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## RESEARCH INTERESTS

Climate sensitivity, cloud feedback, radiative forcing

## EDUCATION

Ph.D., Atmospheric Sciences, University of Washington, Dec 2010

M.S., Atmospheric Sciences, University of Washington, Dec 2007

B.S., Meteorology, Pennsylvania State University, May 2004

## PROFESSIONAL EXPERIENCE

Research scientist, Lawrence Livermore National Laboratory, Apr 2013 - present.

Postdoctoral research scholar, Lawrence Livermore National Laboratory, Jan 2011 - Mar 2013.

Graduate research assistant, Dept. of Atmospheric Sciences, Univ. of Washington, Sep 2004 - Dec 2010.

## SUBMITTED PUBLICATIONS

*Asterisks indicate current or former advisees*

Ceppi, P., A. Bodas-Salcedo, **M. D. Zelinka**, T. Andrews, F. Brient, R. Chadwick, J. M. Gregory, Y.-T. Hwang, S. M. Kang, J. E. Kay, T. Mauritsen, T. Ogura, G. Tselioudis, M. Watanabe, M. J. Webb, and A. A. Wing, 2026: The Cloud Feedback Model Intercomparison Project (CFMIP) contribution to CMIP7, *Geosci. Model Dev.*, submitted.

Chao, L.-W.\*, **M. D. Zelinka**, C. R. Terai, H. Beydoun, B. R. Hillman, N. D. Keen, P. M. Caldwell, P. A. Bogenschutz, and S. A. Klein, 2026: Examining Cloud Feedback Components in the Simple Cloud-Resolving E3SM Atmosphere Model (SCREAM), *J. Climate*, submitted.

**Zelinka, M. D.**, T. A. Myers\*, Y. Qin\*, L.-W. Chao\*, S. A. Klein, S. Po-Chedley, P.-L. Ma, C. Wall, P. Ceppi, A. Gettelman, 2026: Recent cloud trends and extremes reaffirm established bounds on cloud feedback and aerosol-cloud interactions, *Commun. Earth Environ.*, submitted.

Ceppi, P., S. Wilson Kemsley, H. Andersen, T. Andrews, R. J. Kramer, P. Nowack, C. J. Wall, and **M. D. Zelinka**, 2026: Emerging low-cloud feedback and adjustment in global satellite observations, *Geophys. Res. Lett.*, submitted.

Zhang, Y., et al. including **M. D. Zelinka**, 2026: Understanding Biases in Simulated Cloud Radiative Effects in E3SMv3, *Earth Space Sci.*, submitted.

Thackeray, C., J. Norris, A. Hall, **M. D. Zelinka**, and S. Po-Chedley, 2026: Record setting heavy precipitation occurrence in 2024, *Sci. Adv.*, submitted.

Feng, C., et al. including **M. D. Zelinka**, 2026: Interconnection of Aerosol Cloud Interactions and Cloud Feedback through Warm Rain Process, *J. Geophys. Res.*, submitted.

Dingley, B., et al. including **M. D. Zelinka**, 2026: CMIP7 Data Request: Atmosphere Priorities and Opportunities, *Geosci. Model Dev.*, submitted.

Tam, R. Y. S., T. A. Myers\*, **M. D. Zelinka**, C. Proistosescu, Y.-J. Lin, K. Marvel, 2026: Meteorological Drivers of the Low-Cloud Radiative Feedback Pattern Effect and its Uncertainty, *Atmos. Chem. Phys.*, submitted.

