Duo Chan

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Research Interests

- Developing climate datasets combining statistical, physical, and historical approaches
- Understanding climate variability and dynamics, and improving long-term projections using simplified models and AI
- Assessing climate risks in collaboration with policy-relevant and practitioner-led research

Education

2015-21 Ph.D. in Earth and Planetary Sciences, Harvard University (Advisor: Peter Huybers)
2013-15 M.S. in Meteorology, Nanjing University, China
2009-13 B.S. in Applied Meteorology and Minor in Finance, Nanjing University, China

Appointments

2023- Lecturer (Assistant Professor equivalent), School of Ocean and Earth Science, University of Southampton
2021-23 Postdoctoral Scholar, Physical Oceanography Department, WHOI

Awards & Honours

Fellowship Weston Howland Jr. Postdoctoral Fellowship (2021, WHOI) | High Meadows Environmental Fellowship (2021, Princeton, Declined) | Harvard Horizons Fellowship (2020, Harvard) | William Benjamin and Jill Kowal Graduate Aid Fund in Environmental Studies (2015-16, Harvard)
Keynote Speaker 2nd Tropical Climate Variability Conference (2024, Bremen)
Plenary Speaker 15th International Meeting on Statistical Climatology (2024, Toulouse)

Teaching & Supervision

Lecturer Computational Data Analysis for Geophysicists and Ocean Scientists (Fall, 2023/2024)
Teaching Assistant Dynamical Insights from Data (Fall, 2022) | Paleoclimate as prologue (Spring, 2021; Fall, 2016) | Climate change debate (Spring, 2019) | General Circulation of the Atmosphere (Fall, 2014)
Ph.D. Supervisor Callum Pemberton-Louden (2025-) | Ewan Strathdee (2025-) | Khalil Greene (2024-) | Yifei Fan (2021-)
Ph.D. Mentor Se-Yong Song (2023-) | Glenn Liu (2022-2025) | Chenggong Wang (2021-22) | Charlotte Henke (2021) | Sarah King (2020-2021)

Professional Services

Guest Editor Atmosphere Special Issue (Volume 15, Issue 12)
Reviewer PNAS | Nature Communications | Science Advances | Quarterly J. Royal Meteorological Society | J. Climate | Geophysical Research Letter | JGR: Atmospheres | Earth's Future | npj Climate and Atmospheric Science | Climate Dynamics | J. Atmospheric and Oceanic Technology | Earth & Space Science | Remote Sensing | Sustainability | J. Computational and Graphical Statistics | NOAA Small Business Research Funding
Presentation Judge AGU (2022) | Ocean Science Meeting (2022) | National Collegiate Research Conference (2022)
Organizer AGU co-convener (2023; GC084) | Harvard ClimaTea seminar (2017)

Media Coverage & Outreach

Media New Scientist (10/02/2025; 10/01/2025) | Nature News & Views (20/11/2024 17/07/2019) | AGU EOS (05/02/2024; 20/10/2023) | UK's Science Media Centre (05/02/2024) | Science Insider (31/01/2024) | AAAS EurekAlert (29/06/2021) | National Public Radio (19/08/2019) | Yale Climate Connections (07/01/2016)
Outreach Voluntary teaching at Perry School (public middle school in south Boston; Winter, 2019-20)

Peer-reviewed Publications *(* co-first author; † student or mentee; ___ corresponding author)*

[30] He P., Xu Z.*, **Chan D.**, Liu P., & Bai Y. (2025). Climate change aggravates the over-consumption of added sugar in the U.S. especially in disadvantaged groups. Nature Climate Change (in press).

[29] **Fan Y.**†, **Chan D.**, Eugene E., Zhang P., & Li L. (2025). Subpolar North Atlantic cooling reinforced by colder, drier atmosphere with a weakening Atlantic Meridional Overturning Circulation. Science Advances (in press).

[28] Kent E.C., **Chan D.**, Crones R., Englyst P., et al. (2025). Global surface temperatures. In Energy and Climate Change (pp. 85-120). Academic Press.

