PEDRO DINEZIO

University of Colorado Boulder | Department of Atmospheric and Oceanic Sciences
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Professional Experience

Associate Professor, Department of Atmospheric and Oceanic Sciences, University of Colorado Boulder, Boulder, CO.	2020 – present
Research Scientist, Institute for Geophysics, Jackson School of Geosciences, University of Texas, Austin, TX.	2016 – 2020
Assistant Researcher, Department of Oceanography, School of Ocean Earth Science and Technology, University of Hawaii, Honolulu, HI.	2015
Visiting Scientist, 2014 Roland Madden Visitor, National Center for Atmospheric Research, Boulder, CO.	2014
Young Investigator Fellow, International Pacific Research Center, School of Ocean Earth Science and Technology, University of Hawaii, Honolulu, HI.	2011 – 2013
Research Associate, Cooperative Institute of Marine and Atmospheric Studies, National Oceanographic and Atmospheric Administration, Miami, FL.	2005 – 2010

Education

University of Miami 2008 – 2011
Ph.D. in Meteorology and Physical Oceanography
Dissertation title: **Mechanisms of Tropical Pacific Climate Change: Beyond the Bjerknes Feedback.** Advisor: Prof. Amy Clement

University of Miami 2006 – 2008
M.Sc. in Meteorology and Physical Oceanography
Thesis title: **Climate Response of the Equatorial Pacific to Global Warming**
Advisor: Prof. Amy Clement

Instituto Tecnológico de Buenos Aires 1996 – 2000
Mech. Engineering

Honors & Awards

Invited Speaker Kavli Foundation Session Speaker Fifth Japanese-American-German Frontiers of Science symposium	2024
Miami Alumni Award	2020
Roland Madden Visiting Fellowship, National Center for Atmospheric Research	2014
SOEST Young Investigator Fellowship	2012-2013
RSMAS Walton Smith Prize, Best Ph.D. dissertation	2011
RSMAS/MPO best student paper (DiNezio et al. 2009b)	2009

Publications† (H-index = 38 Google Scholar)

Under review

Molina, B. A, **P. N. DiNezio**, and C. Deser: ENSO oscillatory regimes controlled by the zonal location of air-sea coupling region. *J. Climate,* in review. link to preprint

Lawman, A., C. Sun, X. Wu, T.-Y. Sun, N. Piatrunia, K. Gomez, **P. N. DiNezio**, T. Shanahan and co-authors: Tropical rainfall changes in response to a weaker AMOC: Mechanisms and an integrative model-data comparison for Heinrich Stadial 1. *Quat. Sci. Rev.*, in review. link to preprint

†Underlined indicates paper involving mentees.

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Todd, V., T. Shanahan, **P. N. DiNezio**, *et al*. North Pacific response to warming drives persistent drought in the Southwest US. *Nat. Geosci.,* in review. link to preprint

Klavans, J., **P. N. DiNezio,** C. Deser, A. Clement, and T. Shanahan: Human Emissions Drive Major Shifts in the Pacific Decadal Oscillation. *Nature*, in review. link to preprint

DiNezio, P. N. and co-authors: The tropical response to weakening of the Atlantic Meridional Overturning Circulation. *Nature*, in press. link to preprint

Carrapa, B., M. Clementz, K. Thirumalai, J. T. Abell, N. Cosentino, **P. N. DiNezio**, *et al.*: Drivers of Cenozoic global cooling and the impacts of the Andes on ocean fertilization and Late Miocene Cooling. *Nat. Rev. Earth. Env.* In review. link to preprint.

2020 – 2024 (CU Boulder)

Lenssen, N., **P. N. DiNezio**, L. Goddard, C. Deser, Y. Kushnir, S. J. Mason, et al. (2024). Strong El Niño events lead to robust multi-year ENSO predictability. *Geophys. Res. Lett.*, **51**, e2023GL106988. https://doi.org/10.1029/2023GL106988

Yu, Z., Ruan, J., Song, L., et al. 2024: Late Pleistocene island weathering and precipitation in the Western Pacific Warm Pool. *npj Clim. Atmos. Sci*., **7**, 91. https://doi.org/10.1038/s41612-024-00642-0

Thirumalai K., **P. N. DiNezio***, J. Partin, D. Liu, K. Costa, and A. Jacobel, 2024: Future increase in risk of extreme El Niño supported by past glacial changes. *Nature*, https://doi.org/10.1038/s41586-024-07984-y *second first author.

