HILLARY A. SCANNELL

scannell@ldeo.columbia.edu • hillaryscannell.com
Lamont-Doherty Earth Observatory • Columbia University
61 Rte 9W • Palisades, NY 10964

EDUCATION

University of Washington — Seattle, WA
Ph.D. in Oceanography — *2020*

University of Maine — Orono, ME
M.S. in Oceanography — *2014*
B.S. in Marine Science — *2013*

RESEARCH APPOINTMENTS

Lamont-Doherty Earth Observatory at Columbia University — Palisades, NY
Postdoctoral Research Scientist, Climate Data Science Lab — *2020 – Present*

University of Washington — Seattle, WA
Graduate Research Assistant, School of Oceanography — *2015 – 2020*

National Center for Atmospheric Research — Boulder, CO
ASP Graduate Student Visitor, Computational and Information Systems Lab — *Spring 2020*

Tableau Software — Seattle, WA
Research Intern — *Summer 2018*

NOAA Pacific Marine Environmental Laboratory — Seattle, WA
Graduate Research Assistant, Global Tropical Moored Buoy Array Lab — *2015 – 2017*

University of New South Wales — Sydney, NSW
Visiting Research Fellow, Climate Change Research Center — *Summer 2014*

Gulf of Maine Research Institute — Portland, ME
Graduate Research Assistant, Ecosystem Modeling Lab — *2013 – 2015*
Research Intern, Ecosystem Modeling Lab — *Summer 2013*

HONORS & AWARDS

National Center for Atmospheric Research Advanced Study Program Graduate Fellowship — *2020*
Integral Consulting Inc. Environmental Big Data Research Award — *2018*
The New York Times Asia-Pacific Case Competition First Place — *2017*
University of Washington Program on Climate Change Graduate Fellowship — *2015*
National Science Foundation East Asia and Pacific Summer Institute Fellowship — *2014*

TECHNICAL STRENGTHS

Computer Languages	Python (xarray, dask, numpy, scipy), shell scripting, Julia (basic)
Software Contributions	ocetrac, pyqg
Visualization & Design	HoloViz, Bokeh, Cartopy, Matplotlib, LaTeX, HTML
Machine Learning	Scikit-learn, TensorFlow, Keras
Data & Databases	CESM, CMIP5/6, NetCDF, Zarr
Platforms	Azure, GCP, HPC, JupyterLab, VSCode, GitHub

FUNDED PROPOSALS

Scannell, H. A., 2020: National Center for Atmospheric Research Advanced Study Program Graduate Fellowship, $6,000.
Thompson, L. and **H. A. Scannell**, 2020: Following the heat towards large marine ecosystems: AI tools for tracking dangerous marine heatwaves. Leonardo DiCaprio Foundation & Microsoft AI for Earth Innovation Grant, $99,889. [Press Release], [UW eScience Institute Highlight]
Scannell, H. A., 2018–2019: Microsoft AI for Earth Azure Compute Grant, over $15,000 in cloud compute credits.
Scannell, H. A., 2018: Integral Consulting Inc. Environmental Big Data Research Award, $3,764.
Scannell, H. A., 2018: Impacts of El Niño-Southern Oscillation on Indian Ocean heatwaves, National Science Foundation EAPSI/ EPSCoR Co-Funding, $5,070.

PUBLICATIONS

Peer-reviewed:

12. **Scannell, H. A.**, and D. J. Amaya, (2021), The 2019–2020 Northeast Pacific Marine Heatwave [in "State of the Climate in 2020"], *Bull. Amer. Meteor. Soc.*, accepted.

11. **Scannell, H. A.**, L. Thompson, G. C. Johnson, J. M. Lyman, and S. Riser (2020), Subsurface evolution of recent marine heatwaves in the Northeast Pacific, *Geophys. Res. Lett.*, 47, e2020GL090548, DOI: 10.1029/2020GL090548.

10. Sen Gupta, A., M. Thomsen, J. A. Benthuysen, A. J. Hobday, E. Oliver, L. V. Alexander, M. T. Burrows, M. G. Donat, M. Feng, , N. J. Holbrook, S. Perkins-Kirkpatrick, P. J. Moore, R. R. Rodrigues, **H. A. Scannell**, A. S. Taschetto, C. C. Ummenhofer, T. Wernberg, and D. Smale (2020), Drivers and impacts of the most extreme marine heatwaves events, *Sci. Rep.*, 10, 19359, DOI: 10.1038/s41598-020-75445-3.

