Earthmover PBC
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Deepak A. Cherian

Education

2016: Ph.D., MIT-WHOI Joint Program in Oceanography, Physical Oceanography

2010: M.Tech. & B.Tech. (Hons.), Ocean Engineering & Naval Architecture, Indian Institute of Technology, Kharagpur.

Positions

2023 Sep – Present: Forward Engineer, Earthmover PBC

2023 Mar – 2024 Sep: Project Scientist II, NSF National Center for Atmospheric Research

2020 Nov – 2021 Nov: part-time parental leave

2020 Jan – 2023 Mar: Project Scientist I, NSF National Center for Atmospheric Research

2019 Mar – 2020 Jan: Postdoctoral Fellow, NSF National Center for Atmospheric Research

2017 Jan – 2019 Mar: Research Associate (Post-Doc), Oregon State University

2016 Sep – 2017 Jan: Postdoctoral Investigator, Woods Hole Oceanographic Institution

2010–2016: Graduate research assistant, Massachusetts Institute of Technology & Woods Hole Oceanographic Institution

Articles

Cherian, D. A., Guo, Y., Bryan, F. O. (2024). "Assessing Modeled Mesoscale Stirring Using Microscale Observations." Journal of Physical Oceanography, 54(5): 1183–1194.

Morris, D., Cherian, D.A., Castruccio, F., Kleypas, J., Krumhardt, K., Moulton, M., Williamson, R. D., Zohdy, S., Dunning, K., Davidson, C. (2024). "How changes projected by climate models can inform climate adaptation and marine sanctuary management: A collaborative prototype methodology." Journal of Environmental Management, 368, 121953.

Moum, J. N., Smyth, W. D., Hughes, K. G., Cherian, D. A., Warner, S. J., Bourlès, B., Brandt, P., Dengler, M. (2023). "Wind Dependencies of Deep Cycle Turbulence in the Equatorial Cold Tongues." Journal of Physical Oceanography, 53(8): 1979–1995.

Moum, J. N., Hughes, K. G., Shroyer, E. L., Smyth, W. D., Cherian, D.A., Warner, S. J., Bourlès, B., Brandt, P., Dengler, M. (2022). "Deep Cycle Turbulence in Atlantic and Pacific Cold Tongues." Geophysical Research Letters, 49(8).

Whitt, D. B., Cherian, D. A., Holmes, R. M., Bachman, S. D., Lien, R.-C., Large, W. G., Moum, J. N. (2022). "Simulation and Scaling of the Turbulent Vertical Heat Transport and Deep-Cycle Turbulence across the Equatorial Pacific Cold Tongue." Journal of Physical Oceanography, 52(5), 981–1014.

Philipps, H.E., et. al. (2021) "Progress in understanding of Indian Ocean circulation, variability, air-sea exchange and impacts on biogeochemistry". Ocean Science Discussions (17) : 1677–1751.

Shroyer, E.L., et. al. (2021) "Bay of Bengal Intraseasonal Oscillations and the 2018 Monsoon Onset". Bull. Amer. Meteor. Soc. 102 (10): E1936-E1951.

Cherian, D.A., Whitt D.B., Holmes, R.M., Lien, R.-C., Bachman, S.D., Large, W.L. (2021). "Off-equatorial deep cycle turbulence forced by Tropical Instability Waves in the equatorial Pacific". Journal of Physical Oceanography. 51 (5): 1575–1593.

Rypina, I.I., Pratt, L.J., Entner, S., Anderson, A., Cherian. D.A. (2020). "The Influence of an Eddy in the Success Rates and Distributions of Passively Advected or Actively Swimming Biological Organisms Crossing the Continental Slope". Journal of Physical Oceanography 50 (7): 1839–1852.

Cherian, D.A., Shroyer, E.L., Wijesekera, H.W. and Moum, J.N. (2020). "The seasonal cycle of upper-ocean mixing at 8°N in the Bay of Bengal". Journal of Physical Oceanography 50: 323–342

Cherian, D.A. and Brink, K.H. (2018). "Shelf flows forced by deep-ocean anticyclonic eddies at the shelfbreak". Journal of Physical Oceanography. 48 (5): 1117–1138

Cherian, D.A. and Brink, K.H. (2016) "Offshore Transport of Shelf Water by Deep-Ocean Eddies.", Journal of Physical Oceanography 46 (12): 3599–3621

Brink, K.H. and Cherian, D.A. (2013) "Instability of an idealized tidal mixing front: Symmetric instabilities and frictional effects." Journal of Marine Research 71 (6): 425–450.

