William (Will) Chapman

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Research Interests: Weather and Climate Predictability, Climate Dynamics, Air-Sea interaction, Machine Learning / Deep Learning, Numerical Weather Prediction (NWP), NWP Post-Processing

EDUCATION

Scripps Institution of Oceanography — La Jolla, Ca
Ph.D. in Atmospheric Science, Advisors: Dr. Shang-Ping Xie, Dr. Marty Ralph — 2021

Stanford University — Palo Alto, Ca
M.Sc. in Civil & Environmental Engineering — 2016

University of California San Diego — La Jolla, Ca
B.Sc. in Environmental Engineering — 2012

PROFESSIONAL APPOINTMENTS

National Center for Atmospheric Research — Boulder, Co
Project Scientist I — August 2023-current

National Center for Atmospheric Research — Boulder, Co
Post-Doctoral Fellow - Advanced Studies Program * — 2022-July 2023

Multiscale Machine Learning In Coupled Earth System Modeling — Boulder, Co
Post-Doctoral Scholar * — 2022-July 2023

Scripps Institution of Oceanography — La Jolla, Ca
Graduate Research Assistant — 2016-2021

National Center for Atmospheric Research — Boulder, Co
Research Applications Lab - Visiting Graduate Student — 2019

Stanford University — Palo Alto, Ca
Graduate Research Assistant — 2015-2016

Scripps Institution of Oceanography — La Jolla, Ca
Undergraduate Research Assistant — 2011-2012

University of California San Diego — La Jolla, Ca
Interim Assistant Resident Dean - Sixth College — 2012, 2016

*concurrent

PUBLICATIONS

[1] **W. Chapman**, A. C. Subramanian, S.-P. Xie, M. D. Sierks, F. M. Ralph, and Y. Kamae, "Monthly modulations of enso teleconnections: Implications for potential predictability in north america", *Journal of Climate*, pp. 1–71, Mar. 2021.

[2] **W. Chapman**, K. Mayer [+], and M. William, "Exploring the relative importance of the mjo and enso to north pacific subseasonal predictability", *Geophysical Research Letters*, vol. 46, no. 17-18, pp. 10 627–10 635, 2024.

[3] T. B. Higgins, A. C. Subramanian, **W. Chapman**, D. A. Lavers, and A. C. Winters, "Subseasonal potential predictability of horizontal water vapor transport and precipitation extremes in the north pacific", *Weather and Forecasting*, 2024.

[4] N. Rampal, S. Hobeichi, P. B. Gibson, J. Baño-Medina, G. Abramowitz, T. Beucler, J. González-Abad, **W. Chapman**, P. Harder, and J. M. Gutiérrez, "Enhancing regional climate downscaling through advances in machine learning", *Artificial Intelligence for the Earth Systems*, vol. 3, no. 2, p. 230 066, 2024.

[5] A. Badrinath, L. Delle Monache, N. Hayatbini, **W. Chapman**, F. Cannon, and M. Ralph, "Improving precipitation forecasts with convolutional neural networks", *Weather and Forecasting*, vol. 38, no. 2, pp. 291–306, 2023.

[6] **W. Chapman** and J. Berner, "Benefits of deterministic and stochastic tendency adjustments in a climate model", *arXiv preprint arXiv:2308.15295*, 2023.

[7] **W. Chapman** and J. Berner, "Deterministic and stochastic tendency adjustments derived from data assimilation and nudging", *Quarterly Journal of the Royal Meteorological Society*, 2023.

[8] D. Du, A. Subramanian, W. Han, **W. Chapman**, J. Weiss, and E. Bradley, "Increase in mjo predictability under global warming", *Nature CLimate Change*, 2023.

[9] T. B. Higgins, A. C. Subramanian, A. Graubner, L. Kapp-Schwoerer, P. A. Watson, S. Sparrow, K. Kashinath, S. Kim, L. Delle Monache, and **W. Chapman**, "Using deep learning for an analysis of atmospheric rivers in a high-resolution large ensemble climate data set", *Journal of Advances in Modeling Earth Systems*, vol. 15, no. 4, e2022MS003495, 2023.

