents in a jet coordinate frame* @ AGU/ASLO Ocean Sciences Meeting, Portland, OR, USA **[oral]**

Archer, M. R., S.R. Keating, M. Roughan, R. Lumpkin, F. Beron-Vera, & L. K. Shay, 2018. *Intercomparison of two analogous western boundary currents* @ Australian Meteorological and Oceanographic Society (AMOS) Meeting, Sydney, NSW, Australia **[oral]**

Archer, M. R., M. Roughan, S.R. Keating & A. Schaeffer, 2017. *The East Australian Current: Jet Variability and Influence of Shelf Circulation* @ Australian Meteorological and Oceanographic Society (AMOS) Meeting, Canberra, ACT, Australia **[oral]**

Archer, M. R., M. Roughan, S.R. Keating & A. Schaeffer, 2016. *Meandering of the East Australian Current at 30ºS @* Australian Coastal and Oceans Modelling and Observations (ACOMO) Workshop, Canberra, ACT, Australia **[poster]**

Archer, M. R., L. K. Shay & W. E. Johns, 2015. *HF radar observations of the Florida Current in a Stream Coordinate System @* Radiowave Oceanography Workshop (ROW), Woods Hole, MA, USA. **[oral]**

Archer, M. R., & L. K. Shay, 2015. *The Florida Current in Stream Coordinates: On the Effects of Meandering at 25°N to 26°N @* Asia Oceania Geosciences Society (AOGS) Annual Meeting, Singapore **[oral]**

Archer, M. R., L. K. Shay, B. Jaimes & J. Martinez-Pedraja, 2015. *Coastal Ocean Observing in the Straits of Florida using HF Radar: An Overview of Recent Work @* Southeast Coastal Ocean Observing Regional Association (SECOORA) Annual Meeting, Jacksonville, FL, USA **[poster]**

Archer, M. R., L. K. Shay, B. Jaimes & J. Martinez-Pedraja, 2015. *Evaluation of WERA HF Radar Observations: Currents, Winds and Waves @* IEEE/OES 11th Current, Waves and Turbulence Measurement Workshop, St Petersburg, FL, USA **[oral]**

Archer, M. R., L. K. Shay, & J. Martinez-Pedraja, 2014. *Sensing oceanic cyclones and anticyclones across a western boundary current using WERA high frequency radars* AOGS Annual Meeting, Sapporo, Japan **[oral** presented by L.K. Shay**]**

Archer, M. R., L. K. Shay, B. Jaimes, & J. Martinez-Pedraja, 2014. *A near-inertial signal in a background current with strong horizontal shear: HF radar observations in the Straits of Florida @* Radiowave Oceanography Workshop (ROW), Savannah, GA, USA **[oral]**

Archer, M. R., L. K. Shay, J. Martinez-Pedraja & A. B. Parks, 2012. *Application of High Frequency Radar and the Okubo-Weiss Parameter to Analyze Submesoscale Variability in the Florida Current @* AGU/ASLO Ocean Sciences Meeting, Salt Lake City, UT, USA **[oral]**

Shay, L. K, J. Martinez-Pedraja, M. R. Archer, B. K. Haus, & A. B. Parks, 2012. *Submesoscale Surface Current Variability along the Florida Current @* AGU/ASLO Ocean Sciences Meeting, Salt Lake City, UT, USA **[poster** presented by M. R. Archer**]**

Archer, M. R., & P. Flament, 2009. *HF radar measurements of wind direction in the Sulu Sea: Preliminary results @* The Philippines Straits Dynamics Experiment (PhilEx) Meeting, Honolulu, HI, USA **[oral]**