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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.

Post-doctoral 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 WORK

Mauritsen, T., et al. including **M. D. Zelinka**, 2024: Earth's energy accumulation rate more than doubled, and we must pay close attention, submitted.

Feng, C., X. Liu, X. Zhao, L. Lin, Z. Lu, **M. D. Zelinka**, Y. Qin, Y. Shan, Y. Zheng, R. Saravanan, 2024: Interconnection of Aerosol Cloud Interactions and Cloud Feedback through Warm Rain Process, *Geophys. Res. Lett.*, submitted.

Zhou, C., Q. Wang, I. Tan, L. Zhang, **M. D. Zelinka**, M. Wang, 2024: Sea ice pattern effect on Earth's energy budget is characterized by hemispheric asymmetry, submitted.

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.*, submitted.

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.*, submitted.

Lin, Y.-J., G. V. Cesana, C. Proistosescu, **M. D. Zelinka**, and K. C. Armour, 2024: The relative importance of forced and unforced temperature patterns in driving the time variation of low-cloud feedback, *J. Climate*, submitted.

PUBLISHED WORK

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.*, in press.
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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84. Cesana, G. V., et al. including **M. D. Zelinka**, 2024: Observational constraint on a feedback from super-cooled clouds reduces projected warming uncertainty, *Commun. Earth Environ.*, 5, 181, doi:10.1038/s43247-024-01339-1.
83. Zhao, X. et al including **M. D. Zelinka**, 2024: Larger cloud liquid water enhances both aerosol indirect forcing and cloud radiative feedback in two Earth System Models, *Geophys. Res. Lett.*, 51, doi:10.1029/2023GL105529.
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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.
80. Rugenstein, M., **M. D. Zelinka**, K. Karauskas, P. Ceppi, and T. Andrews, 2023: Patterns of Surface Warming Matter for Climate Sensitivity, *Eos*, 104, doi:10.1029/2023EO230411.
79. Samset, B., C. Zhou, J. S. Fuglestedt, M. T. Lund, J. Marotzke, and **M. D. Zelinka**, 2023: Steady global surface warming from 1973 to 2022 but increased warming rate after 1990, *Commun. Earth Environ.*, 4, 400, doi:10.1038/s43247-023-01061-4.
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77. **Zelinka, M. D.**, C. J. Smith, Y. Qin, and K. E. Taylor, 2023: Comparison of methods to estimate aerosol effective radiative forcings in climate models, *Atmos. Chem. Phys.*, 23, 8879-8898, doi:10.5194/acp-23-8879-2023.
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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.
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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.
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55. Scott, R. C., T. A. Myers, J. R. Norris, **M. D. Zelinka**, S. A. Klein, M. Sun, and D. R. Doelling, 2020: Observed Sensitivity of Low-Cloud Radiative Effects to Meteorological Perturbations over the Global Oceans. *J. Climate*, 33, 7717–7734, doi:10.1175/JCLI-D-19-1028.1.
54. Dong, Y. K. C. Armour, **M. D. Zelinka**, C. Proistosescu, D. S. Battisti, C. Zhou, and T. Andrews, 2020: Intermodel Spread in the Pattern Effect and Its Contribution to Climate Sensitivity in CMIP5 and CMIP6 Models. *J. Climate*, 33, 7755–7775, doi:10.1175/JCLI-D-19-1011.1.