9. Holbrook, N. J., A. Sen Gupta, E. C. J. Oliver, A. J. Hobday, J. A. Benthuysen, **H. A. Scannell**, D. A. Smale, and T. Wernberg (2020), Keeping pace with marine heatwaves as oceans warm, *Nat. Rev. Earth Environ.*, 1, 482–493, DOI: 10.1038/s43017-020-0068-4.

8. Holbrook, N. J., **H. A. Scannell**, A. Sen Gupta, J. A. Benthuysen, M. Feng, E. C. J. Oliver, L. V. Alexander, M. T. Burrows, M. G. Donat, A. J. Hobday, P. J. Moore, S. E. Perkins-Kirkpatrick, D. A. Smale, S. C. Straub, and T. Wernberg (2019), A global assessment of marine heatwaves and their drivers, *Nat. Commun.*, 10, 2624, DOI: 10.1038/s41467-019-10206-z.

7. Smale, D. A., T. Wernberg, E. C. J. Oliver, M. Thomsen, B. P. Harvey, S. C. Straub, M. T. Burrows, L. V. Alexander, J. A. Benthuysen, M. G. Donat, M. Feng, A. J. Hobday, N. J. Holbrook, S. E. Perkins-Kirkpatrick, **H. A. Scannell** A. Sen Gupta, B. Payne, and P. J. Moore (2019), Marine heatwaves threaten global biodiversity and the provision of ecosystem services, *Nat. Clim. Change*, 9, 306–312, DOI: 10.1038/s41558-019-0412-1.

6. **Scannell, H. A.**, and M. J. McPhaden (2018), Seasonal mixed layer temperature balance in the Southeastern Tropical Atlantic, *J. Geophys. Res. Oceans*, 123, 5557–5570, DOI: 10.1029/2018JC014099.

5. Oliver, E. C. J., M. G. Donat, M. T. Burrows, P. J. Moore, D. A. Smale, L. V. Alexander, J. Benthuysen, M. Feng, A. Sen Gupta, A. J. Hobday, N. J. Holbrook, S. E. Perkins-Kirkpatrick, **H. A. Scannell**, S. C. Straub, and T. Wernberg (2018), Longer and more frequent marine heatwaves over the past century, *Nat. Commun.*, 9, 1324, DOI: 10.1038/s41467-018-03732-9.

4. Pershing, A. J., M. A. Alexander, C. M. Hernandez, L. A. Kerr, A. Le Bris, K. E. Mills, J. A. Nye, N. R. Record, **H. A. Scannell**, J. D. Scott, G. D. Sherwood, and A. C. Thomas (2016), Response to Comments on "Slow adaptation in the face of rapid warming leads to collapse of the Gulf of Maine cod fishery", *Science*, 352(6284), 423, DOI: 10.1126/science.aae0463.

3. **Scannell, H. A.**, A. J. Pershing, M. A. Alexander, A. C. Thomas, and K. E. Mills (2016), Frequency of marine heatwaves in the North Atlantic and North Pacific since 1950, *Geophys. Res. Lett.*, 43, DOI: 10.1002/2015GL067308.

2. Hobday, A. J., L. V. Alexander, S. E. Perkins, D. A. Smale, S. C. Straub, J. Benthuysen, M. T.Burrows, M. G. Donat, M. Feng, N. J. Holbrook, P. J. Moore, E. C. J. Oliver, **H. A. Scannell**, A. Sen Gupta and T. Wernberg (2016), A hierarchical approach to defining marine heatwaves, *Prog. Oceanogr.*, 141: 227–238, DOI: 10.1016/j.pocean.2015.12.014.

1. Pershing, A. J., M. A. Alexander, C. M. Hernandez, L. A. Kerr, A. Le Bris, K. E. Mills, J. A. Nye, N. R. Record, **H. A. Scannell**, J. D. Scott, G. D. Sherwood, and A. C. Thomas (2015), Slow adaptation in the face of rapid warming leads to collapse of the Gulf of Maine cod fishery, *Science*, 350(6262), 809–812, DOI: 10.1126/science.aac9819.

