

# CURRICULUM VITAE

## CLIFFORD F. MASS

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### Education

B.S., Cornell University 1974  
Major - Physics  
Ph.D., University of Washington 1978  
Atmospheric Sciences  
Doctoral Thesis: "A Numerical and Observational Study of African Wave Disturbances." J. R. Holton, adviser.

### Professional Experience

Mid 1981 to present Assistant, Associate Professor, and Professor, Department of Atmospheric Sciences, University of Washington.  
1978 to mid 1981 Assistant Professor, Department of Meteorology, University of Maryland.

### Books

*The Weather of the Pacific Northwest*, University of Washington Press  
*The Secrets of Weather Prediction*, in preparation.

### Refereed Publications

- Conricket., R., J. Zagrodnik and C. F. Mass, 2019: Dual-polarization radar retrievals of coastal Pacific Northwest rain drop size distribution parameters using random forest regression. Submitted to *J. Atm. Ocean Tech.*
- Mass, C. F. and D. Ovens, 2019: The northern California wildfires of October 8-9, 2017: the role of a major downslope windstorm event. *Bull. Amer. Met Soc.*, **100**, 235-256
- Zou, Y.; O'Neill, S.M.; Larkin, N.K.; Alvarado, E.C.; Solomon, R.; Mass, C.; Liu, Y.; Odman, M.T.; Shen, H., 2019: Machine Learning-Based Integration of High-Resolution Wildfire Smoke Simulations and Observations for Regional Health Impact Assessment. *Int. J. Environ. Res. Public Health* **2019**, *16*, 2137.
- Conricket, R. and C. F. Mass, 2019b: An Evaluation of Simulated Precipitation Characteristics During OLYMPEX. *J. Hydromet.*, **20**, 1147-1164
- Conricket, R. and C. F. Mass, 2019a: Evaluating simulated microphysics during OLYMPEX using GPM satellite observations. *J. Atmos. Sci.*, **76**, 1093-1105
- Weber, N. and C. F. Mass, 2019: Are Global Convection-Permitting Models the Future of Subseasonal Weather Prediction? Accepted in *Bull. Amer. Met. Soc.*, **100**, 1070-1089
- Mass, C., N. Weber, R. Conricket, and J. Zagrodnik, 2019: The Quinault Blow Down: A Microscale Wind Event Driven by a Mountain-Wave Rotor. *Bull. Amer. Met. Soc.*, **100**, 977-986

