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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, 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

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

Open-Science Contributions

Mentoring

2024: Mentor and Supervisor, Earthmover Developer Relations Internship.

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

Service

2022–present: Member, NASA Physical Oceanography Distributed Active Archive Center (PO.DAAC) User Working Group with particular focus on assisting in PO.DAAC's transition to the cloud.

2020–2023: Co-lead, NSF NCAR Earth System Data Science Initiative, founded to accelerate NCAR's transition to Python and modern open-source scientific practices.

2022: Open-Science Subject Matter Expert, NASA Earth System Observatory (ESO) Independent Review Board. Reviewed data systems and open-science facilitation plans for future NASA science mission.

Teaching, Publications

2025: Tutorial on *"Zarr, Icechunk, & Xarray for Cloud-native Geospatial Data-cube Analysis"*. Cloud-Native Geospatial Conference.

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

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

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

Cherian, D. A., Almansi, M., Bourgault, P. (2021). *"cf-xarray: Scale your analysis across datasets with less data wrangling and more metadata handling"* Proceedings of the 2021 EarthCube Annual Meeting. Reproducible Jupyter Notebook.

Helped raise funding for, and led significant overhaul of the Xarray tutorial material with the aim of enabling community members to deliver the material.

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

2017–present: Core maintainer and community leader for open source scientific Python packages in the Pangeo ecosystem spanning storage, compute, and analysis layers: `xarray`, `icechunk`, `flox`, `zarr`, `cf_xarray`, `xgcm`.

Funding

Co-I 2024-2026 Chan Zuckerberg Initiative Essential Open Source Software Cycle 6. "Supporting the adoption of Xarray in the biomedical research community."

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 Cycle 2. "Xarray: Multidimensional Labeled Arrays and Datasets in Python"

Talks

2025 "*Zarr for Cloud-native Geospatial. When and Why?*". Cloud-Native Geospatial Conference.

2025 "*Earthmover: Accelerating frictionless accessibility for the Earth Sciences*" NSF NCAR CISL Seminar.

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

2024 [invited]: '*zarr: cloud-native n-dimensional array storage*" NSF Ocean Observatories Initiative Facility Board (OOIFB) and Data Systems Committee (DSC) Meeting.

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

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

2023 "*Fast & Furious GroupBy Calculations at Scale with Flox, Dask, and Xarray.*". AMS Annual Meeting 2023.

Academic Contributions

Articles

Cherian, D. A. (2025). "Property testing for Ocean Models: Can we specify it?" Invited submission to Electronic Proceedings in Theoretical Computer Science.

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-PI 2023-2028 NSF Cyberinfrastructure for Sustained Scientific Innovation. " Frameworks: A community platform for accelerating observationally-constrained regional oceanographic modeling"

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."

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

Invited Talks

"*Property testing for ocean models: Can we specify it?*"
2025: VSS 2025: International Workshop on Verification of Scientific Software.

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

Monsoon, ICERM Workshop.

"*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.

"*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

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.".

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

Other Service

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.