Conference Proceedings:

1. **Scannell, H. A.**, C. Fraley, N. Mannheimer, S. Battersby, and L. Thompson, Predicting marine heatwaves using global climate models with cluster based long short-term memory, 36th International Conference on Machine Learning (ICML), Climate Change: How Can AI Help, June 14, 2019. [Abstract]

White papers:

1. Crosman, K., L. Johnson, E. Petrou, and **Scannell, H. A.**, Safeguarding Pacific Northwest Fisheries from a Warming Climate. *The New York Times*, International Edition, August 2, 2017. [PDF]

GRADUATE COURSEWORK

Computational Methods for Data Analysis	Data Analysis in Water Sciences
Objective Analysis	Data Visualization
Fundamentals of Climate Change	Methods in Physical Oceanography
Ocean Circulation Observations	Physics of Ocean Circulation
Fluid Dynamics I & II	Atmosphere Ocean Interactions
Marine Geology & Geophysics	Waves

MEETINGS, CONFERENCES & WORKSHOPS

SciPy Conference	*2021*
NCAR Artificial Intelligence for Earth System Science Summer School	*2020*
AGU Ocean Sciences Meeting	*2014, 2018, 2020*
Climate Change AI Workshop, NeurIPS, Vancouver, B.C., Canada	*2019*
PICES Annual Meeting, Victoria, B.C., Canada	*2019*
Microsoft AI for Earth Summit, Redmond, WA	*2019*
The Pangeo 2019 US Community Meeting, Seattle, WA	*2019*
US CLIVAR Large Ensembles Workshop, Boulder, CO	*2019*
Physics Informed Machine Learning Workshop, Seattle, WA	*2019*
8th International Workshop on Climate Informatics, Boulder, CO	*2018*
The 97th AMS Annual Meeting, Seattle, WA	*2017*
Program on Climate Change Spring Symposium, Seattle, WA	*2017*
AGU Fall Meeting, San Francisco, CA	*2014, 2016*

Graduate Climate Conference, Pack Forest, WA *2014, 2016*
Pacific Anomalies Workshop 2, Seattle, WA *2016*
Program on Climate Change Summer Institute, Friday Harbor, WA *2016*
Regional Association for Research on the Gulf of Maine, Portsmouth, NH *2013*

SERVICE & OUTREACH

Co-Chair
- Program on Climate Change Summer Institute on Climate Extremes *2020*
- Ocean Sciences Meeting, Session on Marine Heatwaves & Ocean Biogeochemical Extremes *2020*
- University of Washington Graduate Climate Conference *2016*

Organizer
- Program on Climate Change Spring Symposium *2017 – 2018*

Referee
- SciPy Conference Program Committee *2021*
- NeurIPS Climate Change AI Workshop Program Committee *2019*
- Academic Journals: *2017 – Present*
  Climate Dynamics, *Geophysical Research Letters*, *Journal of Climate*, *Journal of Geophysical Research-Oceans*, *Nature Communications Earth & Environment*

Volunteer
- Graduate Student Steering Committee for the Program on Climate Change *2016 – 2018*
- Contributing Author, oceanbites.org *2014 – 2015*

TEACHING

Graduate Teaching Assistant
University of Washington, School of Oceanography
- OCEAN 201: Introduction to Oceanography, 2018, 2019
- OCEAN 285/286: Physics Across Oceanography: Fluid Mechanics and Waves, 2018
- OCEAN 320: Coastal Oceanography, 2018
- OCEAN 215: Methods of Oceanographic Data Analysis, 2016

University of Maine, School of Marine Science
- SMS 420: Oceans and Climate Change, 2014
- SMS 204: Integrative Marine Science II: Physics and Chemistry of Marine Systems, 2013

SELECTED PRESENTATIONS

Invited Talks:

12. Scannell, HA. Drivers and mechanisms of marine heatwaves in the Northwest Atlantic. NOAA Eastern Region Climate Services Webinar: remote. July 2021. [Replay]
11. Scannell, HA. New insights into the spatiotemporal connectivity of marine heatwaves globally. NCAR Climate & Global Dynamics Seminar Series: remote. April 2021. [Replay]
10. Scannell, HA. West Coast Marine Heatwaves, Olympic Coast National Marine Sanctuary Advisory Council Meeting: remote. September 2020.
9. Scannell, HA. Defining and Characterizing Marine Heatwaves for Prediction. US CLIVAR Predictability, Predictions, and Applications Interface Panel Summer Meeting: remote. July 2020.
8. Scannell, HA. Integrating machine learning with traditional approaches in ocean science. Gulf of Maine Research Institute: Portland, ME. November 2019.
7. Scannell, HA, SC Riser, L Thompson, and G Johnson. The 2019 reappearance of the Northeast Pacific marine heatwave, Physical Oceanography Seminar. School of Oceanography, University of Washington: Seattle, WA. November 2019.

6. Rising Toll of Marine Heatwaves. Water & Salmon Committee of the Washington State Sierra Club: Seattle, WA. April 2019.

5. Scannell, HA. Marine heatwaves threaten global biodiversity and the provision of ecosystem services. NOAA-Northwest Fisheries Science Center: Seattle, WA. March 2019.

