DANNI DU

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Research Interests

Climate model bias correction; subseasonal forecasts; machine learning; hybrid modeling; air-sea interaction; extreme weather and climate events

Work Experience

Postdoc at Princeton University   Aug. 2024 - Present
Advisors: Dr. Alistair Adcroft and Dr. Feiyu Lu
Research Assistant at University of Colorado Boulder   Jan. 2020 - July 2024
Teaching Assistant at University of Colorado Boulder   Aug. 2019 - Dec. 2019
Student intern at Scripps Institution of Oceanography   July 2018 - Sept. 2018
Advisors: Dr. Shang-Ping Xie and Dr. Shineng Hu

Education

Department of Atmospheric and Oceanic Sciences, University of Colorado, Boulder (PhD)
Aug. 2019 - Aug. 2024
Advisors: Dr. Aneesh Subramanian and Dr. Weiqing Han
Department of Hydraulic Engineering, Tsinghua University (BS)
Aug. 2015 - July 2019

Publications

Published:

Du, D., Subramanian, A. C., Han, W., Lim, Y., Hackert, E., & Molod, A., (2025). Assessing the Impact of Satellite Sea Surface Salinity Assimilation on Predicting the MJO Propagation across Maritime Continent in NASA GEOS-S2S-2 Model. *J. Climate*, https://doi.org/10.1175/JCLI-D-24-0579.1

Du, D., Subramanian, A. C., Han, W., Chapman, W. E., Weiss, J. B., & Bradley, E. (2024). Increase in MJO Predictability Under Global Warming. *Nature Climate Change*, https://doi.org/10.1038/s41558-023-01885-0.

Du, D., Subramanian, A. C., Han, W., Ninad, U., & Runge, J. (2024). Causal Analysis Discovers an Enhanced Impact of Tropical Western Pacific on Indian Summer Monsoon Subseasonal Anomalies. *Geophysical Research Letters, 51(10), e2023GL106431*.

Du, D., Subramanian, A. C., Han, W., Wei, H. H., Sarojini, B. B., Balmaseda, M., & Vitart, F. (2023). Assessing the Impact of Ocean In Situ Observations on MJO Propagation Across

the Maritime Continent in ECMWF Subseasonal Forecasts. *Journal of Advances in Modeling Earth Systems*, *15*(2), e2022MS003044.

Wei, H.-H., C. Subramanian, A., Karnauskas, K.B., **Du, D.**, Balmaseda, M.A., B. Sarojini, B., Vitart, F., DeMott, C.A. & Mazloff, M.R. (2023), The role of in-situ ocean data assimilation in ECMWF subseasonal forecasts of SST and MLD over the tropical Pacific Ocean. *Quarterly Journal of the Royal Meteorological Society*, https://doi.org/10.1002/qj.4570

Under Review:

Du, D., Lu, F., Adcroft, A. (2026). Reducing Model Biases with Machine Learning Corrections Derived from Ocean Data Assimilation Increments. *Journal of Advances in Modeling Earth Systems*. 10.22541/essoar.176083747.76188196/v1

Yin, Z., Subramanian, A. C., Datta, R., Herrington, A. R., **Du, D.**, Ali, S., Faruque, O., Wang, J. (2026). Identifying Energy Balance Drivers and Feedbacks of Greenland Ice Sheet Surface Melt Using Causal Discovery. *Geophysical Research Letters*.

Zanna, L., Gregory, W., Perezhogin, P., Sane, A., …, **Du, D.**, … (2026). A Framework for Hybrid Physics-AI Coupled Ocean Models. *Science Advances.*

In Preparation:

Melvin, O., **Du, D.**, & Weiss, J. B. (2026). Meridional Heat Transport Variability Inferred from Top-of-Atmosphere Radiation and Ocean Heat Content Observations.

Benincasa, R., Weiss, J. B., **Du, D.**, Duane, G. D., & Pinardi, N. (2026). Non-Equilibrium Thermodynamics and Climate Predictability: Investigating Entropy Production and Frenesy.

Lee, C., Giglio D., Subramanian A. C., Han, W., Capotondi, A., **Du, D.**, & Molod, A. (2026) Assessing the Impact of Satellite Sea Surface Salinity Assimilation on Vertical Structure of the Upper Ocean in the NASA GEOS-S2S-2.