[27] **Wang C.**†, Yang W., Vecchi G., Zhang B., Soden B. J., & **Chan D.**. (2025). Diagnosing the factors that contribute to the intermodel spread of climate feedback in CMIP6. Journal of Climate, 38(3), 663-674.

[26] Sippel S., Kent E.C., Meinshausen N., **Chan D.**, et al. (2024). Early-twentieth-century cold bias in ocean surface temperature observations. Nature, 635, 618–624.

[25] **Chan D.**, Gebbie G., Huybers P., & Kent E. (2024). A Dynamically Consistent ENsemble of Temperature at the Earth surface since 1850 from the DCENT dataset. Scientific Data, 11(1), 953.

[24] **Fan Y.**†, **Chan D.**, Zhang P., & Li L. (2024). Disagreement on the North Atlantic Cold Blob Formation Mechanisms among Climate Models. Journal of Climate, 37(16), 4061-4078.

[23] **Chan D.**, Gebbie G., & Huybers P. (2024). Ensemble of land-surface air temperatures between 1880-2022 using revised pair-wise homogenization algorithms accounting for auto-correlation. Journal of Climate, 37(7), 2325–2345.

[21] Yin X., Huang B., **Chan D.**, Graham G., Hu Z., Zhang H. (2024) Sea-surface temperatures [in "State of the Climate in 2023"]. BAMS, 105(8), S163–S168.

[20] Ridgen A., Golden C., **Chan D.**, & Huybers P. (2024). Climate change linked to ongoing drought in Southern Madagascar. npj Climate and Atmospheric Science, 7(1), 41.

[19] Bao X., Zhang S., Jiang G., **Chan D.**, Hu Y., Wu H., Li H., Wang X., & Yang T. (2023). Climate changes in the Cryogenian nonglacial epoch: A global synthesis with new findings from the Datangpo Formation in South China. Global and Planetary Change, 229, 104234.

[18] Yin X., Huang B., Hu Z., **Chan D.**, Zhang H. (2023) Sea-surface temperatures [in "State of the Climate in 2022"]. BAMS, 104(9), S153–S156.

[17] **Chan D.**, Gebbie G., & Huybers P. (2023). Global and Regional Discrepancies between Early 20th Century Coastal Air and Sea-Surface Temperature Detected by a Coupled Energy-Balance Analysis. Journal of Climate. 36(9), 2205-20.

[16] Proctor J., Rigden A., **Chan D.**, & Huybers P. (2022). Soil moisture measurements improve prediction of crop yields and reduce projected climate change damages. Nature Food, 3(9): 753.

[15] **Chan D.**, Rigden A., Proctor J., Chan P. H. & Huybers P. (2022). Differences in radiative forcing, not sensitivity, explain differences in summertime land temperature variance change between CMIP5 and CMIP6. Earth's Future, e2021EF002402.

[14] **Chan D.**, Vecchi G., Yang W. & Huybers P (2021). Improved simulation of 19th- and 20th-century North Atlantic hurricane frequency after correcting historical sea surface temperatures. Science Advances. 7(26), eabg6931.

[13] **Chan D.**, & Huybers P (2021). Correcting sea surface temperature observations removes World War II warm anomaly. Journal of Climate, 34(11), 4585-602.

[12] **Chan D.** (2021). Combining statistical, physical, and historical evidence to improve historical sea surface temperature records. Harvard Data Science Review. 3(1), doi: 10.1162/99608f92.edcee38f

[11] Dai C., **Chan D.***, Huybers P., & Pillai, N. (2021). Late 19th-century navigational uncertainties and their influence on sea surface temperature estimates. Annals of Applied Statistics, 15(1): 22-40.

[10] **Chan D.**, & Huybers P. (2020). Systematic differences in bucket sea surface temperatures caused by misclassification of engine room intake measurements. Journal of Climate. 33(18), 7735–53

[9] **Chan D.**, Cobb A., Vargas L., Battisti D., & Huybers P. (2020). Summertime temperature variability increases with local warming in mid-latitude regions. Geophysical Research Letters, e2020GL087624.

