

# Michael Erb

## Curriculum Vitae

Assistant Research Professor  
Northern Arizona University  
School of Earth and Sustainability  
Bury Hall, Room 310  
Flagstaff, AZ 86011

Phone: 928-523-5531  
Email: michael.erb@nau.edu  
Website: [www.michaelerb.org](http://www.michaelerb.org)  
ORCID: [0000-0002-1187-952X](https://orcid.org/0000-0002-1187-952X)

### EDUCATION

Ph.D., Atmospheric Science, Rutgers, The State University of New Jersey, 2014  
M.S., Atmospheric Science, Rutgers, The State University of New Jersey, 2011  
B.S., Atmospheric Sciences, University of North Carolina at Asheville, 2007

### EMPLOYMENT

2017-present	<b>Northern Arizona University</b> , School of Earth and Sustainability Assistant Research Professor, 2019-present Postdoctoral Scholar, 2017-2019
2016-2017	<b>University of Southern California</b> , Department of Earth Sciences Postdoctoral Scholar
2014-2016	<b>University of Texas at Austin</b> , Institute for Geophysics Postdoctoral Fellow

### PUBLICATIONS

#### Manuscripts in Preparation

Hancock, C., [M. P. Erb](#), N. McKay, and S. Dee: A global Data Assimilation of Moisture Patterns from 21,000-0 BP (DAMP-21ka) using lake level proxy records.

Thirumalai, K., S. C. Clemens, Y. Rosenthal, S. Conde, K. Bu, S. Desprat, [M. Erb](#), L. Vetter, M. Franks, J. Cheng, L. Li, Z. Liu, L. Zhou, L. Giosan, A. Singh, and V. Mishra: Extreme Indian Summer Monsoon states lead to oceanic productivity losses.

Wu, S., A. Mazaud, E. Michel, [M. P. Erb](#), H. E. Amsler, P. L. T. Carado, F. Lamy, and S. L. Jaccard: Zonally asymmetric changes in Antarctic Circumpolar Current strength over the past million years.

## Refereed Journal Articles

- 2024 Larocca, L. J., J. M. Lea, M. P. Erb, N. P. McKay, M. Phillips, K. A. Lamantia, and D. S. Kaufman: Arctic glacier snowline altitudes rise 150 meters over the last 4 decades. *The Cryosphere*, **18**, 3591-3611. <https://doi.org/10.5194/tc-18-3591-2024>.
- 2024 McKay, N. P., D. S. Kaufman, S. H. Arcusa, H. R. Kolus, D. C. Edge, M. P. Erb, C. L. Hancock, C. C. Routson, M. Żarczyński, L. P. Marshall, G. K. Roberts, and F. Tellus: The 4.2 ka event is not remarkable in the context of Holocene climate variability. *Nature Communications*, **15**, <https://doi.org/10.1038/s41467-024-50886-w>.
- 2023 Thomas, E. K., A. A. Cluett, M. P. Erb, N. P. McKay, J. P. Briner, I. S. Castañeda, M. C. Corcoran, O. C. Cowling, D. B. Gorbey, K. R. Lindberg, K. K. Prince, and J. Salacup: Early Holocene Laurentide Ice Sheet retreat influenced summer atmospheric circulation in Baffin Bay. *Geophysical Research Letters*, **50**, e2023GL103428. <https://doi.org/10.1029/2023GL103428>.
- 2023 Hancock, C. L., N. P. McKay, M. P. Erb, D. S. Kaufman, C. R. Routson, R. F. Ivanovic, L. J. Gregoire, and P. Valdes: Global synthesis of regional Holocene hydroclimate variability using proxy and model data. *Paleoceanography and Paleoclimatology*, **38**, e2022PA004597, <https://doi.org/10.1029/2022PA004597>.
- 2023 Jiang, Z., C. M. Brierley, J. Bader, P. Braconnot, M. Erb, P. O. Hopcroft, D. Jiang, J. Jungclaus, V. Khon, G. Lohmann, O. Marti, M. B. Osman, B. Otto-Bliesner, B. Schneider, X. Shi, D. J. R. Thornalley, Z. Tian, and Q. Zhang: No consistent simulated trends in the Atlantic Meridional Overturning Circulation for the past 6,000 years. *Geophysical Research Letters*, **50**, e2023GL103078, <https://doi.org/10.1029/2023GL103078>.
- 2023 Malmierca-Vallet, I., L. C. Sime, and the D-O community members: Dansgaard-Oeschger events in climate models: review and baseline Marine Isotope Stage 3 (MIS3) protocol. *Clim. Past*, **19**, 915-942, <https://doi.org/10.5194/cp-19-915-2023>.
- 2022 Erb, M. P., N. P. McKay, N. Steiger, S. Dee, C. Hancock, R. F. Ivanovic, L. J. Gregoire, and P. Valdes: Reconstructing Holocene temperatures in time and space using paleoclimate data assimilation. *Clim. Past*, **18**, 2599-2629, doi:10.5194/cp-18-2599-2022.

