Héctor A. **Inda Díaz**

Physicist, ocean and atmosphere modeler, climate scientist interested in climate change, extreme events, ocean and atmosphere dynamics, high-performance computing, climate risk, and data analysis. Python, programming and open-source software enthusiast.

Postdoctoral Scholar at Lawrence Berkeley National Laboratory

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Professional preparation

Data Science Certification *2023*

The Data Incubator

- Data Science Fellowship

Ph.D. Atmospheric Sciences *2015-2022*

University of California Davis, Davis, California

- Focus on atmospheric dynamics, extreme weather events (heat waves and atmospheric rivers), numerical modeling, and big data analysis

M.S. Physical Oceanography *2012-2014*

Ensenada Center for Scientific Research and Higher Education (CICESE), Baja California, México

- Focus on numerical modeling, Lagrangian dynamics, and connectivity over the Mexican Pacific Ocean

B.S. Physics *2006-2012*

National Autonomous University of México (UNAM), México City, México

- Focus on biophysics: numerical modeling of cardiac ischemic tissue

Experience

Research

Research Associate *July 2023 - Present*

Eagle Rock Analytics

Support developing and performing novel research on cloud-based climate and weather data platforms for multiple State of California agencies (e.g., energy and climate-adjacent).

Support the development of the Cal-Adapt: Analytics Engine, and the associated historic data platform weather station data, and early work to develop a climate risk index with the California Air Resources Board.

Support the identification of climate projection data relevant to UCSD's facilities and operations necessary for assessing climate vulnerabilities and potential climate impacts as part of the UCSD Decarbonization, Electrification, and Sustainability Planning Study.

- Supervisor: Dr. Owen Doherty

Postdoctoral Researcher *June 2022 - Present*

Earth and Environmental Science Area, LBNL

Calibrated and Systematic Characterization, Attribution and Detection of Extremes Scientific Focus Area (CASCADE SFA)

UC Berkeley Monsoon Extremes Project

Research on precipitation extremes associated with the North American monsoon (NAM) system, utilizing the regional refined mesh capabilities in the Energy Exascale Earth System Model (RRM-E3SM) to understand its skill in representing the NAM and how the NAM may be altered by climate change in the coming decades under plausible emissions scenarios and/or warming levels.

- Supervisor: Dr. Alan Rhoades

Ph.D. Thesis dissertation *June 2022*

Atmospheric Science Graduate Group. UC Davis

CASCADE project. Lawrence Berkeley National Laboratory (LBNL)

Using Long Term Composites and Objective Tracking to Assess The Spatiotemporal Characteristics, Variability, and Future Changes in Atmospheric Rivers

`https://escholarship.org/uc/item/3bm3n2nr`

• Supervisor: Dr. Travis A. O'Brien

Graduate Student Research Assistant (GSRA) *August 2016 – December 2021*

Calibrated and Systematic Characterization, Attribution, and Detection of Extremes (CASCADE)

Earth & Environmental Sciences Area, LBNL, Berkeley, California

• Supervisors: Dr. William D. Collins and Dr. Travis A. O'Brien

Graduate Student Researcher (GSR) *August 2015 – January 2016*

Study of the San Francisco Bay outflow using data in situ

Bodega Bay Marine Laboratory, University of California Davis

• Supervisor: Dr. John Largier

M.S. Thesis dissertation *September 2013 – April 2015*

"Lagrangian characteristics and connectivity in the Mexican Pacific Ocean"

Laboratory of Numerical Modeling of the Ocean, Department of Physical Oceanography, CICESE

Lagrangian Characteristics and Connectivity in the Mexican Eastern Pacific

`https://cicese.repositorioinstitucional.mx/jspui/handle/1007/1240`

• Supervisor: Dr. Alejandro Parés Sierra

B.S. Thesis dissertation *September 2011 – August 2012*

"Discordant alternans in a ischemic cardiac tissue"
Laboratory for Biophysics and Excitable Systems, School of Sciences, UNAM

