Adam Massmann

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Education

- **Ph.D. in Environmental Engineering**, Columbia University, *2022*
- **M.S. in Atmospheric Science**, University at Albany, *2016*
- **B.S. in Civil Engineering**, University of Washington, *cum laude, 2014*

Consulting Experience (with Keta Waters)

Puyallup Tribe of Indians: *April 2023- present*
- Electron Hydroelectric Project: Effect of diversions on river temperatures.

Quinault Indian Nation: *April 2022 - 2023*
- *TransAlta Water Right Acquisition: Phase I Feasibility Study*. Stream flow analysis and reservoir simulations.

Swinomish Indian Tribal Community: *Nov. 2022*
- Reservoir simulations related to US Golden Eagle water right application.

Squaxin Island Tribe and Thurston County: *Oct. 2019 - Oct. 2021*
- Develop Soil Water Balance model to estimate recharge for the Thurston County Groundwater Model.

Squaxin Island Tribe: *June 2018 – March 2020*
- Develop Soil Water Balance model to estimate recharge for the Johns/Goldsborough watersheds.

Research experience

Graduate Research Assistant; Environmental Engineering, Columbia University: 2016 - 2022
- land-atmosphere interaction and ecosystem response to aridity with models and observations

Graduate Research Assistant; Atmospheric Sciences, University at Albany: 2015 - 2016
- atmospheric modeling of lake-effect snowstorms, microphysical and rain observations in complex terrain

Undergraduate Research Assistant; Civil Engineering, University of Washington: 2012 - 2014
- snow and land surface energy balance observations in complex terrain

Technical skills

Field observations and hardware
- *eddy-covariance turbulent flux estimation, LI-COR optical gas analyzers, Campbell Scientific dataloggers and sonic anemometers, InterMet radiosondes, PARSIVEL disdrometers, METEK Micro Rain Radars, HOBO dataloggers, iButton chips, Raspberry Pi boards*

Software
- **General Tools**: Python, Scheme, Haskell, Fortran, Git, Latex, Pandoc, Emacs, Debian
- **Environmental Modeling**: MiXed Layer CHemistry Model (MXLCH), Weather Research and Forecasting Model (WRF), Soil Water Balance Model (SWB), QUAL2KW River Model
- **Free Software Contributions**: Stan (docs); hvega; hmatrix; FLUXNETcitations; GNU Guix

Field experience

- CCOPE-2015 Field Campaign (2015), Chile: *field operations lead*
- Pre-OLYMPEX Field Campaign (2014), Washington State: *site design, testing and deployment (snow depth)*
- Snoqualmie Pass Snow Energy Balance Research Site (2013-2014), Washington State: *primary field technician; software design for data archival and quality control*

Additional education

- *Innovative Teaching Summer Institute*, Columbia University Center for Teaching and Learning, June 2019
- *Implicit Bias Workshop*, Columbia University, March 2019
- *Fluid Dynamics of Sustainability and the Environment*, Department of Applied Mathematics and Theoretical Physics, University of Cambridge, September 2016

Miscellaneous activities

– Co-organized the 2021 Columbia University Environmental Engineering Summer Seminar Series
– "Getting a Ph.D. in Environmental Engineering" information session (led by Ian Billinge), Nov. 2020
– Collegiate athletics and academic career Q&A, *Northwest Water Polo Club*, May 2020
– STEM Starters Outreach, Education Lab, Columbia University, Sept. 2019
– Volunteer, *New York Scientific Data Summit*; June, 2019
– Essay reader: *Washington State Opportunity Scholarship*; Mar. 2019
– 6th Grade Science Interviewee; Realm School (Berkeley, CA); Sept. 2016
– UAlbany Weather Camp Volunteer; University at Albany; Aug. 2016
– Science Outreach to Voorheesville HS students; University at Albany; Mar. 2016
– Science Outreach at Liceo Mariano Latorre; Curanilahue, Chile; Aug. 2015
– Engineering Discovery Day; University of Washington; 2013, 2014
– Volunteer Board Member, Northwest Youth Water Polo, Oct. 2013 - Aug. 2014
– Past reviewer for *JGR - Biogeosciences*, *Geophysical Research Letters*, *Journal of Applied Meteorology and Climatology*, *Journal of Climate*, *Journal of Hydrometeorology*, *Water Resources Research*, *Weather and Forecasting*