Persch, C. F., **P. N. DiNezio** & N. S. Lovenduski, 2023: The impact of orbital precession on air-sea CO_2 exchange in the southern ocean. *Geophys. Res. Lett.*, **50**, e2023GL103820. https://doi.org/10.1029/2023GL103820

Maher, N., R. C. J. Wills, **P. DiNezio**, and coauthors, 2023: The future of the El Niño–Southern Oscillation: using large ensembles to illuminate time-varying responses and inter-model differences*, Earth Syst. Dynam.*, **14**, 413–431, https://doi.org/10.5194/esd-14-413-2023

Chikamoto, M., **P. N. DiNezio**, and N. S. Lovendusky, 2023: Long-term slowdown of ocean carbon uptake by alkalinity dynamics. *Geophys. Res. Lett.*, **50**, e2022GL101954. https://doi.org/10.1029/2022GL101954

Karamperidou, C. and **P. N. DiNezio**, 2022: Holocene hydroclimatic variability in the tropical Pacific explained by changing ENSO diversity. *Nat. Commun.* **13**, 7244 (2022). https://doi.org/10.1038/s41467-022-34880-8

Lawman, A. E., **P. N. DiNezio**, J. W. Partin, S. G. Dee, K. Thirumalai, T. M. Quinn, 2022: Unraveling forced responses of extreme El Niño variability over the Holocene. *Sci. Adv.*, **8** (9), https://doi.org/10.1126/sciadv.abm4313

Sun, C., T. M. Shanahan, **P. N. DiNezio**, N. P. McKay, P. D. Roy, 2021: Great Plains storm intensity since the last glacial controlled by spring surface warming, *Nat. Geosci.* **14**, 912–917, https://doi.org/10.1038/s41561-021-00860-8

Chikamoto, M. O. and **P. N. DiNezio**, 2021: Multi-century changes in the ocean carbon cycle controlled by the tropical oceans and the Southern Ocean. *Global Biogeochem. Cy.*, **35** e2021GB007090. https://doi.org/10.1029/2021GB007090

Wu, X, Y. M Okumura, and **P. N. DiNezio**, 2021: Predictability of El Niño duration based on the onset timing, *J. Climate*, **34**(4), 1351-1366, https://doi.org/10.1175/JCLI-D-19-0963.1

Wu, X., Y. M. Okumura, C. Deser, and **P. N. DiNezio**, 2021: Two-year Dynamical Predictions of ENSO Event Duration during 1954–2015. *J. Climate*, https://doi.org/10.1175/JCLI-D-20-0619.1

Deser, C., A. S. Phillips, I. R. Simpson, N. Rosenbloom, D. Coleman, F. Lehner, A. G. Pendergrass, **P. N. DiNezio**, and S. Stevenson, 2020: Isolating the Evolving Contributions of Anthropogenic Aerosols and Greenhouse Gases: A New CESM1 Large Ensemble Community Resource, *J. Climate*, ***33*** (18), 7835-7858, https://doi.org/10.1175/JCLI-D-20-0123.1

DiNezio P. N., M. Puy, K. Thirumalai, F.-F. Jin, and J. Tierney, 2020: Emergence of an equatorial mode of climate variability in the Indian Ocean under greenhouse warming. *Sci. Adv*. **6**, https://doi.org/10.1126/sciadv.aay7684

Deser, C., F. Lehner, K. B. Rodgers, T. Ault, T. L. Delworth, T. L., **P. N. DiNezio**, et al. 2020: Insights from Earth system model initial-condition large ensembles and future prospects. *Nat. Clim. Chang.* https://doi.org/10.1038/s41558-020-0731-2

2009 – 2019 (Previous institutions)

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Thirumalai, K., **P. N. DiNezio**, J. E. Tierney, M. Puy, and M. Mohtadi, 2019: An El Niño mode in the glacial Indian Ocean? *Paleoceanography and Paleoclimatology*, **34**, https://doi.org/10.1029/2019PA003669.