## PEER-REVIEWED PUBLICATIONS

*Asterisks indicate current or former advisees*

103. Espinosa, Z.\*, **M. D. Zelinka**, C. M. Bitz, K. C. Armour, 2026: The strength of coupling to the Southern Ocean modulates Tropical Eastern Pacific variability and forced response, *J. Climate*, in press.
102. Nugent, J. M., et al. including **M. D. Zelinka**, 2025: Overview of the Nephel Perturbed Parameter Ensemble for aerosol-cloud interactions in E3SMv3, *J. Adv. Model. Earth Syst.*, doi:10.1029/2025MS004989, in press.
101. Fridlind, A. M., et al. including **M. D. Zelinka**, 2025: Towards a Climate OSSE Framework for Satellite Mission Design, *Bull. Am. Meteorol. Soc.*, doi:10.1175/BAMS-D-24-0242.1, in press.
100. Aeronson, T. et al. including **M. D. Zelinka**, 2025: Global models predict clouds at the wrong time of day: does it matter for radiation and climate? *Sci. Adv.*, 11, eady3236, doi:10.1126/sciadv.ady3236.
99. Zehrung, A., A. D. King, Z. Nicholls, **M. D. Zelinka**, and M. Meinshausen, 2025: Standardising the “Gregory method” for calculating equilibrium climate sensitivity, *Geosci. Model Dev.*, 18, 9433–9450, doi:10.5194/gmd-18-9433-2025.
98. Chao, L.-W.\*, **M. D. Zelinka**, et al., 2025: Evaluating Mean State Cloud Properties in the Simple Cloud-Resolving E3SM Atmosphere Model (SCREAM), *J. Adv. Model. Earth Syst.*, 17, doi:10.1029/2025MS005133.
97. Hill, P. G., D. L. Finney, and **M. D. Zelinka**, 2025: Cloud feedback uncertainty in the equatorial Pacific across CMIP6 models, *Geophys. Res. Lett.*, 52, doi:10.1029/2025GL117183.
96. Terai, C. R., et al. including **M. D. Zelinka**, 2025: Radiative, hydrologic, and circulation responses to warming in Cess-Potter simulations using the global 3.25-km SCREAM, *J. Adv. Model. Earth Syst.*, 17, doi:10.1029/2024MS004930.
95. Qin, Y.\*, P. -L. Ma, **M. D. Zelinka**, S. A. Klein, T. Zhang, X. Zheng, V. E. Larson, M. Huang, 2025: Impact of Turbulence on the Relationship between Cloud Feedback and Aerosol-Cloud Interaction in an E3SMv2 Perturbed Parameter Ensemble, *J. Adv. Model. Earth Syst.*, 17, doi:10.1029/2024MS004756.
94. Mauritsen, T., et al. including **M. D. Zelinka**, 2025: Earth’s energy imbalance more than doubled in recent decades, *AGU adv.*, 6, doi:10.1029/2024AV001636.
93. Zhou, C.\*, Q. Wang, I. Tan, L. Zhang, **M. D. Zelinka**, M. Wang, and J. Bloch-Johnson, 2025: Sea ice pattern effect on Earth’s energy budget is characterized by hemispheric asymmetry, *Sci. Adv.*, 11, doi:10.1126/sciadv.adr4248.
92. **Zelinka, M. D.**, L.-W. Chao\*, T. A. Myers\*, Y. Qin\*, and S. A. Klein, 2025: Technical note: Recommendations for diagnosing cloud feedbacks and rapid cloud adjustments using cloud radiative kernels, *Atmos. Chem. Phys.*, 25, 1477–1495, doi:10.5194/acp-25-1477-2025.
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90. Lin, Y.-J., G. V. Cesana, C. Proistosescu, **M. D. Zelinka**, and K. C. Armour, 2025: The relative importance of forced and unforced temperature patterns in driving the time variation of low-cloud feedback, *J. Climate*, 38, 513–529, doi:10.1175/JCLI-D-24-0014.1.