- McNicholas, C. and C.F. Mass, 2018: Impacts of Assimilating Smartphone Pressure Observations on Forecast Skill during Two Case Studies in the Pacific Northwest. *Wea. Forecasting*, **33**, 1375–1396
- Conrick, R., C. F. Mass, and Q. Zhong, 2018: Simulated Kelvin-Helmholtz waves over terrain and their microphysical implications. *J. Atmos. Sci.*, **75**, 2787-2800
- McNicholas, C., and C. F. Mass, 2018: Smartphone pressure collection and bias correction using machine learning. *J. Atmos. Ocean Tech.*, **35**, 523-540.
- Weber, N. J. and C. F. Mass, 2017: Evaluating the subseasonal to seasonal CFSv2 forecast skill with an emphasis on tropical convection. *Mon. Wea. Rev.*, **146**, 3795-3815
- Houze, R. A., Jr., L. A. McMurdie, W. A. Petersen, M. R. Schwaller, W. Baccus, J. Lundquist, C. Mass, B. Nijssen, S. A. Rutledge, D. Hudak, S. Tanelli, G. G. Mace, M. Poellot, D. Lettenmaier, J. Zagrodnik, A. Rowe, J. DeHart, L. Madaus, H. Barnes, 2017: The Olympic Mountains Experiment (OLYMPEX). *Bull. Amer. Meteor. Soc.*, **98**, 2167-2188
- Picard, L. and C. F. Mass, 2017: The sensitivity of orographic precipitation to flow direction: an idealized modeling approach. *J. Hydromet.*, **18**, 1673-1688
- Madaus, L., and C. Mass, 2017: Evaluating smartphone pressure observations for mesoscale analyses and forecasts. *Wea. Forecasting.*, **32**, 511-531
- Warner, M. and C. Mass, 2017: Changes in the climatology, structure, and seasonality of northeast Pacific atmospheric rivers in CMIP5 climate simulations. *J. Hydromet.*, **18**, 2121-2141
- Wayand, N. E., J. Stemberis, J. P. Zagrodnik, C. F. Mass, and J. D. Lundquist, 2016, Improving simulations of precipitation phase and snowpack at a site subject to cold air intrusions: Snoqualmie Pass, WA, *J. Geophys. Res. Atmos.*, **121**, doi:10.1002/2016JD025387.
- Brewer, M. and C. Mass, 2016: Projected changes in heat extremes and associated synoptic/mesoscale conditions over the northwest U.S. *J. Climate*, **9**, 6383-6400
- Brewer, M. and C. Mass, 2016: Projected changes in western U.S. large-scale summer synoptic circulations and variability in CMIP5 models. *J. Climate*, **29**, 5965-5978
- Dixon K., C. F. Mass, G. Hakim; R. Holzworth, 2016: The impact of lightning data assimilation on deterministic and ensemble forecasts of convective events. *J. Atmos. Ocean Tech.*, **33**, 1801-1823
- Mass, C., M. Warner, R. Vargas, and N. Johnson, 2015: Synoptic control of cross-barrier precipitation ratios for the Cascade Mountains. *J. Hydrometeor*, **16**, 1014-1028
- Henn, B. Q. Cao; D. Lettenmaier; C. Magirl; C. Mass; J. Bower; M. Laurent; Y. Mao; S. Perica, 2015: Hydroclimatic conditions preceding the March 2014 Oso landslide., 2015: *J. Hydrometeor.* **16**, 1243-1249
- Warner, M. D., C. F. Mass, and E. Salathé, Jr., 2015: Changes in wintertime atmospheric rivers along the North American west coast in CMIP5 climate models. *J. Hydro*, **16**, 118-128
- Mass, C. and L. E. Madaus, 2014: Surface pressure observations from smartphones: a potential revolution for high-resolution weather prediction? *Bull. Amer. Meteor. Soc.*, **95**, 1343–1349.
- Brewer, M. and C. Mass, 2014: Simulation of summer diurnal circulations over the Northwest United States. *Wea. Forecasting*, **29**, 1208–1228.
- Ancell B. C., C. F. Mass, K. Cook, and B. Colman, 2014: Comparison of surface wind and temperature analyses from an ensemble Kalman Filter and the NWS Real Time Mesoscale Analysis system. *Wea. Forecasting*, **29**, 1058–1075
- Madaus, L., G. J. Hakim and C. F. Mass, 2014: Utility of dense pressure observations for improving mesoscale analyses and forecasts. *Mon. Wea. Rev.*, **142**, 2398–2413.
- Mass, C., M. D. Warner, and R. Steed, 2014: Strong Westerly Wind Events in the Strait of Juan de Fuca. *Wea. Forecasting*, **29**, 445–465