Discordant Alternans inside an Ischemic Cardiac Tissue Ring

`https://ru.dgb.unam.mx/handle/DGB_UNAM/TES01000682927`

• Supervisor: Dr. Jorge Humberto Arce Rincón

Teaching

Teacher Assistant *March 2021 – June 2021*

The art of climate modeling

Department of Land, Air, and Water Resources, University of California Davis

Teacher Assistant *March 2018 – June 2018*

Python for environmental scientists

Department of Land, Air, and Water Resources, University of California Davis

Teacher Assistant *March 2017 – June 2017*

Python for environmental scientists

Department of Land, Air, and Water Resources, University of California Davis

Teacher Assistant *January 2014 – April 2014*

Fluid dynamics

Department of Physical Oceanography, CICESE

Teacher Assistant *August 2011 – February 2012*

Fluid Dynamics and Continuous Medium Physics

Department of physics, School of Sciences, UNAM

Teacher Assistant *January 2011 – August 2011*

Computer sciences for physics

Department of physics, School of Sciences, UNAM

Teacher Assistant *January 2011 – August 2011*

Algebra for physics

Department of mathematics, School of Sciences, UNAM

Skills

Programing languages

Python | C | C++ | Fortran | Matlab | Ferret | Bash | CDO | NCO | High-performance computer systems
CUDA | NCL | Perl | R

Python's frameworks, libraries, and others

Jupyter | Dask Slurmcluster | Numpy | NetCDF4 | Pandas | Scikit-learn | Scipy | Numba | Cython | Matplotlib
Shapely | Fiona | mpi4py | xarray | PyNco | Seawater | Cartopy | Tensorflow | AWS | PyTorch | Among others

Numerical modeling for the ocean and the atmosphere

Weather Research and Forecasting Model (WRF) | Regional Climate Model System (RegCM)
Community Earth System Model (CESM) | Energy Exascale Earth System Model (E3SM)
Regional Refined Model E3SM (RRM-E3SM)
Regional Ocean Modeling System (ROMS) | Coastal and Regional Ocean COmmunity model (CROCO)

Languages

English | Spanish

Main presentations

International Atmospheric Rivers Conference *Santiago, Chile, October 202*

"Relationship Between Atmospheric Rivers and the Dry Season Extreme Precipitation in Central-Western Mexico"

"Change in Size of Atmospheric Rivers Under Future Climate Scenarios. A Perspective Independent of the Detection Algorithm Extreme Precipitation in Central-Western Mexico"

American Geophysical Union Fall Meeting *New Orleans, Louisiana, December 2021*

"Characterizing the size of Atmospheric Rivers using a perspective independent from the detection algorithm"

American Geophysical Union Fall Meeting *New Orleans, Louisiana, December 2021*

*"Anthropogenic and Meteorological Contributions to the 2021 Pacific Northwest Heatwave"

American Geophysical Union Fall Meeting *San Francisco, California, December 2019*

*"The Importance of Uncertainty in the Detection of Weather Events: Probabilistic Detection of Atmospheric Rivers"

3rd Atmospheric River Tracking Method Intercomparison Project Workshop. *Berkeley, CA, October 2019*

"Characterizing the size, Lagrangian properties, and coherent structures of atmospheric rivers"

Mexican Geophysical Union Annual Meeting *Puerto Vallarta, México, October 2019*

"Assessing the atmospheric rivers size independently from the detection algorithm"

American Geophysical Union Fall Meeting *New Orleans, Louisiana, December 2017*

"Contrasting self-aggregation over land and ocean surfaces"

American Geophysical Union Fall Meeting *San Francisco, California, December 2016*

"The anthropogenic influence on heat and humidity in the US Midwest"

Mexican Geophysical Union Annual Meeting *Puerto Vallarta, México, October 2014*

"Connectivity patterns in the Mexican Ocean Pacific coast, a numerical study"

7th International Meeting of Students in Physical Oceanography *Ensenada, México, November 2014*

"Connectivity patterns in the Mexican Ocean Pacific coast"

American Geophysical Union Fall Meeting *San Francisco, California, December 2014*

"Numerical Study of Surface Connectivity in the Eastern Mexican Pacific"