[10] W. Hu, M. Ghazvinian, **W. Chapman**, A. Sengupta, F. M. Ralph, and L. Delle Monache, "Deep learning forecast uncertainty for precipitation over the western united states", *Monthly Weather Review*, vol. 151, no. 6, pp. 1367–1385, 2023.

[11] F. Schevenhoven, N. Keenlyside, F. Counillon, A. Carrassi, **W. Chapman**, M. Devilliers, A. Gupta, S. Koseki, F. Selten, M.-L. Shen, *et al.*, "Supermodeling: Improving predictions with an ensemble of interacting models", *Bulletin of the American Meteorological Society*, 2023.

[12] **W. Chapman**, L. Delle Monache, S. Alessandrini, A. C. Subramanian, F. M. Ralph, S.-P. Xie, S. Lerch, and N. Hayatbini, "Probabilistic predictions from deterministic atmospheric river forecasts with deep learning", *Monthly Weather Review*, vol. 150, no. 1, pp. 215–234, 2022.

[13] S. Michael, P. David, **W. Chapman**, and R. F. Martin, "Seasonally anchored bias correction of cmip5 hydrological simulations", *Authorea Preprints*, 2022.

[14] P. B. Gibson, **W. Chapman**, A. Altinok, L. Delle Monache, M. J. DeFlorio, and D. E. Waliser, "Training machine learning models on climate model output yields skillful interpretable seasonal precipitation forecasts", *Nature - Communications Earth & Environment*, vol. 2, no. 1, p. 159, Aug. 2021, ISSN: 2662-4435.

[15] S. E. Haupt, **W. Chapman**, S. V. Adams, C. Kirkwood, J. S. Hosking, N. H. Robinson, S. Lerch, and A. C. Subramanian, "Towards implementing artificial intelligence post-processing in weather and climate: Proposed actions from the oxford 2019 workshop", *Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences*, vol. 379, no. 2194, p. 20 200 091, 2021. eprint: https://royalsocietypublishing.org/doi/pdf/10.1098/rsta.2020.0091.

[16] S. Meech, S. Alessandrini, **W. Chapman**, and L. Delle Monache, "Post-processing rainfall in a high-resolution simulation of the 1994 piedmont flood", *Bulletin of Atmospheric Science and Technology*, Jan. 2021, ISSN: 2662-1509.

[17] Prabhat, K. Kashinath, M. Mudigonda, S. Kim, L. Kapp-Schwoerer, A. Graubner, E. Karaismailoglu, L. von Kleist, T. Kurth, A. Greiner, A. Mahesh, K. Yang, C. Lewis, J. Chen, A. Lou, S. Chandran, B. Toms, **W. Chapman**, K. Dagon, C. A. Shields, T. O'Brien, M. Wehner, and W. Collins, "Climatenet: An expert-labeled open dataset and deep learning architecture for enabling high-precision analyses of extreme weather", *Geoscientific Model Development*, vol. 14, no. 1, pp. 107–124, 2021.

[18] G. Schamberg, **W. Chapman**, S.-P. Xie, and T. P. Coleman, "Direct and indirect effects—an information theoretic perspective", *Entropy*, vol. 22, no. 8, p. 854, 2020.

[19] A. M. Wilson, **W. Chapman**, A. Payne, A. M. Ramos, C. Boehm, D. Campos, J. Cordeira, R. Garreaud, I. V. Gorodetskaya, J. J. Rutz, *et al.*, "Training the next generation of researchers in the science and application of atmospheric rivers", *Bulletin of the American Meteorological Society*, vol. 101, no. 6, E738–E743, 2020.