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.
52. Zhou, C., Y. Hu, J. Lu, and **M. D. Zelinka**, 2020: Responses of the Hadley Circulation to regional sea surface temperature changes, *J. Climate*, 33, 429–441, doi:10.1175/JCLI-D-19-0315.1.
51. Po-Chedley, S., **M. D. Zelinka**, N. Jeevanjee, T. J. Thorsen, and B. D. Santer, 2019: Climatology explains intermodel spread in upper tropospheric cloud and relative humidity response to greenhouse warming, *Geophys. Res. Lett.*, 46, doi:10.1029/2019GL084786.
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46. Santer, B. D., et al. including **M. D. Zelinka**, 2019: Celebrating the anniversary of three key events in climate change science, *Nature Clim. Change*, 9, 180–182, doi:10.1038/s41558-019-0424-x.
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44. McCoy, D. T., et al. including **M. D. Zelinka**, 2019: Cloud feedbacks in extratropical cyclones: insight from long-term satellite data and high-resolution global simulations, *Atmos. Chem. Phys.*, 19, 1147–1172, doi:10.5194/acp-19-1147-2019.
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38. Qu, X., A. Hall, A. M. DeAngelis, **M. D. Zelinka**, S. A. Klein, H. Su, B. Tian, and C. Zhai, 2018: On proposed emergent constraints of climate sensitivity, *J. Climate*, 31, 863–875, doi:10.1175/JCLI-D-17-0482.1.
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16. **Zelinka, M. D.**, T. Andrews, P. M. Forster, and K. E. Taylor, 2014: Quantifying Components of Aerosol-Cloud-Radiation Interactions in Climate Models, *J. Geophys. Res.*, **119**, 7599–7615, doi:10.1002/x/2014JD021710.
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11. Grise, K.M., L.M. Polvani, G. Tselioudis, Y. Wu, and **M.D. Zelinka**, 2013: The ozone hole indirect effect: Cloud-radiative anomalies accompanying the poleward shift of the eddy-driven jet in the Southern Hemisphere. *Geophys. Res. Lett.*, **40**, 1–5, doi:10.1002/grl.50675.
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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

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

LLNL Physical and Life Sciences Directorate Award for Excellence in Publications [Lee et al. 2024]

Zelinka et al. (2020) named "Editor's Choice Paper" by Editor-in-Chief of *Geophysical Research Letters*

American Meteorological Society Henry G. Houghton Award, 2022

Eos Research Spotlight for Zelinka et al. (2022)

Editors' Citation for Excellence in Refereeing - *Geophysical Research Letters*, 2021

LLNL Deputy Director's Science & Technology Excellence in Publication Award [Zelinka et al. 2020]

Sherwood et al. (2020) named runner-up for *Science Magazine's* 2020 Breakthrough of the Year

LLNL Deputy Director's Science & Technology Excellence in Publication Award [Sherwood et al. 2020]

Nature Climate Change Research Highlight for Dong et al. (2020)

LLNL Physical and Life Sciences Directorate Award for Excellence in Publications [Sherwood et al. 2020]

US CLIVAR Research Highlight for Zelinka et al. (2020)

Eos Research Spotlight for Zelinka et al. (2020)

PROFESSIONAL ACTIVITIES, SERVICE, & LEADERSHIP ROLES

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–present

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

Convener, Extratropical Cloud Feedbacks Session, 2020 CFMIP Meeting
 Discussion Leader, 2019 Gordon Research Conference on Radiation & Climate
 LLNL Physical and Life Sciences Postdoc Committee, 2017–2020
 Section Editor for *Current Climate Change Reports* Topical Collection on Climate Feedbacks, 2014–2017
 Contributor to climatefeedback.org, 2017–present
 Chair, 2011 Gordon Research Seminar on Radiation and Climate
 Proposal reviewer for DOE, European Research Council, NASA, and NSF
 Editor for *P. Natl. Acad. Sci.*

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 System Dynamics*
Earth System Science Data | *Environ. Res. Lett.* | *Geophys. Res. Lett.* | *Geosci. Model Dev.*
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.* | *Surv. Geophys.*

RECENT INVITED PRESENTATIONS

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
 “Moving the field forward” Panel, Pattern Effect Workshop, 12 May 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 Symposia, 28 May 2020

Imperial College London, Atmospheric Physics Group Webinar, 12 May 2020
Global Model Cloud-Aerosol Research Webinar Series, 2 April 2020
UC Davis Department of Land, Air and Water Resources, 16 October 2019
Geophysical Fluid Dynamics Laboratory, 23 May 2019

ADVISEES

Post-Docs

Li-Wei Chao
Yi Qin (Post-doc, 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 (UC Berkeley)
Scott Feldman (Meteorologist, Verisk Weather Solutions)

OUTREACH ACTIVITIES

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

Last updated: September 3, 2024