Awards, fellowships, and scholarships

– **Presidential Fellow**, Columbia University, 2019-2022
– **Senior Lead Teaching Fellowship**, Columbia University, 2020-2021
– **Lead Teaching Fellowship**, Columbia University, 2019-2020
– **PI, XSEDE Startup Allocation:** "A moist static energy approach to understanding wet and dry season transitions in the Amazon rainforest," 2016-2018
– **NSF Graduate Research Fellowship Program**, 2015-2019
– **AMS Student Travel Grant**, 16th Conference on Mountain Meteorology, 2014
– **Ruth and Richard Meese Endowed Scholarship**, Department of Civil Engineering, University of Washington, 2013-2014
– **Mary Gates Research Scholarship**, University of Washington, 2013
– **John Arthur Elliot Endowed Scholarship**, Department of Civil Engineering, University of Washington, 2013

Publications

– **Massmann, A.,** 2022. Estimating ecosystem evaporation response to aridity with theory and causality. Doctoral dissertation, *Columbia University*. doi:10.7916/m1gy-x889.
    – Chapter 4, "Estimating the ecosystem evaporation response to interventions on soil moisture: confounding and causal modeling in a simulated world", **is new material** that has not been published elsewhere; **Olya Skulovich** and **Pierre Gentine** collaborated on this project.
– **Massmann, A.**, Gentine, P. and Runge, J., 2021. Causal inference for process understanding in Earth sciences. arXiv:2105.00912.
– Rojas, Y., Minder, J.R., Campbell, L.S., **Massmann, A.** and Garreaud, R., 2021. Assessment of GPM IMERG satellite precipitation estimation and its dependence on microphysical rain regimes over the mountains of south-central Chile. *Atmospheric Research*, 253, p.105454. doi.org:10.1016/j.atmosres.2021.105454.
– **Massmann, A.**, Gentine, P. and Lin, C., 2019. When does vapor pressure deficit drive or reduce evapotranspiration? *Journal of Advances in Modeling Earth Systems*, 11. doi:10.1029/2019MS001790 arXiv:1805.05444. * **Top Downloaded Paper (10%), 2018-2019**
– Gentine, P., **Massmann, A.**, Lintner B.R., Alemohammad, S.H., Fu, R., Green, J.K., Kennedy, D. and Vilà-Guerau de Arellano J., 2019. Land Atmosphere Interaction in the Tropics. *Hydrology and Earth System Sciences*. doi:10.5194/hess-2019-12.
– Fults, L.S., **Massmann, A.K.**, Montecinos, A., Andrews, E., Kingsmill, D.E., Minder, J.R., Garreaud, R.D. and Snider, J.R., 2019. Wintertime Aerosol Measurements during the Chilean Coastal Orographic Precipitation Experiment. *Atmospheric Chemistry and Physics*. doi:10.5194/acp-2019-185.
– **Massmann, A.K.**, Minder, J.R., Garreaud, R.D., Kingsmill, D.E., Valenzuela, R.A., Montecinos, A., Fults, S.L. and Snider, J.R., 2017. The Chilean Coastal Orographic Precipitation Experiment: Observing the influence of microphysical rain regimes on coastal orographic precipitation. *Journal of Hydrometeorology*, 18(10), pp.2723-2743. doi:10.1175/JHM-D-17-0005.1.
– Wayand, N.E., **Massmann, A.**, Butler, C., Keenan, E., Stimberis, J. and Lundquist, J.D., 2015. A meteorological and snow observational data set from Snoqualmie Pass (921 m), Washington Cascades, USA. *Water Resources Research*, 51(12), pp.10092-10103. doi:10.1002/2015WR017773.