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- Brewer, M., C. Mass, and B. Potter, 2013: The West Coast Thermal Trough: Mesoscale Evolution and Sensitivity to Terrain and Surface Fluxes. *Mon. Wea. Rev.*, **141**, 2869–2896.
- Wolff, J. K., B. S. Ferrier, C. F. Mass, 2012: Establishing Closer Collaboration to Improve Model Physics for Short-Range Forecasts. *Bull. Amer. Meteor. Soc.*, **93**, ES51–ES53.
- Brewer, Matthew C., Clifford F. Mass, Brian E. Potter, 2012: The West Coast Thermal Trough: Climatology and Synoptic Evolution. *Mon. Wea. Rev.*, **140**, 3820–3843.
- Mass, C., 2012: Nowcasting: The Promise of New Technologies of Communication, Modeling, and Observation. Mass, Clifford, 2012: Nowcasting: The Promise of New Technologies of Communication, Modeling, and Observation. *Bull. Amer. Meteor. Soc.*, **93**, 797–8
- Warner, Michael D., Clifford F. Mass, Eric P. Salathé, 2012: Wintertime extreme precipitation events along the Pacific Northwest coast: climatology and synoptic evolution. *Mon. Wea. Rev.*, **140**, 2021–2043
- Sharp, J. and C. Mass, 2012: The Structure and Dynamics of Gap Flow Through the Columbia Gorge. Submitted to *Mon. Wea. Rev.*
- Mass, C. F., A. Skaenakis, M. Warner, 2011: Extreme Precipitation over the West Coast of North America: Is There a Trend?, *J. of Hydromet.*, **12**, 310-318
- Ancell, B., C. F. Mass, and G. J. Hakim, 2011: Evaluation of Surface Analyses and Forecasts with a Multiscale Ensemble Kalman Filter in Regions of Complex Terrain. *Mon. Wea. Rev.*, **139**, 2008-2024
- Kleiber, William, Adrian E. Raftery, Jeffrey Baars, Tilmann Gneiting, Clifford F. Mass, Eric Grimit, 2011: Locally Calibrated Probabilistic Temperature Forecasting Using Geostatistical Model Averaging and Local Bayesian Model Averaging. *Mon. Wea. Rev.*, **139**, 2630–2649.
- Stoelinga, M., M. Albright and C. Mass: Snowpack trends over the Pacific Northwest, 2010., *J. Climate*, **23**, 2473-2491
- C. F. Mass and B. Dotson, 2010: Major windstorms of the Pacific Northwest. *Mon. Wea. Rev.*, **138**, 2499-2527
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- Ancell B. C., Mass C. F., 2008: The variability of adjoint sensitivity with respect to model physics and basic-state trajectory. *Monthly Weather Review*, **136**, 4612-4628
- Salathe, E. P., P. H. Zahn, R. Steed, and C. F. Mass, 2008. A high-resolution climate model for the United States Pacific Northwest: Mesoscale feedbacks and local responses to climate change. *J. Climate*, **21**, 5708-5726.
- Mass, C. F., J. Baars, G. Wedam, E. Gritmit, and R. Steed, 2008: Removal of systematic model bias on a model grid. *Wea. Forecasting*, **23**, 438-459.
- Gritmit, E. P., and C. F. Mass, 2007: Measuring the Ensemble Spread-Error Relationship with a Probabilistic Approach: Stochastic Ensemble Results. *Monthly Weather Review*, **135**, 203-221
- Garvert, M., B. Smull, and C. Mass, 2007: Multiscale mountain waves influencing a major orographic precipitation event. *J. Atmos. Sci.*, **64**, 711-737
- Maurer, E. P., and C. F. Mass, 2006. Using radar data to partition precipitation into rain and snow in a hydrologic model. *Journal of Hydrologic Engineering* **11**, 214-221
- Ancell B. C. and C. F. Mass, 2006: Structure, growth rates, and tangent linear accuracy of adjoint sensitivities with respect to horizontal and vertical resolution. Accepted in *Monthly Weather Review*. **134**, 2971-2988
- Tinis, S. W., R. E. Thomson, C. F. Mass, and B. M. Hickey, 2006: Comparison of MM5 and meteorological buoy winds from British Columbia to northern California. *Atmos. Ocean*, **44**, 65-81
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- Colle B. A., M. F. Garvert, J. B. Wolfe, C. F. Mass and C. P. Woods. 2005: The 13-14 December 2001 IMPROVE-2 Event. Part III: Simulated Microphysical Budgets and Sensitivity Studies. *Journal of the Atmospheric Sciences*, **62**, 3535-3558.
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- Eckel, F. A. and C. F. Mass, 2005: Effective mesoscale, short-range ensemble forecasting. *Weather and Forecasting*, **20**, 3238-350
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- Vaughan J., B. Lamb, R. Wilson, C. Bowman, C. Kaminsky, S. Otterson, M. Boyer, C. Mass, M. Albright, J. Koenig, Alice Collingwood, Mike Gilroy and Naydene Maykut, 2004: A Numerical Daily Air-Quality Forecast System for the Pacific Northwest. *Bull. Amer. Meteor. Soc.*, **85**, 549-561.
- McMurdie, L., and C. F. Mass, 2004: Major Numerical Forecast Failures in the Northeast Pacific. *Weather and Forecasting*, **19**, 338-356
- C.F. Mass, 2003: Reply to Comments on "IFPS and the Future of the National Weather Service". *Weather and Forecasting*, **18**, 1305-1306

