

# Laura C. Slivinski

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National Oceanic and Atmospheric Administration  
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Earth System Research Laboratories  
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## EDUCATION

- 2014           **Ph.D., Applied Mathematics**, Brown University  
Advisor: Prof. Björn Sandstede  
Title: *Lagrangian Data Assimilation and its Applications to Geophysical Fluid Flows*
- 2010           **M.S., Applied Mathematics**, Brown University, Providence, RI
- 2009           **B.S., Mathematics**, University of Maryland, College Park

## PROFESSIONAL EXPERIENCE

- 2023 – pres.       **Research Mathematical Statistician**, NOAA Physical Sciences Laboratory, Boulder, CO. *Sparse-input global reanalysis; observation impact studies using data-denial experiments; global hourly-updating data assimilation; coupled data assimilation.*
- 2015 – 2023       **Research Scientist**, CIRES & NOAA PSL, Boulder, CO.
- 2014 – 2015       **Postdoctoral Investigator**, Woods Hole Oceanographic Institution; Dept. of Physical Oceanography, Woods Hole, MA. *Lagrangian data assimilation for parameter estimation*
- Summer 2013      **Graduate Student Visitor**, National Center for Atmospheric Research; Mesoscale and Microscale Meteorology Laboratory, Boulder, CO. *Applications of particle filters to high-dimensional nonlinear systems*
- Summer 2010      **Graduate Intern**, MIT Lincoln Laboratory, Lexington, MA. *Compressive sensing techniques for communications algorithms*
- 2009 – 2014      **Graduate Research Assistant**, Brown University, Division of Applied Mathematics, Providence RI. *Lagrangian data assimilation and dynamical systems*
- Summer 2008      **Undergraduate Intern**, Mathematics Summer Employment Program, National Security Agency. *Analysis of metadata files using Perl for intelligence applications.*

## HONORS & AWARDS

- 2022                    CIRES Cash-in-a-Flash Award  
*For outstanding service and dedication to the Reanalysis and Data Assimilation Team*
- 2020                    CIRES Silver Medal  
*For creating a 200-year Historic Reanalysis dataset of global weather and extremes from only surface pressure and sea surface temperature observations*
- 2020, 2021            NOAA Boulder Outreach Gold Star Award
- 2015                    AWM-NSF Mathematics Travel Grant for Women Researchers
- 2014                    Stella Dafermos Prize from the Division of Applied Mathematics at Brown University
- 2006 – 2009           University of Maryland Gemstone Program (*interdisciplinary undergraduate team research project, culminating in a thesis defense*)
- 2005 – 2009           University of Maryland Presidential Scholarship, Distinguished Scholar, Orbital Science's Kelly H. Burke Scholarship, National Society of Collegiate Scholars, Mortar Board Honor Society

## GRANTS AWARDED

- 2019 – 2022           *Principal Investigator* (co-PI Gilbert P. Compo). “Development of a Global Hourly Updating Data Assimilation System”, National Oceanic and Atmospheric Administration; \$877,892.00.

## PEER-REVIEWED PUBLICATIONS

- Hawkins, E., P. Brohan, S. Burgess, S. Burt, G. Compo, S. Gray, I. Haigh, H. Hersbach, K. Kuyper, O. Martinez-Alvarado, C. McColl, A. Schurer, **L. Slivinski**, and J. Williams, 2022. Rescuing historical weather observations improves quantification of severe windstorm risks. *EGUsphere* [preprint]. <https://doi.org/10.5194/egusphere-2022-1045>
- Yu, B., X.L. Wang, Y. Feng, R. Chan, G.P. Compo, **L.C. Slivinski**, P.D. Sardeshmukh, M. Wehner, and X.-Y. Yang, 2022. Northern Hemisphere Extratropical Cyclone Activity in the Twentieth Century Reanalysis Version 3 (20CRv3) and Its Relationship with Continental Extreme Temperatures. *Atmosphere* 13 (8): 1166. <https://doi.org/10.3390/atmos13081166>
- Lorrey, A.M., P.R. Pearce, R. Allan, C. Wilkinson, J.-M. Woolley, E. Judd, S. Mackay, S. Rawhat, **L.C. Slivinski**, S. Wilkinson, E. Hawkins, P. Quesnel, G.P. Compo, 2022: Meteorological data rescue: Citizen science lessons learned from Southern Weather Discovery. *Patterns* 3(6). <https://doi.org/10.1016/j.patter.2022.100495>