[20] **W. Chapman**, S. E. Haupt, C. Kirkwood, S. Lerch, M. Matsueda, and A. C. Subramanian, "Data from: Towards implementing ai post-processing in weather and climate: Proposed actions from the oxford 2019 workshop", 2019.

[21] **W. Chapman**, A. Subramanian, L. Delle Monache, S. Xie, and F. Ralph, "Improving atmospheric river forecasts with machine learning", *Geophysical Research Letters*, vol. 46, no. 17-18, pp. 10 627–10 635, 2019.

[22] M. Z. Jacobson, M. A. Delucchi, Z. A. Bauer, S. C. Goodman, **W. Chapman**, M. A. Cameron, C. Bozonnat, L. Chobadi, H. A. Clonts, P. Enevoldsen, *et al.*, "100% clean and renewable wind, water, and sunlight all-sector energy roadmaps for 139 countries of the world", *Joule*, vol. 1, no. 1, pp. 108–121, 2017.

[+]shared first author

PUBLICATIONS - IN PROGRESS [Only First Author]

1. **W., Chapman**, J. Berner, "Machine Learning for Online Bias Correction in CAM6", *Near Submission, 2024*

2. **W., Chapman**, J. Berner, "Online Corrections to the MJO in CAM6", *Near Submission, 2024*

3. **W., Chapman**, J Schreck, D.J. Gagne "WxFormer: Advancing Skill in Medium-Range Global Weather Forecasting through Machine Learning.", *Near Submission, 2024*

4. **W., Chapman**, AC Subramanian, SP Xie, T Palmer, A Weisheimer, "Phase-Dependent Forecast Skill of the Madden Julian Oscillation (MJO) Teleconnection in Early and Late Winter.", *In Review, 2024*

5. **W., Chapman, K.J. Mayer, W. Manriquez**, "Exploring the Relative Contribution of the MJO and ENSO to Midlatitude Subseasonal Predictability with an Interpretable Neural Network.", *Authorea Preprints, Jan. 2024*

6. **W., Chapman**, DJ Gagne, J Schreck, J Berner, "nonLIMear: A Non-Linear Linear Inverse Model for Long-Range ENSO Forecasting", *In Progress, 2022*- github link

7. **W., Chapman**, AC subramanian, J Berner, "MJOcast: An Open Access Software Platform for Ensemble MJO Forecast Derivation", *SOFTWARE SUBMISSION; In Progress, 2023*- github link,project website

PEER-REVIEWED CONFERENCE PAPERS

1. Yu, Yang, KR, Moy, **W., Chapman**, PL O'Neill, and R Rajagopal, "Assessing climate change vulnerability of microgrid systems.", *2016 IEEE Power and Energy Society General Meeting (PESGM). IEEE, 2016*

2. A. Jakubisin, **W. Chapman**, and M. Sierks, "Sustainability and the Student Affairs Professional", *National Association of Student Personnel Administrators Annual Conference, March 2015*

SELECTED CONFERENCES

1. **W Chapman**, "Training Machine Learning Models on Climate Model Output Yields Skillful Interpretable Seasonal Precipitation Forecasts ", *3rd NOAA Workshop on Leveraging AI in Environmental Sciences – Sept. 14, 2021* **Highlighted Talk**

2. **W Chapman**, "Deep-learning Applications for Environmental Science Artificial Intelligence for Feature Detection ", *20th Conference on Artificial Intelligence for Environmental Science - AMS 101st Annual Meeting - January 2021, 2020* **Session Co-Chair**

3. **W Chapman**, "AI, Ethics, and Inclusion for Geosciences, part 1", *20th Conference on Artificial Intelligence for Environmental Science - AMS 101st Annual Meeting - January 2021, 2020* **Session Co-Chair**

4. **W Chapman**, L Delle Monache, S Alessandrini, AC Subramanian, N Hayatbini, SP Xie, and FM Ralph, "Probabilistic Weather Prediction with Bayesian Neural Networks", *Machine Learning for Weather and Climate Modeling II - AGU Fall Meeting 2020, 2020*