4. Scannell, HA. Taking a holistic view of marine heatwaves globally. NOAA Alaskan Fisheries Science Center: Seattle, WA. March 2017

3. Scannell, HA. Marine Heatwaves: Emerging climate phenomena. Sound Waters University: Langley, WA. February 2017

2. Scannell, HA, MH England, and A Sen Gupta. Climatic influences on extra-tropical marine heatwaves. Commonwealth Scientific and Industrial Research Organization, Oceans and Atmosphere Flagship Seminar Series: Perth, Western Australia. January 2015.

1. Scannell, HA, MH England, and A Sen Gupta. The ocean heatwave phenomenon and the climatic mechanisms at play. Climate Change Research Center Seminar, University of New South Wales: Sydney, Australia. August 2014.

Conference Talks:

4. Scannell, HA, L Thompson, DB Whitt, DJ Gagne, and RP Abernathey. Ocetrac: morphological image processing for monitoring ocean temperature extremes. SciPy Conference: remote. July 2021. [Replay]

3. Scannell, HA, SC Riser, L Thompson, and G Johnson. The 2019 reappearance of the Northeast Pacific marine heatwave. Ocean Sciences Meeting: San Diego, WA. February 2019.

2. Scannell, HA, and MJ McPhaden. Seasonal mixed layer heat budget in the Southeast Tropical Atlantic. Ocean Sciences Meeting: Portland, Oregon. February 2018.

1. Scannell, HA, and MJ McPhaden. Mechanisms controlling the seasonal mixed layer heat budget in the southeast Tropical Atlantic. Program on Climate Change Spring Symposium, University of Washington: Seattle, WA. April 2017.

Conference Posters:

8. Scannell, HA, L Thompson, W Cheng, and E Maroon. Characterization of marine heatwaves in the CESM Large Ensemble. US CLIVAR Large Ensembles Workshop, NCAR: Boulder, CO. July 2019.

7. Scannell, HA, and MJ McPhaden. Seasonal mixed layer heat budget in the southeast tropical Atlantic. American Meteorological Society Annual Meeting: Seattle, WA. January 2017.

6. Scannell, HA, and MJ McPhaden. Seasonal mixed layer heat budget in the southeast tropical Atlantic. AGU Fall Meeting: San Francisco, CA. December 2016.

5. Scannell, HA, and MJ McPhaden. Seasonal mixed layer heat budget in the southeast tropical Atlantic. Graduate Climate Conference: Pack Forest, WA. October 2016.

4. Scannell, HA, MH England, and A Sen Gupta. Climatic influences on Indian and Pacific Ocean heatwaves. AGU Fall Meeting: San Francisco, CA. December 2014.

3. Scannell, HA, MH England, and A Sen Gupta. Quasi-decadal variability of ocean heatwaves in the Southern Hemisphere extra-tropics. Graduate Climate Conference: Pack Forest, WA. November 2014.

2. Scannell, HA, AJ Pershing, and KE Mills. Frequency of ocean heatwaves occurring in the Atlantic and Pacific Oceans. Ocean Sciences Meeting: Honolulu, HI. February 2014.

1. Scannell, HA, AJ Pershing, and KE Mills. Likelihood of an ocean heatwave in the northwest Atlantic Ocean. Regional Association for Research on the Gulf of Maine: Portsmouth, NH. October 2013.

SELECTED INTERVIEWS

2021

Nature: Fevers are plaguing the oceans — and climate change is making them worse

2019

National Public Radio: Earth's Oceans Are Getting Hotter And Higher, And It's Accelerating
The Washington Post: The 'Blob' is surging back in the Pacific, leading to fears of mass die-offs of marine life and unusual weather patterns
InsideClimate News: A Marine Heat Wave Intensifies, with Risks for Wildlife, Hurricanes and California Wildfires
Forbes: Another 'Warm Blob' Is Forming In The Pacific Ocean
InsideClimate News: 5 Science Teams Racing Climate Change as the Ecosystems They Study Disappear

2018

EOS Earth & Space Science News: Why Is the Gulf of Maine Warming Faster Than 99% of the Ocean?
Carbon Brief: Restricting global warming to 1.5C would 'halve' risk of marine heatwaves

2017

UW Today: The New York Times recognizes UW student policy recommendations
The Daily: Understanding the blob and 65 years of hot water

2016

Weather Underground: The North Atlantic Blob: A Marine Cold Wave That Won't Go Away
NBC KING 5 News: Global 'blobs' getting more extreme
Hakai Magazine: Revenge of the Blob
German National Public Radio: Heatwaves at Sea