89. Thackeray, C., **M. D. Zelinka**, J. Norris, A. Hall, S. Po-Chedley, 2024: Relationship between tropical cloud feedback and climatological bias in clouds, *Geophys. Res. Lett.*, 51, doi:10.1029/2024GL111347.
88. Ceppi, P., T. A. Myers\*, P. Nowack, C. J. Wall, and **M. D. Zelinka**, 2024: Implications of a pervasive climate model bias for low-cloud feedback, *Geophys. Res. Lett.*, 51, doi:10.1029/2024GL110525.
87. Espinosa, Z.\* and **M. D. Zelinka**, 2024: The Shortwave Cloud-SST Feedback Amplifies Multi-Decadal Pacific Sea Surface Temperature Trends: Implications for Observed Cooling, *Geophys. Res. Lett.*, 51, doi:10.1029/2024GL111039.
86. Lee, J. et al. including **M. D. Zelinka**, 2024: Systematic and Objective Evaluation of Earth System Models: PCMDI Metrics Package (PMP) version 3, *Geosci. Model Dev.*, 17, 3919–3948, doi:10.5194/gmd-17-3919-2024.
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81. Qin, Y.\*, X. Zheng, S. A. Klein, **M. D. Zelinka**, P.-L. Ma, J.-C. Golaz, S. Xie, 2024: Causes of Reduced Climate Sensitivity in E3SM from Version 1 to Version 2, *J. Adv. Model. Earth Syst.*, 16, doi:10.1029/2023MS003875.
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75. Zhou, C.\*, M. Wang, **M. D. Zelinka**, Y. Liu, Y. Dong, K. C. Armour, 2023: Explaining Forcing Efficacy with Pattern Effect and State Dependence, *Geophys. Res. Lett.*, 50, doi:10.1029/2022GL101700.
74. **Zelinka, M. D.**, I. Tan, L. Oreopoulos, G. Tselioudis, 2023: Detailing Cloud Property Feedbacks with a Regime-Based Decomposition, *Clim Dyn.*, 60, 2983–3003, doi:10.1007/s00382-022-06488-7.
73. Santer, B. D, et al. including **M. D. Zelinka**, 2022: Robust anthropogenic signal identified in the seasonal cycle of tropospheric temperature, *J. Climate*, 35(18), 6075–6100, doi:10.1175/JCLI-D-21-0766.1.

72. Hausfather, Z., K. Marvel, G. A. Schmidt, J. W. Nielsen-Gammon, and **M. D. Zelinka**, 2022: Climate simulations: recognize the “hot model” problem, *Nature*, doi:10.1038/d41586-022-01192-2.
71. Samset, B., C. Zhou\*, J. Fuglestad, M. Lund, J. Marotzke, **M. D. Zelinka**, 2022: Earlier emergence of a temperature response to mitigation by filtering annual variability, *Nat Commun.*, 13, 1578, doi:10.1038/s41467-022-29247-y.
70. McCoy, D. M. et al. including **M. D. Zelinka**, 2022: Extratropical shortwave cloud feedbacks in the context of the global circulation and hydrological cycle, *Geophys. Res. Lett.*, 49, doi:10.1029/2021GL097154.
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67. **Zelinka, M. D.**, S. A. Klein, Y. Qin\*, and T. A. Myers\*, 2022: Evaluating climate models’ cloud feedbacks against expert judgment, *J. Geophys. Res.*, 127, doi:10.1029/2021JD035198.
66. Hahn L. C., K. C. Armour, **M. D. Zelinka**, C. M. Bitz, and A. Donohoe, 2021: Contributions to Polar Amplification in CMIP5 and CMIP6 Models. *Front. Earth Sci.*, doi: 10.3389/feart.2021.710036.
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62. Thackeray, C. W., A. Hall, **M. D. Zelinka**, and C. G. Fletcher, 2021: Assessing prior emergent constraints on surface albedo feedback in CMIP6, *J. Climate*, 34(10), 3889–3905, doi:10.1175/JCLI-D-20-0703.1.
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60. Pihl, E., et al. including **M. D. Zelinka**, 2021: 10 New Insights in Climate Science 2021 – a Horizon Scan, *Global Sustainability*, 1–65, doi:10.1017/sus.2021.2.
