

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

Ph.D. in Oceanography, Advisors: Dr. Shang-Ping Xie, Dr. Marty Ralph

La Jolla, Ca

2021

Stanford University

M.Sc. in Civil & Environmental Engineering

Palo Alto, Ca

2016

University of California San Diego

B.Sc. in Environmental Engineering

La Jolla, Ca

2012

PROFESSIONAL APPOINTMENTS

National Center for Atmospheric Research

Project Scientist I

Boulder, Co

August 2023-current

National Center for Atmospheric Research

Post-Doctoral Fellow - Advanced Studies Program *

Boulder, Co

2022-July 2023

Multiscale Machine Learning In Coupled Earth System Modeling

Post-Doctoral Scholar *

Boulder, Co

2022-July 2023

Scripps Institution of Oceanography

Graduate Research Assistant

La Jolla, Ca

2016-2021

National Center for Atmospheric Research

Research Applications Lab - Visiting Graduate Student

Boulder, Co

2019

Stanford University

Graduate Research Assistant

Palo Alto, Ca

2015-2016

Scripps Institution of Oceanography

Undergraduate Research Assistant

La Jolla, Ca

2011-2012

University of California San Diego

Interim Assistant Resident Dean - Sixth College

La Jolla, Ca

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

- [4] 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.
- [5] 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.
- [6] 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.
- [7] **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.
- [8] S. Michael, P. David, **W. Chapman**, and R. F. Martin, “Seasonally anchored bias correction of cmip5 hydrological simulations”, *Authorea Preprints*, 2022.
- [9] 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.
- [10] 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>.
- [11] 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.
- [12] 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.
- [13] 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.
- [14] 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.
- [15] **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.
- [16] **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.

- [17] 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.

PUBLICATIONS - IN PROGRESS [Only First Author]

1. **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*, 2023
2. **W., Chapman**, J. Berner, “Leveraging DART Increments to Correct Model Bias in the Community Atmosphere Model.”, *In Progress*, 2022
3. **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](#)

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–current
UW-CICOES Post-Doctoral Fellow - <i>declined</i>	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** and Kirsten Mayer, "Methods in eXplainable Artificial Intelligence (XAI) + Coding Exercises", *UNIDATA users workshop* – June, 2023.
2. **W Chapman**, "Leveraging DART and Nudging Increments to Address Model Bias in CAM6", *NOAA - Atmosphere-Ocean Processes and Predictability Section* – March, 2023.

3. **W Chapman**, “Monthly Modulations of ENSO teleconnections”, *NCAR ASP 2022 Workshop on S2S Science and prediction* – July, 2022.
4. **W Chapman**, “AI for Earth and Space Science Workshop at Microsoft ICLR 2022”, *Atmosphere Session* – May, 2022. **Organizer**
5. **W Chapman**, “Probabilistic Forecasting of Atmospheric River Events with Deep Learning”, *UCLA Student Seminar Series*.-Dec. 03, 2021
6. **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**
7. **W Chapman**, “Probabilistic Weather Prediction with Neural Networks”, *TRUSTWORTHY ARTIFICIAL INTELLIGENCE FOR ENVIRONMENTAL SCIENCE (TAI4ES) SUMMER SCHOOL* – July 27, 2021. **Lecture**
8. **W Chapman**, “Methods for Accurate Uncertainty for Deep Learning Regression Problems”, *SIO Machine Learners* – March 16, 2021
9. **W Chapman**, “Machine Learning in Python for Environmental Science Problems: Introduction to Machine Learning”, *AMS committee 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**
10. **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
11. **W Chapman**, “Bayesian Neural Networks and NWP Forecast Post-Processing”, *UCI/Columbia CBrain Meeting* – April 21, 2020
12. **W Chapman**, “AGU Tutorial on Machine Learning and Deep Learning for the Environmental and Geosciences”, *AGU Fall Meeting* – December 08, 2019 **Instructor**
13. **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
14. **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
15. **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
16. **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
17. **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