5. P Gibson, **W Chapman**, A Altinok, MJ Deflorio, L Delle Monache, and D Waliser, "Interpretable Machine Learning applied to Seasonal Forecasting of Western US Precipitation", *Machine Learning for Weather and Climate Modeling III - AGU Fall Meeting 2020, 2020*

6. M Sierks, MD Dettinger, **W Chapman**, and M Ralph, "Assessing Vulnerability and Adaptive Management Under Climate Change Scenarios: Lessons from California's Largest Reservoir", *AGU Fall Meeting 2020, 2020*

7. **W Chapman**, TJ Kilpatrick, "Machine Learning for inpainting QuikSCAT winds in Hawaii's Lee Region", *AI Applied to Airborne or Spaceborne Earth Observation Datasets - 100th American Meteorological Society Annual Meeting, January 2020, 2020.* **AMS Student Presentation Award - 1st Place**

8. **W Chapman**, "Atmospheric River Forecast Model Bias Correction", *19th Conference on Artificial Intelligence for Environmental Science - 99th American Meteorological Society Annual Meeting, 2019.*

9. **W Chapman**, S.-P.Xie, and T.Kilpatrick, "Machine Learning to Improve QuikSCAT Ambiguity Selection Near Hawaii's Big Island", *The International Ocean Vector Science Team Meeting, May 2019.*

AWARDS

NCAR - ASP Post-Doctoral Fellow	2022–2023
UW-CICOES Post-Doctoral Fellow - *declined*	2022
Microsoft AI for Earth Grant	2018–2021
Edward A. Frieman Prize (For Excellence in Graduate Research)	2020
AMS AI for Environmental Science Conference Student Presentation - 1st place	2019
UCSD Provost Honors 11x	2008–2012

SELECTED INVITED TALKS, TEACHING, & SEMINARS

1. **W Chapman**, "Advancing Weather and Climate Prediction with Data-Driven Methods", University of Washington, Allen School Colloquia Series *Feb, 2024.*

2. **W Chapman**, "Advancing Weather and Climate Prediction with Data-Driven Methods", Naval Post-Graduate School, *Mar, 2024.*

3. **W Chapman**, "AI/ML Efforts in CESM Using Python", *CESM SE Working Group Annual Meeting – Mar, 2024.*

4. **W Chapman** and Kirsten Mayer, "Methods in eXplainable Artificial Intelligence (XAI) + Coding Exercises", *UNIDATA users workshop – June, 2023.*

5. **W Chapman**, "Leveraging DART and Nudging Increments to Address Model Bias in CAM6", *NOAA - Atmosphere-Ocean Processes and Predictability Section – March, 2023.*

6. **W Chapman**, "Monthly Modulations of ENSO teleconnections", *NCAR ASP 2022 Workshop on S2S Science and prediction – July, 2022.*

7. **W Chapman**, "AI for Earth and Space Science Workshop at Microsoft ICLR 2022", *Atmosphere Session – May, 2022.* ***Organizer***

8. **W Chapman**, "Probabilistic Forecasting of Atmospheric River Events with Deep Learning", *UCLA Student Seminar Series.-Dec. 03, 2021*

9. **W Chapman**, "Week 3-6 Prediction of North American Temperature Anomalies in the CESM LENS", *2021 ASP Colloquium - The Science of Subseasonal to Seasonal (S2S) Predictions – July 12-23, 2021.* ***Instructor***

10. **W Chapman**, "Probabilistic Weather Prediction with Neural Networks", *TRUSTWORTHY ARTIFICIAL INTELLIGENCE FOR ENVIRONMENTAL SCIENCE (TAI4ES) SUMMER SCHOOL – July 27, 2021.* ***Lecture***

11. **W Chapman**, "Methods for Accurate Uncertainty for Deep Learning Regression Problems", *SIO Machine Learners – March 16, 2021*