59. Zhou, C.\*, **M. D. Zelinka**, A. E. Dessler, and M. Wang, 2021: Greater committed warming after accounting for the SST pattern effect, *Nature Clim. Change*, 11, 132–136, doi:10.1038/s41558-020-00955-x.
58. Ma, H.-Y., et al. including **M. D. Zelinka**, 2021: A multi-year short-range hindcast experiment with CESM1 for evaluating climate model moist processes from diurnal to interannual timescales, *Geosci. Model Dev.*, 14, 73–90, doi:10.5194/gmd-14-73-2021.
57. McCoy, D. M., P. Field, A. Bodas-Salcedo, G. S. Elsaesser, and **M. D. Zelinka**, 2020: A regime-oriented approach to observationally constraining extratropical shortwave cloud feedbacks, *J. Climate*, doi:10.1175/JCLI-D-19-0987.1.
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53. **Zelinka, M. D.**, T. A. Myers\*, D. T. McCoy, S. Po-Chedley, P. M. Caldwell, P. Ceppi, S. A. Klein, and K. E. Taylor, 2020: Causes of higher climate sensitivity in CMIP6 models, *Geophys. Res. Lett.*, 47, doi:10.1029/2019GL085782.
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12. Johnston, M. S., et al. including **M. D. Zelinka**, 2013: Diagnosing the average spatio-temporal impact of convective systems - Part 1: A methodology for evaluating climate models, *Atmos. Chem. Phys.*, **13**, 12043–12058, doi:10.5194/acp-13-12043-2013.
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10. **Zelinka, M.D.**, S.A. Klein, K.E. Taylor, T. Andrews, M.J. Webb, J.M. Gregory, and P.M. Forster, 2013: Contributions of Different Cloud Types to Feedbacks and Rapid Adjustments in CMIP5. *J. Climate*, **26**, 5007–5027. doi: 10.1175/JCLI-D-12-00555.1.
9. Zhou, C.\*, **M.D. Zelinka**, A.E. Dessler, P. Yang, 2013: An analysis of the short-term cloud feedback using MODIS data. *J. Climate*, **26**, 4803–4815. doi:10.1175/JCLI-D-12-00547.1.
8. Klein, S.A., et al. including **M. D. Zelinka**, 2013: Are climate model simulations of clouds improving? An evaluation using the ISCCP simulator. *J. Geophys. Res.* **118**, 1329–1342. doi:10.1002/jgrd.50141.
7. Forster, P.M., et al. including **M. D. Zelinka**, 2013: Evaluating adjusted forcing and model spread for historical and future scenarios in the CMIP5 generation of climate models. *J. Geophys. Res.* **118**, 1139–1150. doi: 10.1002/jgrd.50174.
6. **Zelinka, M.D.**, S.A. Klein, and D.L. Hartmann, 2012: Computing and Partitioning Cloud Feedbacks Using Cloud Property Histograms. Part I: Cloud Radiative Kernels. *J. Climate*, **25**, 3715–3735. doi:10.1175/JCLI-D-11-00248.1.
5. **Zelinka, M.D.**, S.A. Klein, and D.L. Hartmann, 2012: Computing and Partitioning Cloud Feedbacks Using Cloud Property Histograms. Part II: Attribution to Changes in Cloud Amount, Altitude, and Optical Depth. *J. Climate*, **25**, 3736–3754. doi:10.1175/JCLI-D-11-00249.1.
4. **Zelinka, M.D.** and D.L. Hartmann, 2012: Climate Feedbacks and their Implications for Poleward Energy Flux Changes in a Warming Climate. *J. Climate*, **25**, 608–624, doi:10.1175/JCLI-D-11-00096.1.
3. **Zelinka, M.D.** and D.L. Hartmann, 2011: The Observed Sensitivity of High Clouds to Mean Surface Temperature Anomalies in the Tropics. *J. Geophys. Res.*, **116**, D23103, doi:10.1029/2011JD016459.