[8] **Chan D.**, Zhang, Y., Wu Q., & Dai X. (2020). Quantifying the dynamics of the interannual variabilities of the wintertime East Asian Jet Core. Climate Dynamics, 54(3), 2447-63.

[7] **Chan D.**, Kent E., Berry D. & Huybers P. (2019). Correcting datasets leads to more homogeneous early 20th century sea surface warming. Nature, 571, 393-397. (covered by NPR)

[6] **Chan D.** & Huybers P. (2019). Systematic differences in bucket sea surface temperature measurements amongst nations identified using a linear-mixed-effect method. Journal of Climate, 32(5), 2569-89.

[5] **Chan D.**, Wu Q., Jiang G., & Dai X. (2016). Projected shifts in Köppen climate zones over China and their temporal evolution in CMIP5 multi-model simulations. Advances in Atmospheric Sciences, 3(33), 283-93.

[4] Hu C., Wu Q., Yang S., Yao Y., **Chan D.**, Li Z., & Deng K. (2016). A linkage observed between austral autumn Antarctic Oscillation and preceding Southern Ocean SST anomalies. Journal of Climate, 29(6), 2109-22.

[3] Wu Q., Cheng L., **Chan D.**, Yao Y., Hu H., & Yao Y. (2016). Suppressed mid-latitude summer atmospheric warming by Arctic sea ice loss during 1979–2012. Geophysical Research Letters, 43(6), 2792-800.

[2] **Chan D.**, & Wu Q. (2015). Significant anthropogenic-induced changes of climate classes since 1950. Scientific Reports. 5. 13487. (covered by Yale Climate Connections)

[1] **Chan D.**, & Wu Q. (2015). Attributing observed SST trends and sub-continental land warming to anthropogenic forcing during 1979–2005. Journal of Climate, 28, 3152–70.

Sea-Going Experience

2021 One Ocean Expedition, Statsraad Lehmkuhl: Miami-New York, Dec. 10-18

Conferences and Presentations

Invited Talks

[6] Recent advancements in historical earth surface temperature analysis and insights into climate change from enhanced data. (U Eastern Angles, 2025 | Pacific Climate Impacts Consortium, 2024 | Helmholtz Centre for Polar and Marine Research, 2024 | U Southampton (Math), 2024 | U Leipzig, 2024 | U Bremen, 2024 | UK Met Office, 2024 | Plenary Talk, IMSC, France, 2024 | UCL, London, 2024)

[5] Combining the physics of air-sea interaction and data-driven methods to improve historical estimates of earth surface temperatures (Ocean University of China, 2023 | Duke Kunshan, 2023 | Hanyang University, 2023 | MIT, 2023 | UC Colorado, 2023 | NCAR, 2023 | U Chicago, 2023 | WHOI GFD summer school, 2022 | U Miami, 2022).

[4] Are we already at a 1.5°C warming threshold? (U Southampton (SOES), 2022).

[3] Combining statistical, physical, and historical methods to improve historical sea surface temperature data (Zhejiang University, 2022 | Ocean Dynamics Seminar, 2022 | Penn State U, 2022 | UC Irvine, 2021 | U Washington, 2021 | WHOI, 2021 | Nanjing University, 2021 | U.K. National Oceanography Centre, 2021 | Harvard Horizons, 2021 | Princeton, 2020 | Yale, 2020).

[2] Applying statistical methods to climate reconstructions – Late 19th-century navigational errors and their influence on sea surface temperatures (Joint Statistical Meeting, 2020).

[1] Correcting datasets leads to more homogeneous early-twentieth-century sea surface warming (Fudan University, 2019 | Nanjing University, 2019).

Recent Conference Talks

[3] Improved Homogenisation of Observation (DCENT) Shows Steadier and Faster Historical Global Warming (AMS, 2025).

[2] Discrepancies between Coastal Air and Sea-Surface Temperature and Implications for Global Mean Temperature Estimates (AMS, 2023 | AGU, 2022 | 47 NOAA Climate Diagnostic and Prediction Workshop, 2022).

[1] Coastal air-sea coupling represented using a simple model implications for historical warming. (OSM, 2022).