12. **W Chapman**, "Machine Learing in Python for Environmental Science Problems: Introduction to Machine Learning", AMS committe on Artificial Intelligence Applications to Environmental Science, *20th Conference on Artificial Intelligence for Environmental Science - AMS 101st Annual Meeting - April 2021* ***Instructor - Supervised Learning Fundamentals***

13. **W Chapman**, L Delle Monache, S Alessandrini, AC Subramanian, N Hayatbini, SP Xie, and FM Ralph, "Deterministic and Probabilistic Methods for Improving Atmospheric River Forecasts with Machine Learning", *Scripps Institutional Seminar – November 17, 2020*

14. **W Chapman**, "Bayesian Neural Networks and NWP Forecast Post-Processing", *UCI/Columbia CBrain Meeting – April 21, 2020*

15. **W Chapman**, "AGU Tutorial on Machine Learning and Deep Learning for the Environmental and Geosciences", *AGU Fall Meeting – December 08, 2019* ***Instructor***

16. **W Chapman**, AC Subramanian, L Delle Monache, SP Xie, and FM Ralph, "Spatial Correction of NWP Forecasts", *National Center for Atmospheric Research RAL – November 7, 2019*

17. **W Chapman**, T Kilpatrick, and SP Xie, "Comparative Field Reconstruction: Deep Learning, MCA, CCA", *National Center for Atmospheric Research - Artificial Intelligence Affinity Group (AIAG) – Oct 9, 2019*

18. **W Chapman**, A Wilson, and FM Ralph, "Center for Western Weather and Water Extremes: Atmospheric River Colloquium", *Western States Water Council and the California Department of Water Resources Subseasonal to Seasonal Workshop – May 23, 2019*

19. **W Chapman**, SP Xie, and FM Ralph, "High Impact Weather, Climate Extremes, and Non-Gaussian Statistics", *Climate Science Policy Ocean/Atmos Ph.D. Student Seminar – February 8, 2019*

20. **W Chapman**, "No Red Meat or a New Electric Vehicle, Food Choices and Emissions", *Connecting the Dots 2015: The Food, Energy, Water and Climate Nexus*, Stanford University – April 17, 2015

TEACHING & MENTORING EXPERIENCE

- **Lecture – Climate Variability** at The University of Colorado - Boulder ⟶ Fall 2022
  Climate Dynamics and Modeling ATOC 4870
- **SOARS research mentor** at The National Center for Atmospheric Research ⟶ Summer 2022
  Tony Manriquez (Now B.Sc at CSU) - Significant Opportunities in Atmospheric Research Program
- **SOARS computational mentor** at The National Center for Atmospheric Research ⟶ Summer 2022
  Jocelyn Rodriguez (Now B.Sc at UC Davis) - Significant Opportunities in Atmospheric Research Program
- **Intern Program Supervisor** at Scripps Institution of Oceanography ⟶ Summer 2020
  Center for Western Weather and Water Extremes (12 interns)
- **Intern Supervisor** at Scripps Institution of Oceanography ⟶ 2020
  Anirudhan Badrinath (Now M.Sc. Candidate Stanford): Deep Learning NWP Precipitation Post-Processing
- **Intern Supervisor** at Scripps Institution of Oceanography ⟶ 2019
  Laura Thapa (Now Ph.D. Candidate UCLA): Machine Learning for Physics Discovery
- **Teaching Assistant** at Stanford University ⟶ Fall 2015
  Weather and Storms (CEE 263C)

TECHNICAL SKILLS

- **Languages:** Bash, Fortran, LaTex, Objective C/C++
- **Modeling Tools:** NetCDF, CDO, NCO, HPC, Machine Learning, Open MPI
- **Development Tools :** Git/GitHub, Jupyter Suite
- **Scientific Visualization & Analysis:** Python, R, Matlab, Pytorch, Keras, Tensorflow