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- C. F. Mass et al.; 2003: Regional Environmental Prediction over the Pacific Northwest. *Bull. Amer. Meteor. Soc.*, **84**, 1353-1366
- Sharp, J., and C. F. Mass, 2002: Columbia Gorge flow: insights from observational analysis and ultra-high resolution model simulation. *Bull. Amer. Meteor. Soc.*, **18**, 75-79
- Grimit, E. P., and C. F. Mass, 2002: Initial results of a mesoscale short-range ensemble forecasting system over the Pacific Northwest, *Weather and Forecasting*, **17**, 192-205
- Mass, C., D. Ovens, M. Albright, and K. Westrick, 2002: Does Increasing Horizontal Resolution Produce Better Forecasts?: The Results of Two Years of Real-Time Numerical Weather Prediction in the Pacific Northwest. *Bull. Amer. Meteor. Soc.*, **83**, 407-430.
- Westrick, K. J., P. Storck, and C. F. Mass, 2002, Description and evaluation of a hydrometeorological forecast system for mountainous watersheds. *Weather and Forecasting*, **17**, 250-262.
- Colle, B.A., C. F. Mass, and D. Ovens, 2001: Evaluation of the timing and strength of MM5 and Eta surface trough passages over the eastern Pacific. *Weather and Forecasting*, **16**, 553-572
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- Colle, B. A. and C. F. Mass, 2000: High-resolution observations and numerical simulations of easterly gap flow through the Strait of Juan de Fuca on 9-10 December 1995. *Mon. Wea. Rev.*, **128**, 2363-2396
- Colle, B. A. and C. F. Mass, 2000: The 5-9 February 1996 flooding event over the Pacific Northwest: sensitivity studies and evaluation of the MM5 precipitation forecasts. *Mon. Wea. Rev.*, **128**, 593-617
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- Schneider, S. H., and C. Mass, 1975: Volcanic dust, sunspots, and temperature trends. *Science*, **190**.

## Electronic Publications

- National Meteorological Center Grid Point Data Set CD-ROM (Versions I and II).  
 GALE Experiment CD-ROM.  
 North American Observational Data for August-December 1987 CD-ROM.  
 World Weather Disc CD-ROM.  
 Climate Analysis Center Global Gridded Data

## **Offices and Honors**

Fellow, American Meteorological Society  
Max Eaton Award, American Meteorological Society  
President, Puget Sound Chapter, American Meteorological Society.  
Program Chairman, Puget Sound Chapter, AMS.  
Treasurer, Puget Sound Chapter, AMS.  
Chairman, UCAR (University Corporation for Atmospheric Research), UNIDATA Data Access Committee.  
Associate Editor, Monthly Weather Review.  
Consulting Editor, Encyclopedia of Climate and Weather.  
Chairman, UCAR Committee on Meteorological Data Sets  
Chairman, 15th AMS Conference on Weather Analysis and Forecastings  
Chairman, Special Workshop on Real-Time Mesoscale NWP in the University Community  
Chairman, AMS Mesoscale Meteorology Committee  
Chairman, DTC Science Advisory Board  
Co-chair, AMS Committee on Communication