- Slivinski, L.C.**, D.E. Lippi, J.S. Whitaker, G. Ge, J.R. Carley, C. Alexander, G.P. Compo, 2022: Overlapping Windows in a Global Hourly Data Assimilation System. *Monthly Weather Review* 150(6). <https://doi.org/10.1175/mwr-d-21-0214.1>
- Broennimann, S., P. Stucki, J. Franke, V. Valler, Y. Brugnara, R. Hand, **L.C. Slivinski**, G.P. Compo, P.D. Sardeshmukh, M. Lang, 2022: Influence of warming and atmospheric circulation changes on multidecadal European flood variability. *Climate of the Past* 18(4). <https://doi.org/10.5194/cp-18-919-2022>
- Slivinski, L. C.**, G. P. Compo, P. D. Sardeshmukh, J. S. Whitaker, and 36 coauthors, 2021: An evaluation of the performance of the 20th Century Reanalysis version 3. *J. Climate* 34(4): 1417–1438. <https://doi.org/10.1175/JCLI-D-20-0505.1>
- Fogt, R.L., C.P. Belak, J.M. Jones, **L.C. Slivinski**, and G.P. Compo, 2021: An assessment of early 20th century Antarctic pressure reconstructions using historical observations. *Int. J. Climatol.* 41 (Suppl. S1): E672–E689. <https://doi.org/10.1002/joc.6718>
- Robertson, F. R., J.B. Roberts, M.G. Bosilovich, A. Bentamy, C.A. Clayson, K. Fennig, M. Schröder, H. Tomita, G.P. Compo, M. Gutenstein, H. Hersbach, C. Kobayashi, L. Ricciardulli, P. Sardeshmukh, and **L.C. Slivinski**, 2020: Uncertainties in Ocean Latent Heat Flux Variations over Recent Decades in Satellite-Based Estimates and Reduced Observation Reanalyses. *J. Climate* 33: 8415–8437. <https://doi.org/10.1175/JCLI-D-19-0954.1>
- Slivinski, L.C.**, G.P. Compo, J.S. Whitaker, P.D. Sardeshmukh, and 42 coauthors, 2019: Towards a more reliable historical reanalysis: Improvements for version 3 of the Twentieth Century Reanalysis system. *Quarterly Journal of the Royal Meteorological Society* 145:2876-2908. <https://doi.org/10.1002/qj.3598> [Invited.]
- Slivinski, L.C.**, G.P. Compo, J.S. Whitaker, P.D. Sardeshmukh, J.-W. A. Wang, K. Friedman, C. McColl, 2019: What is the impact of additional tropical observations on a modern data assimilation system? *Monthly Weather Review* 147, 2433-2449. <https://doi.org/10.1175/MWR-D-18-0120.1>
- Wang, J.-W. A., P.D. Sardeshmukh, G.P. Compo, J.S. Whitaker, **L.C. Slivinski**, C.M. McColl, and P.J. Pegion, 2019: Sensitivities of the NCEP Global Forecast System. *Monthly Weather Review* 147, 1237 – 1256. <https://doi.org/10.1175/MWR-D-18-0239.1>
- Slivinski, L.C.**, 2018: Historical reanalysis: what, how, and why? *Journal of Advances in Modeling Earth Systems* 10, 1736 – 1739. <https://doi.org/10.1029/2018MS001434> [Invited.]
- Dole, R.M., J.R. Spackman, M. Newman, G.P. Compo, C.A. Smith, L.M. Hartten, J.J. Barsugli, R.S. Webb, M.P. Hoerling, R. Cifelli, K. Wolter, C.D. Barnet, M. Gehne, R. Gelaro, G.N. Kiladis, S. Abbott, E. Akish, J. Albers, J.M. Brown, C.J. Cox, L. Darby, G. de Boer, B. DeLuisi, J. Dias, J. Dunion, J. Eischeid, C. Fairall, A. Gambacorta, B.K. Gorton, A. Hoell, J. Intrieri, D. Jackson, P.E. Johnston, R. Lataitis, K.M. Mahoney, K. McCaffrey, H.A. McColl, M.J. Mueller, D. Murray, P.J. Neiman, W. Otto, O. Persson,