Wu, X., Y.M. Okumura, and **P.N. DiNezio**, 2019: What Controls the Duration of El Niño and La Niña Events? *J. Climate*, **32**, 5941–5965, https://doi.org/10.1175/JCLI-D-18-0681.1

DiNezio, P. N., J. E. Tierney, B. Otto-Bliesner, A. Timmermann, T. Bhattacharya, N. Rosenbloom, and E. Brady, 2018: Glacial changes in tropical climate amplified by the Indian Ocean. *Sci. Adv*., **4** (12) https://doi.org/10.1126/sciadv.aat9658.

DiNezio P. N., C. Deser, A. Karspeck, S. Yeager, J. Caron, N. Rosenbloom, Y. Okumura, G. Danabasoglu, G. Meehl, 2017a: A 2 Year Forecast for a 60–80% Chance of La Niña in 2017–2018. *Geophys. Res. Lett. 44*, https://doi.org/10.1002/2017GL074904.

Okumura, Y. M., **P. N. DiNezio**, and C. Deser, 2017: Evolving impacts of multi-year La Niña events on atmospheric circulation and US drought. *Geophys. Res. Lett.*, 44, https://doi.org/10.1002/2017GL075034.

Puy, M., J. Vialard, M. Lengaigne, E. Guilyardi, **P. N. DiNezio**, A. Voldoire, M. Balmaseda, G. Madec, C. Menkes, and M. J. Mcphaden, 2017: Influence of Westerly Wind Events stochasticity on El Niño amplitude: the case of 2014 vs. 2015. *Clim Dyn*., https://doi.org/10.1007/s00382-017-3938-9.

Thirumalai, K., **P. N. DiNezio**, Y. Okumura, and C. Deser, 2017: Extreme April 2016 temperatures in Southeast Asia caused by El Nino and worsened by global warming. *Nat. Commun.*, **8**, http://dx.doi.org/10.1038/ncomms15531.

DiNezio, P. N., C. Deser, Y. Okumura, and A. Karspeck, 2017a: Predictability of 2-year La Niña events in a coupled general circulation model. *Clim. Dyn.*, 866–894, https://doi.org/10.1007/s00382-017-3575-3.

Lee, S.-K., **P. N. DiNezio**, E.-S. Chung, S.-W. Yeh, A. T. Wittenberg, and C. Wang, 2014: Spring persistence, transition and resurgence of El Niño. *Geophys. Res. Lett.*, **41** (23), 8578–8585, https://doi.org/10.1002/2014GL062484.

DiNezio, P. N., and C. Deser, 2014: Nonlinear controls on the persistence of La Niña. *J. Climate* **27**, 7335–7355, https://doi.org/10.1175/JCLI-D-14-00033.1.

Small, J. and coauthors, 2014: A new synoptic scale resolving global climate simulation using the Community Earth System Model. *J. Adv. Model Earth Sy.,* **6**, 1065–1094, https://doi.org/10.1002/2014MS000363.

DiNezio P. N., 2014: Climate science: A high bar for decadal forecasts of El Niño*. Nature,* **507***,* 437–439, http://dx.doi.org/10.1038/507437a.

Clement A. and **P. N. DiNezio**, 2014: The Tropical Pacific Ocean: Back in the Driver's Seat? *Science*, **314**, 976–978, http://dx.doi.org/10.1126/science.1248115.

Zhang, H., A. Clement, **P. N. DiNezio**, 2013: The South Pacific Meridional Mode: A Mechanism for ENSO-like variability. *J. Climate*, **27**, 769–783, https://doi.org/10.1175/JCLI-D-13-00082.1.