2. **Zelinka, M.D.** and D.L. Hartmann, 2010: Why is Longwave Cloud Feedback Positive? *J. Geophys. Res.*, **115**, D16117, doi:10.1029/2010JD013817.
1. **Zelinka, M.D.** and D.L. Hartmann, 2009: Response of Humidity and Clouds to Tropical Deep Convection. *J. Climate*, **22**, 2389–2404. doi:10.1175/2008JCLI2452.1.

## BOOK CHAPTERS

- Chao, L. -W.\*, A. E. Dessler, and **M. D. Zelinka**, 2026: Climate Feedbacks. In: Robinson, W.A. (Ed.), *Encyclopedia of Atmospheric Sciences*, vol. 5. Elsevier, Academic Press, pp. 117–128, doi:10.1016/B978-0-323-96026-7.00038-2.
- McCoy, D. T., M. E. Frazer, J. Muelmenstaedt, I. Tan, C. R. Terai, and **M. D. Zelinka**, 2024: Extratropical Cloud Feedbacks, in *Clouds and their Climatic Impacts: Radiation, Circulation, and Precipitation*, S. C. Sullivan (Ed) and C. Hoose (Ed), American Geophysical Union.
- Contributing author to Forster et al. 2021: The Earth’s Energy Budget, Climate Feedbacks, and Climate Sensitivity, in *Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*. Masson-Delmotte et al. (eds.). Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, pp. 923–1054, doi:10.1017/9781009157896.009.
- McCoy, D.T., D. L. Hartmann, and **M. D. Zelinka**, 2017: Mixed-Phase Cloud Feedbacks, in *Mixed-phase Clouds: Observations and Modeling*, Andronache, C. (Ed.), Elsevier.
- Tan, I., T. Storelvmo, and **M. D. Zelinka**, 2017: The climatic impact of thermodynamic phase partitioning in mixed-phase clouds, in *Mixed-phase Clouds: Observations and Modeling*, Andronache, C. (Ed.), Elsevier.
- Dessler, A.E. and **M. D. Zelinka**, 2015: Climate Feedbacks, in *Encyclopedia of Atmospheric Sciences*, 2nd edition, Vol 2, pp. 18–25, G. R. North (editor-in-chief), J. Pyle and F. Zhang (editors).

## RECENT HONORS & AWARDS

- Richard P. and Linda S. Turco Lectureship, Department of Climate, Meteorology, & Atmospheric Sciences, University of Illinois Urbana–Champaign, 2024–2025.
- LLNL Physical and Life Sciences Directorate Awards for Excellence in Publications for Lee et al. (2024), Sherwood et al. (2020), Zhou et al. (2016), and Norris et al. (2016)
- Zelinka et al. (2020) named “Editor’s Choice Paper” by Editor-in-Chief of *Geophysical Research Letters*, 2024
- American Meteorological Society Henry G. Houghton Award, 2022
- Eos* Research Spotlights for Zelinka et al. (2022), Zelinka et al. (2020), Zhou et al. (2017), Zelinka et al. (2016), and McCoy et al. (2016)
- Editors’ Citation for Excellence in Refereeing - *Geophysical Research Letters*, 2021
- LLNL Deputy Director’s Science & Technology Excellence in Publication Awards for Zelinka et al. (2020), Sherwood et al. (2020), and Santer et al. (2015)
- Sherwood et al. (2020) named runner-up for *Science Magazine’s* 2020 Breakthrough of the Year
- Nature Climate Change* Research Highlight for Dong et al. (2020)
- US CLIVAR Research Highlight for Zelinka et al. (2020)
- LLNL Outstanding Mentor Award, 2018
- LLNL Early and Mid-Career Recognition Program Award, 2018
- Diablo Magazine* 40 Under 40, 2017



## PROFESSIONAL ACTIVITIES, SERVICE, & LEADERSHIP ROLES

Chair, 2027 Gordon Research Conference on Radiation and Climate

Vice Chair, 2025 Gordon Research Conference on Radiation and Climate

Editor, *Journal of Climate*, Dec 2024–present

Steering Group, CMIP7 Data Request (Atmosphere Theme), Jul 2024–present

External Peer Reviewer, NASA Langley Research Center Science Directorate, Nov 2023

Programme Advisory Group, Uncertainty in Climate Sensitivity due to Clouds (CloudSense) Research Programme, Sep 2023–present

CFMIP Scientific Steering Committee, Jul 2023–present

Discussion Leader, 2023 Gordon Research Conference on Radiation & Climate

AGU Global Environmental Change Fellows Committee, 2022–2024

Contributing Author, IPCC 6th Assessment Report, 2019–2021

LLNL Physical and Life Sciences Postdoc Committee, 2017–2020

Section Editor, *Current Climate Change Reports* Topical Collection on Climate Feedbacks, 2014–2017

Contributor, [climatefeedback.org](http://climatefeedback.org), 2017–present

Chair, 2011 Gordon Research Seminar on Radiation and Climate

Proposal reviewer for DOE, European Research Council, NASA, and NSF

Editor, *Proceedings of the National Academy of Sciences*

Reviewer for:

*Atmosphere* | *Atmos. Ocean* | *Atmos. Chem. Phys.* | *Atmos. Meas. Tech.* | *Atmos. Sci. Lett.*  
*B Am Meteorol Soc* | *Clim. Dynam.* | *Climatic Change* | *Earth's Future* | *Earth Syst. Dyn.*  
*Earth Syst. Sci. Data* | *Environ. Res. Lett.* | *Geophys. Res. Lett.* | *Geosci. Model Dev.*  
*Int. J. Appl. Earth Obs. Geoinf.* | *J. Adv. Model. Earth Syst.* | *J. Appl. Meteorol. Clim.*  
*J. Atmos. Oceanic Technol.* | *J. Atmos. Sci.* | *J. Climate* | *J. Geophys. Res.* | *J. Meteorol. Soc. Jpn.*  
*Nature* | *Nat. Clim. Change* | *Nat. Commun.* | *Nat. Geosci.* | *npj Climate and Atmospheric Science*  
*P. Natl. Acad. Sci.* | *Sci. Rep.* | *Sci. Adv.* | *Surv. Geophys.*

## RECENT INVITED PRESENTATIONS

UC San Diego, Scripps Institution of Oceanography, 27 Jan 2026

McGill University, Department of Atmospheric and Oceanic Sciences, 21 Oct 2025

Duke University, Earth & Climate Sciences Division, 3 Oct 2025

Stanford University, Department of Earth System Science, 2 Apr 2025

Univ. of Illinois Urbana–Champaign, Dept. of Climate, Meteorology, & Atmospheric Sciences, 22 Oct 2024

CERES Science Team Meeting, 2 Oct 2024

LLNL Senior Staff Meeting, 1 Jul 2024

NASA Ames Research Center, Earth Science Division, 20 Jun 2024

Yale University, School of the Environment, 25 Apr 2024  
AGU Fall Meeting: The Flows of Energy Through the Climate System Session, 12 Dec 2023  
AGU Fall Meeting: Climate Sensitivity and Feedbacks Session, 11 Dec 2023  
University of Cambridge Centre for Atmospheric Science, Department of Chemistry, 24 Oct 2023  
Yale University School of the Environment, 27 Apr 2023  
AGU Fall Meeting: Atmospheric Physics, Radiation, Clouds, and Aerosols Session, 15 Dec 2022  
Yale University, School of the Environment, 21 Apr 2022  
Aerosol and Cloud, Convection and Precipitation Webinar Series, 19 Apr 2021  
University of Maryland Baltimore County Department of Physics Colloquium, 24 Feb 2021  
University of Toronto Physics Colloquium, 28 Jan 2021  
AGU Fall Meeting: CMIP6 Climate Model Evaluation Session, 8 Dec 2020  
The National Academies of Sciences, Engineering, and Medicine Workshop “Data in Motion: New Approaches to Advancing Scientific, Engineering and Medical Progress”, 14-15 October 2020  
2020 Princeton AOS Summer Workshop, 17-21 Aug 2020  
2020 CESM Workshop (Plenary talk), 15 June 2020  
ECS & Cloud Feedback Virtual Symposium, 28 May 2020

## ADVISEES

### Postdocs

Li-Wei Chao (Postdoc, LLNL)  
Yi Qin (Postdoc, PNNL)  
Timothy Myers (Research Scientist, NOAA/CIRES)  
Chen Zhou (Associate Professor, Nanjing University)

### Graduate Students

Zac Espinosa (University of Washington)

### Undergraduate Students

Russell Hunter (Duke University / Second Lieutenant, US Space Force)  
Thea Moellerstedt (Graduate Student, UCSD)  
Scott Feldman (Meteorologist, Verisk Weather Solutions)

## OUTREACH ACTIVITIES

LLNL Ambassador Lecturer, Aug 2024 - present

LLNL Technical Lightning Talk: Community Cohorts program for new hires, 24 Aug 2023.

LLNL - Las Positas College Science and Engineering Seminar Series, 20 Apr 2023.

Science on Saturday, The Future in Focus: Predicting Climate Change through Observations, Modeling, and Artificial Intelligence, 4 Mar 2023.

Castro Valley Rotary Club, 13 Sep 2022.

Science on Saturday, The Future in Focus: Predicting Climate Change through Observations, Modeling, and Artificial Intelligence, 26 Feb 2022.

San Joaquin County Office of Education Climate Change Summit, 26 Sep 2020

Panel Discussant, Wild and Scenic Film Festival, Bankhead Theater, Livermore, CA, Jan 2020

Univ. of Washington Dept. of Atmospheric Sciences and Program on Climate Change Outreach Teams, Sep 2004 – Dec 2010

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