Haine, T.W.N. and Cherian, D.A. (2013) "Analogies of Ocean/Atmosphere Rotating Fluid Dynamics with Gyroscopes: Teaching Opportunities." Bull. Amer. Meteor. Soc. 94: 673–684.

Funding

Co-I 2023-2028 ONR Arabian Sea Transition Layer Departmental Research Initiative.
"High resolution coupled modeling and data assimilation for improved understanding of transition layer processes in the Arabian Sea Warm Pool"

Co-I 2022-2025 NOAA Climate Variability and Predictability.
"Developing a framework for a field campaign in the cold tongue: Analysis of Pacific Upwelling and Mixing Physics from models and observations."

Co-PI 2022-2025 NASA Open Source Tools, Frameworks, and Libraries.
"Enhancing analysis of NASA remote sensing datasets with Xarray"

Co-I 2020-2021 Chan Zuckerberg Initiative Essential Open Source Software.
"Xarray: Multidimensional Labeled Arrays and Datasets in Python"

lead-PI, 2019-2022 NASA Physical Oceanography.
"Relating SSHA-derived Eddy Diffusivity to In-situ Estimates from Microstructure and ECCO."

Invited Talks

"*What can a data commons learn from the open science software commons?*"
2024: Innovations in Open Science (IOS) Planning Workshop: Community Expectations for a Geoscience Data Commons. NCAR.

"*cf-xarray: Scale your analysis across datasets with less data wrangling and more metadata handling*"
2023: AGU Fall Meeting.

"*Seasonal cycle of mixing in the Bay of Bengal*"
2022: (talk) Prediction and Variability of Air-Sea Interactions: the South Asian Monsoon, ICERM Workshop.

"*Open-Sesame: open your science with Pangeo*"
2022: (talk) Ocean Sciences Meeting.

"*Off-equatorial deep-cycle turbulence forced by Tropical Instability Waves in the equatorial Pacific*"
2020: Department of Marine & Coastal Sciences Seminar Series, Rutgers University.
Physical Oceanography Seminar, University of Washington

"*When a deep-ocean eddy meets shelf-slope topography.*"
2019 : Gordon Research Conference, Coastal Ocean Dynamics.

Talks & Posters

"*Property Testing for ocean models*"

2024: ▶ NSF NCAR CGD Oceanography Section Day of Celebration.

"*Fast & Furious GroupBy Calculations at Scale with Flox, Dask, and Xarray.*"

2023 AMS Annual Meeting.

"*Looking for mesoscale stirring in microstructure.*" — presented at

2022: Gordon Research Conference, Ocean Mixing, 2022
(talk) Eddy Mixing Climate Processes Team Meeting
Ocean Sciences Meeting, 2022

"*flox: fast and furious GroupBy reductions with Dask at Pangeo scale.*" — presented at

2021: ▶ Pangeo Showcase
Dask Distributed Summit

"*Off-equatorial deep cycle turbulence forced by Tropical Instability Waves in the equatorial Pacific*" — presented at

2021: ▶ Climate & Global Dynamics Laboratory Seminar, NCAR.
2020: (talk) AGU General Meeting, 2020
University of British Columbia, Physical Oceanography Seminar
(talk) Ocean Sciences Meeting, 2020 - San Diego

"*The seasonal cycle of upper-ocean mixing in the Bay of Bengal*" — presented at

2019: Massachusetts Institute of Technology, Sack Lunch Seminar
Woods Hole Oceanographic Institution, Physical Oceanography Seminar
National Center for Atmospheric Research, CGD seminar
Oregon State University, CEOAS seminar
2018: (poster) Gordon Research Conference, Ocean Mixing
(talk) Ocean Sciences Meeting, 2018 – Portland