X. Quan, I. Rangwala, A.J. Ray, D. Reynolds, E.R. Dellaripa, K. Rosenlof, N. Sakaeda, P.D. Sardeshmukh, **L.C. Slivinski**, L. Smith, A. Solomon, D. Swales, S. Tulich, A. White, G. Wick, M.G. Winterkorn, D.E. Wolfe, and R. Zamora, 2018: Advancing science and services during the 2015-16 El Niño: The NOAA El Niño Rapid Response field campaign. *Bulletin of the American Meteorological Society*, 99, 975 – 1001. <https://doi.org/10.1175/BAMS-D-16-0219.1>

Thorne, P., R.J. Allan, L. Ashcroft, P. Brohan, R.J. Dunn, M.J. Menne, P.R. Pearce, J. Picas, K.M. Willett, M. Benoy, S. Bronnimann, P.O. Canziani, J. Coll, R. Crouthamel, G.P. Compo, D. Cuppett, M. Curley, C. Duffy, I. Gillespie, J. Guijarro, S. Jourdain, E.C. Kent, H. Kubota, T.P. Legg, Q. Li, J. Matsumoto, C. Murphy, N.A. Rayner, J.J. Rennie, E. Rustemeier, **L.C. Slivinski**, V. Slonosky, A. Squintu, B. Tinz, M.A. Valente, S. Walsh, X.L. Wang, N. Westcott, K. Wood, S.D. Woodruff, and S.J. Worley, 2017: Toward an integrated set of surface meteorological observations for climate science and applications. *Bulletin of the American Meteorological Society*, 98, 2680 – 2702. <https://doi.org/10.1175/BAMS-D-16-0165.1>

**Slivinski, L.C.**, L.J. Pratt, I.I. Rypina, M.M. Orescanin, B. Raubenheimer, J. MacMahan, and S. Elgar, 2017: Assimilating Lagrangian data for parameter estimation in a multiple-inlet system. *Ocean Modelling*, 113, 131 – 144. <https://doi.org/10.1016/j.ocemod.2017.04.001>

Xia, C., C. Cochrane, J. DeGuire, G. Fan, E. Holmes, M. McGuirl, P. Murphy, J. Palmer, P. Carter, **L.C. Slivinski**, and B. Sandstede, 2017: Assimilating Eulerian and Lagrangian data in traffic-flow models. *Physica D*, 346, 59 – 72. <https://doi.org/10.1016/j.physd.2017.02.004>

**Slivinski, L.C.**, and C. Snyder, 2016: Exploring practical estimates of the ensemble size necessary for particle filters. *Monthly Weather Review*, 144(3), 861 – 875. <https://doi.org/10.1175/MWR-D-14-00303.1>

**Slivinski, L.C.**, E.T. Spiller, A. Apte, and B. Sandstede, 2015: A hybrid particle-ensemble Kalman filter for Lagrangian data assimilation. *Monthly Weather Review*, 143(1), 195 – 211. <https://doi.org/10.1175/MWR-D-14-00051.1>

## OTHER PUBLICATIONS & DATASETS

Compo, G. P., **L.C. Slivinski**, et. al. (2019): *The International Surface Pressure Databank version 4*. Research Data Archive at the National Center for Atmospheric Research, Computational and Information Systems Laboratory. <http://rda.ucar.edu/datasets/ds132.2/>. Accessed 31 Oct. 2019.

**Slivinski, L. C.**, et al. 2019. *NOAA-CIRES-DOE Twentieth Century Reanalysis Version 3*. Research Data Archive at the National Center for Atmospheric Research, Computational and Information Systems Laboratory. <https://doi.org/10.5065/H93G-WS83>. Accessed 31 Oct. 2019.

- Slivinski, L.C.,** E.T. Spiller, and A. Apte, 2015: A hybrid particle-ensemble Kalman filter for high-dimensional Lagrangian data assimilation. *Dynamic Data-Driven Environmental Systems Science*. Ed. Sai Ravela, Adrian Sandu. Volume 8964 of Lecture Notes in Computer Science, pp 263-273. Springer International Publishing. [https://doi.org/10.1007/978-3-319-25138-7\\_24](https://doi.org/10.1007/978-3-319-25138-7_24)
- Slivinski, L.C.,** A.R. Margetts, and D.W. Bliss, 2011: Sparse space-time equalization with  $l_1$  norm. *Asilomar Conference on Signals, Systems, and Computers*. Pacific Grove, CA. <https://doi.org/10.1109/ACSSC.2011.6190282>
- Cigna, J., P. Davé, C. Hickey, J. Holzberger, M. Kuhn, S. Kwok, B. O'Haver, E. Ryan, and **L. Slivinski**, 2009: Specializing pedestrian maps to address the needs of people using wheelchairs: A case study in community-sustainable information systems. (*Undergraduate Thesis*.) Available from the Digital Repository at the University of Maryland (<http://hdl.handle.net/1903/9076>).