- 2022 Routson, C. C., M. P. Erb, and N. P. McKay: High latitude modulation of the Holocene North American Monsoon. *Geophysical Research Letters*, **49**, doi:10.1029/2022GL099772.
- 2021 Routson, C. C., D. S. Kaufman, N. P. McKay, M. P. Erb, et al.: A multiproxy database of western North American Holocene paleoclimate records. *Earth Syst. Sci. Data*, **13**, 1613-1632, doi:10.5194/essd-13-1613-2021.
- 2020 Brierley, C. M., et al.: Large-scale features and evaluation of the PMIP4-CMIP6 *midHolocene* simulations. *Clim. Past*, **16**, 1847-1872, doi:10.5194/cp-16-1847-2020.
- 2020 Erb, M. P., J. Emile-Geay, G. J. Hakim, N. Steiger, and E. J. Steig: Atmospheric dynamics drive most interannual U.S. droughts over the last millennium. *Sci. Adv.*, **6**, 12 pp, doi:10.1126/sciadv.aay7268.
- 2020 Kaufman, D., N. McKay, C. Routson, M. Erb, C. Dätwyler, P. S. Sommer, O. Heiri, and B. Davis: Holocene global mean surface temperature, a multi-method reconstruction approach. *Sci. Data*, **7**, 13 pp, doi:10.1038/s41597-020-0530-7.
- 2020 Kaufman, D., N. McKay, C. Routson, M. Erb, et al.: A global database of Holocene paleotemperature records. *Sci. Data*, **7**, 34 pp, doi:10.1038/s41597-020-0445-3.
- 2019 Broadman, E., L. L. Thurston, E. Schiefer, N. P. McKay, D. Fortin, J. Geck, M. G. Loso, M. Nolan, S. H. Arcusa, C. W. Benson, R. A. Ellerbroek, M. P. Erb, C. C. Routson, C. Wiman, A. J. Wong, and D. Kaufman: An Arctic watershed observatory at Lake Peters, Alaska: weather-glacier-river-lake system data for 2015-2018. *Earth Syst. Sci. Data*, **11**, 1957-1970, doi:10.5194/essd-11-1957-2019.
- 2019 Khider, D., J. Emile-Geay, N. P. McKay, Y. Gil, D. Garijo, V. Ratnakar, et al.: PaCTS v1.0: A crowdsourced reporting standard for paleoclimate data. *Paleoceanography and Paleoclimatology*, **34**, 27 pp, doi:10.1029/2019PA003632.
- 2019 Neukom, R., L. A. Barboza, M. P. Erb, F. Shi, J. Emile-Geay, M. N. Evans, J. Franke, D. S. Kaufman, L. Lücke, K. Rehfeld, A. Schurer, F. Zhu, S. Brönnimann, G. J. Hakim, B. J. Henley, F. C. Ljungqvist, N. McKay, V. Valler, and L. von Gunten: Consistent multidecadal variability in global temperature reconstructions and simulations over the Common Era. *Nature Geoscience*, **12**, 643-649, doi:10.1038/s41561-019-0400-0.

- 2019 Tardif, R., G. J. Hakim, W. A. Perkins, K. A. Horlick, M. P. Erb, J. Emile-Geay, D. M. Anderson, E. J. Steig, and D. Noone: Last Millennium Reanalysis with an expanded proxy database and seasonal proxy modeling. *Clim. Past*, **15**, 1251-1273, doi:10.5194/cp-15-1251-2019.
- 2019 Routson, C. C., N. P. McKay, D. S. Kaufman, M. P. Erb, H. Goosse, B. N. Shuman, J. R. Rodysill, and T. Ault: Mid-latitude net precipitation decreased with Arctic warming during the Holocene. *Nature*, **568**, 83-87, doi:10.1038/s41586-019-1060-3.
- 2019 Anderson, D. M., R. Tardif, K. Horlick, M. P. Erb, G. J. Hakim, D. Noone, W. A. Perkins, and E. Steig: Additions to the Last Millennium Reanalysis multi-proxy database. *Data Science Journal*, **18**(2), 1-11, doi:10.5334/dsj-2019-002.
- 2018 McKay, N. P., D. S. Kaufman, C. C. Routson, M. P. Erb, and P. D. Zander: The onset and rate of Holocene Neoglacial cooling in the Arctic. *Geophys. Res. Lett.*, **45**, 12487-12496, doi:10.1029/2018GL079773.
- 2018 Tabor, C. R., B. L. Otto-Bliesner, E. C. Brady, J. Nusbaumer, J. Zhu, M. P. Erb, T. E. Wong, Z. Liu, and D. Noone: Interpreting precession-driven  $\delta^{18}\text{O}$  variability in the South Asian monsoon region. *J. Geophys. Res.-Atmos.*, **123**, 20 pp, doi:10.1029/2018JD028424.
- 2018 Bosmans, J. H. C., M. P. Erb, A. M. Dolan, S. S. Drijfhout, E. Tuenter, F. J. Hilgen, D. Edge, J. O. Pope, and L. J. Lourens: Response of the Asian summer monsoons to idealized precession and obliquity forcing in a set of GCMs. *Quaternary Sci. Rev.*, **188**, 121-135, doi:10.1016/j.quascirev.2018.03.025.
- 2018 Erb, M. P., C. S. Jackson, A. J. Broccoli, D. W. Lea, P. J. Valdes, M. Crucifix, and P. N. DiNezio: Model evidence for a seasonal bias in Antarctic ice cores. *Nature Communications*, **9**, 10 pp, doi:10.1038/s41467-018-03800-0.
- 2015 Erb, M. P., C. S. Jackson, and A. J. Broccoli: Using single-forcing GCM simulations to reconstruct and interpret Quaternary climate change. *J. Climate*, **28**, 9746-9767, doi:10.1175/JCLI-D-15-0329.1.
- 2015 Erb, M. P., A. J. Broccoli, N. T. Graham, A. C. Clement, A. T. Wittenberg, and G. A. Vecchi: Response of the equatorial Pacific seasonal cycle to orbital forcing. *J. Climate*, **28**, 9258-9276, doi:10.1175/JCLI-D-15-0242.1.
- 2014 Mantsis, D. F., B. R. Lintner, A. J. Broccoli, M. P. Erb, A. C. Clement, H.-S. Park: The response of large-scale circulation to obliquity-induced changes in