DiNezio, P. N., and J. Tierney, 2013: The impact of sea level on glacial Indo-Pacific climate. *Nat. Geosci.*, **6**, 485–491, https://doi.org/10.1038/ngeo1823.

DiNezio, P. N., B. J. Kirtman, A. C. Clement, S.-K. Lee, G. A. Vecchi, and A. Wittenberg, 2012: Mean Climate Controls on the Simulated Response of ENSO to Increasing Greenhouse Gases. *J Climate*, **25**, 21, 7399–7420, https://doi.org/10.1175/JCLI-D-11-00494.1.

Clement A. C., **P. N. DiNezio**, and C. Deser, 2011: Rethinking the Ocean's Role in the Southern Oscillation. *J. Climate*, **24**(15), 4056–4072, https://doi.org/10.1175/2011JCLI3973.1.

Goni, G.J., F. Bringas, and **P. N. DiNezio**, 2011: Observed Low Frequency Variability of the Brazil Current Front. *J. Geophys. Res.,* 116, C10037, http://dx.doi.org/10.1029/2011JC007198.

DiNezio, P. N., A. C. Clement, G. A. Vecchi, B. J. Soden, B. J. Kirtman, and S.-K. Lee, 2009b: Climate Response of the Equatorial Pacific to Global Warming. *J. Climate*, **22**, 4873–4892, https://doi.org/10.1175/2009JCLI2982.1.

DiNezio, P. N., L. Gramer, W. Johns, C. Meinen, and M. Baringer, 2009a: Observed Interannual Variability of the Florida Current: Wind Forcing and the North Atlantic Oscillation. *J. Phys. Oceanogr.*, **39**, 721–736, https://doi.org/10.1175/2008JPO4001.1.

Selected invited departmental talks, colloquia, and workshop presentations

Points of no return in the tropics? Unprecedented climate extremes driven by ocean-atmosphere interactions, Frontiers of Science Symposium JAGFOS 2024.

Climas del pasado – clave para el future, *Seminario CIMA/DCAO*, 2024

Anthropogenic forcing of recent Pacific climate change amplified by tropical-extratropical interactions, *TROPICS workshop*, Max Planck Institute for Meteorology, 2024.

Ocean-atmosphere interactions critical to predict climate change, *COSIM Seminar,* Los Alamos National Laboratory, 2024.

Ocean-atmosphere interactions critical to predict climate change, *PAOC Colloquium,* MIT, 2024.

Advances in Climate Simulation and Nonlinear Systems Dynamics, *Dynamics Days Latin America and the Caribbean*, 2024.

La incidencia del la clima en productividad de nuestros suelos, *Jornada Nacional de Suelos*, 2024.

Improving predictions of tropical climate change: Beyond model democracy, *Barcelona Super Computing Center*, 2024.

Recent tropical Pacific cooling driven by anthropogenic emissions, *Workshop on Confronting Earth System Model Trends with Observations: The Good, the Bad, and the Ugly*, 2024

Anthropogenic forcing of the tropical Pacific cooling trend, *ECS & cloud feedback virtual symposium #26,* 2023.

New model-data approaches reduce uncertainty in climate risk prediction, *AGU Fall meeting*, 2023.

The tropical response to a collapse of the Atlantic Meridional Overturning Circulation, *EGU General Assembly*, 2023.

Consistent past and future changes in Indian Ocean climate driven by coupled ocean-atmosphere dynamics, *AGU Fall meeting*, 2022.

Future increase in extreme El Niño supported by past glacial changes, *Ocean Sciences Meeting*, 2022.

Influence of continental shelfs on tropical climate, *Tectonics and Climate Workshop*, Dept. of Geological Sciences, CU Boulder, 2022.

Glacial Lessons on Tropical Climate Change, *PMIP30 Symposium*: *30 Years of PMIP,* 2021.

Needs for community-driven modelling, Identifying New Community-Driven Science Themes for NSF's Support of Paleo Perspectives on Climate Change workshop, 2021.

Aumento de la variabilidad tropical extrema en respuesta al Calentamiento Global, *Colloquio CIMA/DCAO*, U. de Buenos Aires, 2021.