## INVITED PRESENTATIONS

- Slivinski, L.C. and G.P. Compo, 2022: **Overview of different periods for reanalysis**. Talk. *CLIVAR Workshop on Future US Earth System Reanalysis*, Boulder, CO, USA.
- Slivinski, L.C., G.P. Compo, J.S. Whitaker, P.D. Sardeshmukh, P. Brohan, R. Allan, et al., 2021: **The 20th Century Reanalysis**. Talk (virtual). *26th UN Climate Change Conference of the Parties (COP26)*. Glasgow, United Kingdom.
- Slivinski, L.C., G.P. Compo, P.D. Sardeshmukh, J.S. Whitaker, 2021: **A synoptic to decadal evaluation of the 20th Century Reanalysis version 3**. Talk. *U. Bern Institute of Geography's Colloquium in Climatology, Climate Impact and Remote Sensing*. Bern, Switzerland.
- Slivinski, L.C., G.P. Compo, J.S. Whitaker, P.D. Sardeshmukh, P. Brohan, B. Giese, C. McColl, and R. Allan, 2019: **Capturing nearly 200 years of storms in the 20th Century Reanalysis version 3**. Talk. *South America C3S Data Rescue Capacity Building Workshop and ACRE Meeting*, UTN, Buenos Aires, Argentina.
- Slivinski, L. C., A. Apte, E. Spiller, and B. Sandstede, 2018: **Recent applications of the hybrid particle-ensemble Kalman filter in Lagrangian data assimilation**. Talk. *Applied Math Department Dynamics Seminar*, Univ. of Colorado, Boulder, CO, USA.
- Slivinski, L.C., G. P. Compo, J. S. Whitaker, and P. D. Sardeshmukh, 2017: **Status of, and plans for, the 20th Century Reanalysis**. Talk. *The 10th Atmospheric Circulation Reconstructions over the Earth Workshop*, Auckland, New Zealand.
- Slivinski, L.C., G. P. Compo, J. S. Whitaker, and P. D. Sardeshmukh, 2017: **Improvements in the 20th Century Reanalysis version 3**. Talk. *5th International Conference on Reanalysis*, Rome, Italy.
- Slivinski, L.C., G. P. Compo, P. D. Sardeshmukh, J. S. Whitaker, J.-W. A. Wang, K. Friedman, and C. McColl, 2017: **The impact of observations on data assimilation:**

**Results from data-denial experiments.** Talk. *NOAA EN3R PSD-NCEP Workshop*, College Park, MD, USA.

Slivinski, L.C., G. P. Compo, J. S. Whitaker, and P. D. Sardeshmukh, 2017: **Opportunities for improvement in the Twentieth Century Reanalysis.** Talk. *Banff International Research Station Workshop*, Banff, Alberta, Canada.

Slivinski, L.C., 2016: **An application of Lagrangian data assimilation to Katama Bay, MA.** Talk. *Mathematics and Climate Research Network webinar*.

Slivinski, L.C., 2016: **Discussion on data assimilation.** Panelist. *Meeting on Mathematical Issues in Sea-Ice Modeling and Data Assimilation*, Nansen Environmental and Remote Sensing Center, Bergen, Norway.

Slivinski, L.C., 2015: **Extracting the most from drifter trajectories: A method for Lagrangian data assimilation.** Talk. *Midwest Mathematics and Climate Conference*, Lawrence, KS, USA.

## OTHER SELECTED PRESENTATIONS

Slivinski, L. C., D. E. Lippi, J. S. Whitaker, G. Ge, J. R. Carley, C. Alexander, G. P. Compo, 2022: **Overlapping Windows in a Global Hourly Data Assimilation System.** Talk. *International Symposium on Data Assimilation*. Fort Collins, CO, USA.