"*Shelf flows forced by mesoscale eddies at the shelfbreak*" — presented at

2017 : (poster) Gordon Research Conference – Coastal Ocean Dynamics

"*Offshore export of shelf water by deep-ocean eddies*" — presented at

2017: National Taiwan University
Oregon State University, CEOAS seminar
2016: Indian Institute of Science, College of Ocean and Atmospheric Sciences
(talk) Ocean Sciences Meeting, 2016 – New Orleans

"*Arresting an eddy's cross-isobath translation*" — presented at

2016: Oregon State University, CEOAS seminar

Massachusetts Institute of Technology, Sack Lunch Seminar

2015: (talk, poster) Gordon Research Conference – Coastal Ocean Modeling

Teaching, Mentoring, Outreach

2024↗: Mentor and Supervisor, Earthmover Developer Relations Internship.

2021, 2022↗, 2023: Project Mentor, NCAR CISL Summer Internships in Parallel Computer Science (SIParCS).

2022: Mentor, Promoting Geoscience, Research, Education and Success Program (PROGRESS).

2022: Mentor, AGU Geosciences Education & Mentorship Support Program (GEMS).

2020: ▶ Coiled Science Thursday Livestream Series: Demo on "Scalable computing in oceanography.".

2023: ▶ 2023 Unidata Users Workshop: Invited tutorial on levearging Climate and Forecast (CF) convention metadata for analytics.

2020, 2023 SciPy Conference: Tutorial on python package `xarray`

2020, 2022 OceanHackWeek: Invited tutorial on python package `xarray` for analysis of geoscience datasets.

2019 Project Mentor, Monsoon Air-Sea Interactions Winter School. International Center for Theoretical Studies, Bangalore, India

2017 Winter Term: Guest Lecture for "Geophysical Waves" , (graduate level course), Oregon State University

Service

2022–present: Member, NASA Physical Oceanography Distributed Active Archive Center (PO.DAAC) User Working Group.

2020–2023: Co-lead, NCAR Earth System Data Science Initiative.

2022: Subject Matter Expert, NASA Earth System Observatory Independent Review Board.

2021, 2022, 2024: External reviewer for the NSF Physical Oceanography panel.

Reviewer for Ocean Science, Geophysical Research Letters, Journal of Geophysical Research - Oceans, Journal of Marine Research, and Journal of Physical Oceanography.

Core maintainer and community leader for open source scientific Python packages in the Pangeo ecosystem spanning storage, compute, and analysis layers: `xarray`, `xgcm`, `cf_xarray`, `flox`, `zarr`.

Published articles describing scalable data analytics techniques on NCAR's Earth System Data Science blog.

Assistance with parallel scaling of analysis workflows on various public forums; e.g. Xarray Github Discussions, Pangeo Discourse forum, various NCAR internal channels.

Software

Experience with configuring, running, and analyzing various ocean models in both idealized and realistic configurations including the Regional Ocean Modeling System (ROMS), MIT General Circulation Model (MITgcm), Estimating the Climate and Circulation of the Oceans (ECCO), and the Community Earth System Model (CESM).

Extensive experience with parallel analysis of large datasets using scientific Python packages on HPC and cloud computing systems e.g. `Dask, NumPy, Pandas, xarray`; extensive experience with MATLAB

Additional Training

2020 Diversity leadership training summit organised by UCAR Human Resources and the Office for Diversity, Equity and Inclusion.

2014 Coastal and Estuarine Field Methods Summer School,
Woods Hole Oceanographic Institution

2013 Teaching Certificate Program, Massachusetts Institute of Technology

2012 Estuarine and Coastal Fluid Dynamics Summer School,
University of Washington Friday Harbor Laboratories

Fieldwork

2018 Sep: *R/V Thomas G. Thompson*, Western Pacific. PI: Jim Moum (OSU)

2017 Feb: *R/V Roger Revelle*, South China Sea. PI: Lou St-Laurent (WHOI)

2014 July: *R/V Tioga*, off Martha's Vineyard. (student-run cruise for summer school)
PI: Deepak Cherian, Jonathan Fincke, Cara Manning (WHOI).

2013 Nov: *R/V Roger Revelle*, Bay of Bengal. PI: Emily Shroyer (OSU)

2011 July: *SSV Corwith Cramer*, Middle Atlantic Bight. PI: Donglai Gong (WHOI)