Publications (continued)

– Lapo, K.E., Hinkelman, L.M., Landry, C.C., **Massmann, A.K.** and Lundquist, J.D., 2015. A simple algorithm for identifying periods of snow accumulation on a radiometer. *Water Resources Research*, 51(9), pp.7820-7828. doi:10.1002/2015WR017590.
– Lundquist, J.D., Wayand, N.E., **Massmann, A.**, Clark, M.P., Lott, F. and Cristea, N.C., 2015. Diagnosis of insidious data disasters. *Water Resources Research*, 51(5), pp.3815-3827. doi:10.1002/2014WR016585.

Presentations (first author)

– Massmann, A., 2020. What do we know? Or, how we need a framework for consolidating and collaborating on climate knowledge. *Columbia University Earth and Environmental Engineering Summer Seminar Series*, New York, NY.
– Massmann, A., 2019. Causality and predictions; engineering and science: the applicability of causal methods to earth science and the potential for progress at the human-environment interface. Oral presentation, *Columbia University Earth and Environmental Engineering Graduate Symposium*, New York, NY.
– Massmann, A., 2019. Probabilistic graphical models, causality and software. Oral presentation, *Workshop on Data Analytics for Climate and Earth (DANCE)*, Arrowhead Lake, CA.
– Massmann, A., Gentine, P. and Wild, M., 2018. Propagator networks and truth maintenance systems: blending physical constraints and data to understand land-atmosphere interaction in the pre-satellite and pre-FLUXNET era. Title modified post-submission to: "Causal Bayesian networks in earth science research: an example examination of North American dimming in the 1950s-1970s". Poster presentation, *AGU 2018 Fall Meeting*, Washington D.C.
– Massmann, A., Gentine, P. and Lin, C., 2017. When does vapor pressure deficit drive or reduce evapotranspiration? Oral presentation, *AGU 2017 Fall Meeting*, New Orleans, LA.
– Massmann, A., Gentine, P. and Lin C., 2017. When does vapor pressure deficit drive or reduce evapotranspiration? Oral presentation, *Columbia University Earth and Environmental Engineering Graduate Symposium*, New York, NY.
– Massmann, A.K., Minder, J.R., Kingsmill, D.E., Garreaud, R., Montecinos, A., Snider, J.R., Fults, S., Valenzuela, R. and Falvey, M. 2016. The Chilean Coastal Orographic Precipitation Experiment Pilot Project. Overview and Preliminary Results. Oral presentation, *17th Conference on Mountain Meteorology*, Burlington, VT.
– Massmann, A., Minder, J., Montecinos, A. and Fults, S., 2015 (invited). CCOPE-15 Trabajo Preliminar: Usando Perfiles de Radares para Clasificar Lluvia en la Cordillera Nahuelbuta [CCOPE-15 Preliminary Work: Using Radar Profiles to Classify Rain in the Nahuelbuta Mountains]. *Seminario de Geofísica*, Universidad de Concepción, Concepción, Chile.
– Massmann, A.K. and Minder, J.R., 2015. Utilizing a Semi-idealized Modeling Framework to Understand Meso- and Convective-scale dynamics of severe Lake-effect Snowstorms. Poster presentation, *16th Conference on Mesoscale Meteorology*, Boston, MA.
– Massmann, A.K. and Minder, J.R., 2015. Utilizing a Semi-idealized Modeling Framework to Understand Observed Lake-effect Snowstorm Dynamics. Poster presentation, *40th Annual Northeastern Storm Conference*, Saratoga Springs, NY.
– Massmann, A.K., Lundquist, J.D., and Raleigh, M.S., 2013. Using Inexpensive Temperature Sensors to Estimate Incoming Radiation and Snow Surface Albedo. Poster presentation, *University of Washington Undergraduate Research Symposium*, Seattle, WA.