Slivinski, L. C., D. E. Lippi, J. S. Whitaker, G. Ge, J. R. Carley, C. Alexander, G. P. Compo, 2022: **Overlapping Windows in a Global Hourly Data Assimilation System.** Talk. *American Meteorological Society Annual Meeting*. virtual.

Slivinski, L. C., D. E. Lippi, J. S. Whitaker, G. Ge, J. R. Carley, C. Alexander, G. P. Compo, 2021: **Progress towards a global hourly-updating data assimilation system.** Talk. *WCRP-WWRP Symposium on Data Assimilation and Reanalysis*. virtual.

Slivinski, L. C., G. P. Compo, P. D. Sardeshmukh, and J. S. Whitaker, 2021: **A synoptic to decadal evaluation of the 20th Century Reanalysis Version 3.** Talk. *WCRP-WWRP Symposium on Data Assimilation and Reanalysis*. virtual.

Slivinski, L.C., G.P. Compo, J.S. Whitaker, and P.D. Sardeshmukh, 2020: **Assimilating 200 Years of Weather: The Twentieth-Century Reanalysis Version 3 System.** Talk. *American Meteorological Society Annual Meeting*, Boston, MA, USA.

Slivinski, L.C., G.P. Compo, J.S. Whitaker, P.D. Sardeshmukh, P. Brohan, B. Giese, C. McColl, and R. Allan, 2018: **Capturing more than 100 years of storms in the 20<sup>th</sup> Century Reanalysis version 3.** Talk. *AGU Fall Meeting*, Washington, D.C., USA.

Slivinski, L.C., A. Apte, and E. Spiller, 2018: **Recent applications of the hybrid particle-ensemble Kalman filter in Lagrangian data assimilation.** Talk. *The 8th EnKF Data Assimilation Workshop*, Montreal, Quebec, Canada.

- Slivinski, L.C., G.P. Compo, J.S. Whitaker, and P.D. Sardeshmukh, 2017: **Quantifying uncertainty in the 20<sup>th</sup> Century Reanalysis version 2c, and improvements in version 3**. Poster. *AGU Fall Meeting*, San Francisco, CA, USA.
- Slivinski, L.C., G.P. Compo, J.S. Whitaker, and P.D. Sardeshmukh, 2016: **Biases in the 20<sup>th</sup> Century Reanalysis version 2c and a comparison to version 3**. Talk. *9th ACRE Workshop and Historical Weather and Climate Data Forum*, University of Maynooth, Ireland.
- Slivinski, L.C., L. Pratt, I. Rypina, M. Orescanin, S. Elgar, and B. Raubenheimer, 2016: **An application of Lagrangian data assimilation to Katama Bay, MA**. Poster. *AGU Ocean Sciences Meeting*, New Orleans, LA, USA.
- Slivinski, L.C., L. Pratt, and I. Rypina, 2015: **An application of Lagrangian data assimilation to Katama Bay, MA**. Talk. *SIAM Conference on Applications of Dynamical Systems*, Snowbird, UT, USA.
- Slivinski, L.C., L. Pratt, and I. Rypina, 2014: **An application of Lagrangian data assimilation to Katama Bay using ensemble methods**. Talk. *MURI 3D+1 Workshop*, Miami, FL, USA.
- Slivinski, L.C., A. Apte, E. Spiller, and B. Sandstede, 2014: **A hybrid particle-ensemble Kalman filter scheme for Lagrangian data assimilation**. Talk. *SIAM Conference on Uncertainty Quantification*, Savannah, GA, USA.
- Slivinski, L.C. and C. Snyder, 2013: **Particle filtering for nonlinear systems: Proposals and scalability**. Talk. *IMA Hot Topics Workshop: Predictability in Earth Systems Processes*, University of Minnesota, MN, USA.
- Slivinski, L.C., A. Apte, E. Spiller, and B. Sandstede, 2013: **Lagrangian data assimilation and its applications to geophysical fluid flows**. Poster. *Sixth WMO Symposium on Data Assimilation*, College Park, MD, USA.
- Slivinski, L.C., A. Apte, E. Spiller, and B. Sandstede, 2012: **Lagrangian data assimilation and its applications to geophysical fluid flows**. Talk. *Colloquium*, TIFR-CAM, Bangalore, India.
- Slivinski, L.C., A.R. Margetts, and D.W. Bliss, 2011: **Sparse space-time equalization with  $l_1$  norm**. Poster. *IEEE Asilomar Conference on Signals, Systems, and Computers*, Pacific Grove, CA, USA