Teaching, Mentoring and Services

Mentor for an undergrad student on Earth System Meridional Heat Transport, 2024 - Present
Mentor for an undergrad student on the topic of Tropical Instability Waves, 2021
Teaching Assistant for Introduction to Oceanography, 2019
Organizing committee member of M2LInES annual meeting, 2025
Co-convener of AGU24 session "Subseasonal to Seasonal Tropical Variability", 2024
Reviewer of GRL, QJRMS, Journal of Climate, Climate Dynamics, International Journal of Climatology, & Atmospheric Science Letters, 2022 - Present
AGU member, 2023 - Present

Skills

Fluent in Python and Fortran
Building multiple machine learning models
Processing climate model outputs with large ensembles

Setting up coupled model experiments such as CESM2 and SPEAR experiments
Setting up AGCM experiments such as ECHAM
Running ocean models such as ROMS and MOM6

Honors and Awards

2024-2025 ATOC Department Service Award, 2025
The 2nd place of student oral presentation at the 11th MJO symposium at AMS, 2023
US CLIVAR travel support for WCRP Open Science Conference at Kigali, 2023
Travel grant from CU Boulder, 2023
Selected to attend the NCAR ASP summer colloquium "the sciences of S2S predictions", 2021
ATOC fellowship, CU Boulder, 2020 and 2022
Academic Excellence Award, Tsinghua University, 2018
Academic Progress Award, Tsinghua University, 2017

Selected Conferences, Workshops and Seminars

American Geophysical Union Meeting, 2025 (poster presentation: Reducing Model Biases with Machine Learning Corrections Derived from Ocean Data Assimilation Increments)

Invited Seminar at Stony Brook University, 2025 (Reducing Model Biases with Machine Learning Corrections Derived from Ocean Data Assimilation Increments)

M2LInES annual meeting, 2025 (organizing committee; chair of the emulator session and e-lightning session; oral presentation: Learning from DA increments provides a solution to reducing model biases)

BIRS MJO predictability workshop, 2025 (oral presentation: improved MJO prediction across the Maritime Continent with sea surface salinity assimilation; oral presentation: increase in MJO predictability under global warming)

American Geophysical Union Meeting, 2024 (co-convener of session Subseasonal to Seasonal Tropical Variability: Observations, Modeling, Processes, and Global Impacts)

Invited talk at the US CLIVAR Predictability, Predictions, and Applications Interface (PPAI) Panel Meeting, 2024 (Increase in MJO predictability under global warming)

American Geophysical Union Meeting, 2023 (poster presentation: Assessing the Impact of Sea Surface Salinity Assimilation on Madden-Julian Oscillation Forecasts in the NASA GEOS-S2S-v model; poster presentation: Enhanced Impact of Tropical Western Pacific on Indian Summer Monsoon Subseasonal Anomalies Discovered by Using a Causal Discovery Method)

WWRP/WCRP S2S Summit at Reading, 2023 (poster presentation: Increase in MJO Predictability Under Global Warming)

American Meteorological Society Meeting, 2023 (oral presentation: Increase in MJO Predictability Under Global Warming)

Invited Seminar at University of Tokyo, 2022 (Increase in MJO Predictability Under Global Warming)

Joint workshop of the OceanPredict OS-Eval & CP-TT including SynObs kick-off at Tsukuba, Japan, 2022 (oral presentation: Assessing the Impact of Ocean In Situ Observations on MJO Propagation Across the Maritime Continent in ECMWF Subseasonal Forecasts)

Eastern Pacific Ocean Conference, 2022 (oral presentation: A Potential Pathway for the Eastern Tropical Pacific low-frequency SST Anomalies to Modulate the Indian Summer Monsoon Subseasonal Anomalies)

Invited talk at S2S webinar on ocean, 2022 (Assessing the Impact of Ocean In Situ Observations on MJO Propagation Across the Maritime Continent in ECMWF Subseasonal Forecasts)

Ocean Sciences Meeting, 2022 (oral presentation: Assessing the Impact of Ocean In-situ Observations on MJO Propagation Across the Maritime Continent in ECMWF Subseasonal Forecasts)