Extreme tropical variability under greenhouse warming, *Dept. of Atmospheric Sciences Colloquium*, Colorado State U., 2021.

Extreme tropical variability under greenhouse warming, *OCE/MPO/ATM Seminar*, *U. of Miami,* 2021.

Glacial lessons on tropical climate change, *Oceanography Seminar*, U. of Washington, 2020.

Improving predictions of Indian Ocean climate change using paleoclimate data, *AGU Fall meeting, 2020*.

Unprecedented climate swings in the tropics driven by greenhouse warming, *AGU Fall meeting, 2019*.

Can the tropical oceans amplify climate change? *BASC seminar,* UC Berkeley, 2019.

Glacial lessons on tropical climate change, *CGD seminar*, NCAR, 2019.

Could an El Niño happen in the Indian Ocean? *Atmospheric Sciences Seminar*, U. of Hawaii, 2018.

Bridging theory, observations, and models of the El Niño/Southern Oscillation, *Natural Variability in the Pacific Summer School*, Princeton U., 2018, Invited speaker and instructor.

Mechanisms controlling the position of the Inter-Tropical Convergence Zone, *2nd WCRP Grand Challenge Meeting on Monsoons and Tropical Rain Belts*, 2018.

Asymmetries in the predictability of El Niño and La Niña: Implications for TPOS2020, *TPOS2020 workshop*, 2018.

How early could the current La Niña have been predicted? *International Research Institute for Climate and Society*, 2018.

Glacial lessons on tropical climate change, *Lamont Doherty Earth Observatory,* Columbia U., 2018.

How early could the current La Niña have been predicted? *Oceanography seminar,* Texas A&M U., 2018..

Non-linear controls on the persistence of La Nina events in CCSM. *CGD Seminar,* NCAR, 2012.

Glacial-interglacial rainfall dynamics of the warm pool: dynamics and detection in models. *Lake Towuti Drilling Workshop,* 2011.

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Mentoring

Graduate Students Advised

Brandon Molina, Cole Persch, Victoria Todd, Xian Wu, Allison Lawman, Chijun Sun.

Postdoc mentoring

Jeremy Klavans, Nathan Lenssen, Megumi Chikamoto, Kaustubh Thirumalai, Sylvia Dee Martin Puy.

Undergraduate mentoring

Charlotte Merchant, Oscar Gandara, Natalie Gonzalez.

Teaching

Classroom Teaching

ATOC 1060, Our Changing Environment, Fall 2020, Fall 2021, Spring 2024.
ATOC 4740/5740, Dynamics of Past Climate Changes: Lessons for the Future, Spring 2021 and 2023.
ATOC 6800, Scientific Writing and Communication, Fall 2022 & 2023.
OCN 105 Sustainability in a Changing World, Fall 2015, U. of Hawaii, co-developer and instructor.
GEO 391 Atmosphere-Ocean Interactions and Climate, Spring 2016, U. of Texas Austin, co-developer and instructor.
GEO 291 Paleoclimate dynamics and synthesis, Fall 2017, Spring 2018, Fall 2018, U. of Texas Austin, co-developer and instructor.

Service to the Scientific Community

Reviewer NSF, DOE, NOAA, Nature journals, J. of Climate, Geophys. Res. Lett., Clim. Dyn.

Organizer HiLo: A model hierarchy for systematically evaluating the impact of spatial resolution on the simulation of climate variability and change	2024-ongoing
Organizer Multi-year predictions workshop	2022
Contributing author IPCC AR6 Chapter 2: Changing state of the climate system	2021
Contributing author IPCC AR5 Chapter 5: Information from Paleoclimate Archives	2014
Member NOAA/CPC ENSO diagnostics panel	2011–present
Member CLIVAR Large “Initial-Condition” Earth System Model Ensembles	2018–2020
Member CISL HPC Allocations Panel	2024–present
Consulting Climate Risk WTW Research Network	2024–present
Founder CACTUS Centro de Acción frente al Calor para Trabajadores UrbanoS	2024–present