## TEACHING EXPERIENCE

- 2019, 2021                    **Guest lecturer**, University of Colorado Boulder  
Applied mathematics course on data assimilation  
“Inflation and localization in practice: Reconstructing 200 years of weather”
- 2010 – 2011                **Teaching assistant**, Brown University  
Probabilistic and Deterministic Models for Operations Research,

Statistical Inference I  
 2007 – 2009 **Tutor**, University of Maryland  
 Algebra I, Calculus I, Calculus II  
 2007 – 2008 **Teaching assistant**, University of Maryland  
 Algebra I and II

## PROFESSIONAL SERVICE

Oct. 2022 **Session chair**, “Reanalysis”; [International Symposium on Data Assimilation – Online](#)  
 2022 – 2023 **Mentor**, CIRES Mentoring Program  
 Aug. 2022 – pres. **Seminar committee member**, NOAA Physical Sciences Laboratory  
 July 2022 **Career panelist**, Research Experience for Community College Students (RECCS); CU Boulder  
 May 2022 **Scientific Organizing Committee member**, CLIVAR Workshop on Future US Earth System Reanalysis  
 Jan. 2022 **Session chair**, “Data Assimilation Methodology Advancement for Numerical Weather Prediction” at the AMS Annual Meeting  
 Sept. 2021 **Panelist**, Science Career Paths panel at the NOAA booth; CU Denver Career Fair  
 May – Jul. 2021 **Writing Mentor**, Significant Opportunities in Atmospheric Research and Science (SOARS) undergraduate research program  
 Feb. 2020 **Panelist**, Boulder High School visit to NOAA ESRL  
 Oct. 2019 – Dec. 2020 **Mentor**, U. of Maryland Gemstone Alumni Mentor & Partner Program  
 Jul. 2019 **Poster judge**, UCAR Summer Intern Research Poster Session  
 2018 – pres. **Co-administrator**, Advancing Reanalysis website (reanalyses.org)  
 Jul. 2018 **Invited speaker**, [UNAVCO](#)’s intern career circle  
 Mar. 2017, 2018 **Volunteer and career mentor**, Denver Museum of Nature and Science’s Girls and Science Day  
 Dec. 2016, 2018 **Outstanding Student Presentation Award judge**, AGU Fall Meeting  
 Feb. 2016 **Session moderator**, AGU Ocean Sciences Meeting  
 May 2015 **Mini-symposium organizer**, “Applications of Ensemble Data Assimilation Methods to Climate Processes” at the SIAM Conference on Applications of Dynamical Systems



- Apr. 2014            **Mini-symposium co-organizer**, “Data Assimilation in Atmospheric and Oceanographic Processes” at the SIAM Conference on Uncertainty Quantification
- 2014 – pres.        **Peer-reviewer** for *Monthly Weather Review*, *Journal of Climate*, *Ocean Modelling*, *Journal of Advances in Modeling Earth Systems*, *Climate Dynamics*, *Atmosphere*; **internal reviewer** for NOAA/PSL; **grant proposal reviewer** for NSF and SNSF.

## PROFESSIONAL DEVELOPMENT

- Spring 2018        American Meteorological Society Summer Policy Colloquium  
*10-day immersion in science policy, Washington, D.C.*
- Spring 2015        National Network for Ocean and Climate Change Interpretation  
*Study Circle Science Fellow*
- Summer 2013       Interdisciplinary Summer School: Data Assimilation in the  
Geosciences, University of Maryland, College Park
- Summer 2012       International Summer School on Advanced Data Assimilation for  
Geosciences, Les Houches, France.

## MEMBERSHIPS & OTHER INFORMATION

Member of the American Meteorological Society and the American Geophysical Union.

Former member of the Society for Industrial and Applied Mathematics, the Mathematics and Climate Research Network, the Postdoctoral Association of WHOI (*Secretary, Dept. Representative*), the Rose Whelan Society of Brown, and Women in Math at the University of Maryland (*Secretary, Undergraduate Representative*).

Languages: English, LaTeX, MATLAB, Python, NCL.

Experience with Unix/Linux, Fortran, R, Perl.