## **National Committees**

Exec. Committee AMS Forecast Interest Group  
AMS Membership Committee  
AMS Board on Enterprise Communication  
DTC Science Advisory Board  
WRF Research Applications Board  
NRC Committee on Atmospheric Predictability  
AMS Ad-Hoc Committee on Community Fora  
Chairman and member, USWRP CONDUIT committee  
USWRP Science Advisory Board  
WRF Science Board  
Chairman and member, AMS Mesoscale Committee  
USWRP PDT#4 on Mountain Meteorology  
USWRP PDT#9 on Hydrology  
AMS Committee on Weather Analysis and Forecasting  
MM5 Community Oversight Committee  
AMS Information Systems Committee  
UCAR/NWS Local Digital Library Committee  
UNIDATA Steering and Data Access Committees  
National Academy of Sciences Geophysical Data Committee  
UCAR COMET Advisory Committee  
Search Committee for New NWS Director  
Executive Committee, Board of Oceans and Atmosphere, National Association of State Universities and Land Grant Colleges  
UCAR UCAM Committee

## **Regional Committees**

Northwest Regional Modeling Consortium

## **University Committees and Organizations**

Member and Chair: College Council, College of the Environment  
Member, University Senate 1988-1990, 2004-2006  
Department Computer Committee

Arts and Sciences Graduation Committee  
Department Rules and Computer Committees

### **Past Graduate Students**

Kucera, T., 1981: M.S. on mesoscale modeling in complex terrain.  
Delman, A., 1981: M.S. on diurnal wind and temperature variations and air quality in Washington, D.C. area.  
Dubofsky, D., 1981: M.S. on a diagnostic study of Hurricane David.  
Dempsey, D., 1985: Ph.D. on mesoscale modeling in complex terrain.  
Pam Speers, 1985: M.S. on precipitation diagnoses and modeling in complex terrain.  
David Portman, 1988: M.S. Effects of major eruptions on surface temperature and pressure.  
Daniel Brees, 1988: M.S. Onshore push of the Pacific Northwest.  
Brian Ulrickson, 1989: Ph.D. 3D primitive equation modeling of flow in the LA basin.  
Garth Ferber, 1991 M.S. Mesoscale pressure perturbations forced by the Olympic Mountains.  
David Schultz, 1992, M.S. Structural analysis of a midlatitude cyclone over land.  
Brian Colle, 1994, M.S. Northerly surges to the east of the Rocky Mountains.  
Jim Steenburgh, 1995, Ph.D: Mesoscale modeling of synoptic/orographic interactions.  
Brian Colle, 1997, Ph.D: Dynamics of windstorms in three dimensional terrain  
Fang-Ching Chien, 1997, Ph.D: Interaction of fronts with coastal topography.  
Ken Westrick, 1998, M.S.: Coupling of atmospheric and distributed hydrological models.  
Richard Steed, 1999, M.S.: Initialization of mesoscale forecasting models.  
Eric Gritmit, 2001, M.S.; A Short-Range Ensemble Prediction System  
Justin Sharp, 2002: M.S.: A Study of the Meteorology of the Columbia River Gorge  
Tony Eckel, 2004: Ph.D. Effective Short-Range Mesoscale Ensemble Prediction.  
Eric Gritmit, 2004: Ph.D. Predicting Forecast Skill Using a Mesoscale Ensemble System  
Justin Sharp, 2005, Ph.D. Modeling study of the flow in the Columbia River Gorge.  
Brian Ancell, 2006, Ph.D. Adjoint and ensemble-based forecast sensitivity  
Bri Dotson, 2007, M.S.. Structure and dynamics of major Pacific windstorms.  
Garrett Wedam, 2008, M.S. Errors in numerical prediction models  
Robert Hahn, 2008, M.S. Understanding of microphysical errors in numerical models.  
Ken Dixon, 2013: M.S. Lightning Data Assimilation  
Michael Warner, 2014. M.S. , Ph.D. Heavy precipitation events of the U.S. West Coast  
Lee Picard, 2015. MS. An idealized model of orographic precipitation  
Matt Brewer, 2017: Ph.D. Structure and dynamics of the thermal trough  
Luke Madaus, 2016. Ph.D. Initiation of convection and smartphone data assimilation  
Brandon McClung, 2019, M.S. Diablo Winds.