Mexican Physical Society 2011 Annual Meeting *Mérida, México, November 2011*

"Numerical modeling of a ring of ischemic cardiac tissue"

Main publications

O'Brien, T. A., Payne, A. E., Shields, C. A., Rutz, J., Brands, S., Castellano, C., Chen, J., Cleveland, W., DeFlorio, M. J., Goldenson, N., Gorodetskaya, I. V., **Inda-Díaz, H. A.**, Kashinath, K., Kawzenuk, B., Kim, S., Krinitskiy, M., Lora, J. M., McClenny, B., Michaelis, A., ... Zhou, Y. (2020). Detection Uncertainty Matters for Understanding Atmospheric Rivers. Bulletin of the American Meteorological Society, 101(6), E790–E796. https://doi.org/10.1175/bams-d-19-0348.1.

O'Brien, T. A., Risser, M. D., Loring, B., Elbashandy, A. A., Krishnan, H., Johnson, J., Patricola, C. M., O'Brien, J. P., Mahesh, A., Arriaga Ramirez, S., Rhoades, A. M., Charn, A., **Inda Díaz, H.A.**, & Collins, W. D. (2020). Detection of atmospheric rivers with inline uncertainty quantification: TECA-BARD v1.0.1. Geoscientific Model Development, 13(12), 6131–6148. https://doi.org/10.5194/gmd-13-6131-2020.

Inda Díaz, H. A., O'Brien, T. A., Zhou, Y., & Collins, W. D. (2021). Constraining and Characterizing the size of Atmospheric Rivers: A perspective independent from the detection algorithm. Journal of Geophysical Research: Atmospheres. https://doi.org/10.1029/2020jd033746.

T. A. O'Brien, M. F. Wehner, A. E. Payne, C. A. Shields, J. J. Rutz, L.R. Leung, F. M. Ralph, A. Collow, I. Gorodetskaya, B. Guan, J. M. Lora, E. McClenny, K. M. Nardi, A. M. Ramos, R. Tomé, C. Sarangi, E. J. Shearer, P. A. Ullrich, C. Zarzycki, B. Loring, H. Huang, **H. A. Inda-Díaz**, A. M. Rhoades, Y. Zhou, (2022). Increases in Future AR Count and Size: Overview of the ARTMIP Tier 2 CMIP5/6 Experiment. Journal of Geophysical Research: Atmospheres. https://doi.org/10.1029/2021JD036013.

Inda Díaz, H. A. and O'Brien, T. A.(2023). Relationship between atmospheric rivers and the dry season extreme precipitation in central-western Mexico. ESS Open Archive. (Submitted to JGR Atmospheres). doi:10.22541/essoar.167751636.68895308/v1.

Alan M. Rhoades, Colin M. Zarzycki, **Héctor A. Inda-Díaz**, Mohammed Ombadi, et al. (2023). Recreating the California New Year's flood event of 1997 in a regionally refined Earth system model. Journal of Advances in Modeling Earth Systems, 15, e2023MS003793. https://doi.org/10.1029/2023MS003793

Alan M. Rhoades, Colin M. Zarzycki, **Héctor A. Inda-Díaz**, Mohammed Ombadi, et al. (2024). Anticipating How Rain-on-Snow Events Will Change through the 21st Century: Lessons from the 1997 New Year's Flood Event. (Submitted to Climate Dynamics).

Areidy Beltran-Peña, Alan M. Rhoades, **Héctor A. Inda-Díaz**, et al. (2024). Future Implications of Enhanced Hydroclimate Variability and Reduced Snowpack on California's Water Availability (Submitted to AGU Water Resources Research).

Other interests and formation

Violin Soloist Basic and Intermediate Level *Tepic, México, 1995-2003*

Part of the Nayarit Chamber Orchestra *Tepic, México, 1998-2003*

Moscow State Conservatory P. I. Tchaikovsky

Member of the UNAM Volleyball Varsity Team *Mexico City, Mexico, 2007-2012*

Representative team of the National Autonomous Univeristy of Mexico

Member of the board for the MGSA *Davis, California, 2016-2018*

Mexican Graduate Students Association, University of California, Davis