- meridional heating gradients. *J. Climate*, **27**, 5504-5516, doi:10.1175/JCLI-D-13-00526.1.
- 2013 Erb, M. P., A. J. Broccoli, and A. C. Clement: The contribution of radiative feedbacks to orbitally-driven climate change. *J. Climate*, **26**, 5897-5914, doi:10.1175/JCLI-D-12-00419.1.
- 2013 Mantsis, D. F., A. C. Clement, B. Kirtman, A. J. Broccoli, and M. P. Erb: Precessional cycles and their influence on the North Pacific and North Atlantic summer anticyclones. *J. Climate*, **26**, 4596-4611, doi:10.1175/JCLI-D-12-00343.1.
- 2011 Mantsis, D. F., A. C. Clement, A. J. Broccoli, and M. P. Erb: Climate feedbacks in response to changes in obliquity. *J. Climate*, **24**, 2830-2845, doi:10.1175/2010JCLI3986.1.

### Other Publications

- 2017 Emile-Geay, J., M. P. Erb, G. J. Hakim, E. J. Steig. And D. C. Noone: Workshop Report: Climate dynamics with the Last Millennium Reanalysis. *PAGES Magazine*, **25**, 1 pp.
- 2006 Erb, M. P., and C. C. Hennon: A case study of Hurricane Katrina: rapid intensification in the Gulf of Mexico. *Proceedings of the National Conference of Undergraduate Research (NCUR)*, 8 pp.

### AWARDS AND NOMINATIONS

- 2020 Nominated as part of a team for "Most Significant Research/Scholarly Work," a Research and Creative Activity (RCA) award at Northern Arizona University.

### FUNDED GRANTS

- 2019-2022 "Collaborative Research: Quantifying Holocene Climate Variations through Data Assimilation using Proxies and GCM output." PIs: Michael P. Erb, Nicholas P. McKay, Nathan J. Steiger, and Sylvia G. Dee. Funded by NSF's Paleo Perspectives on Climate Change (P2C2).
- 2020-2023 "Collaborative Research: Patterns and processes of abrupt Arctic warming based on paleoclimate observations and models." PIs: Elizabeth K. Thomas, Nicholas P. McKay, Michael P. Erb, and Darrell S. Kaufman. Funded by NSF's Arctic System Science (ARCSS).

- 2020-2023 | “Collaborative Research: PReSto: A Paleoclimate Reconstruction Storehouse to broaden access and accelerate scientific inference.” PIs: Nicholas P. McKay, Michael P. Erb, Cody C. Routson, Julien Emile-Geay, and Deborah Khider. Funded by NSF’s Geoinformatics (GI).
- 2020-2023 | “Monsoon 21k: A global monsoon synthesis, reconstruction, and data-model comparison.” PIs: Cody C. Routson, Darrell S. Kaufman, Nicholas P. McKay, and Michael P. Erb. Funded by NSF’s Paleo Perspectives on Climate Change (P2C2).

### ADDITIONAL SUMMITTED PROPOSALS

- 2024 | “Investigating spatial patterns of temperature and precipitation in the PATCH project.” PIs: Michael Erb and Nicholas McKay. Submitted to NSF’s Climate and Large-Scale Dynamics (CLD) solicitation.
- 2023 | “Collaborative Research: Browsing Intra-pacific Variability and Linked enVironmental Effects (BIVALVE).” PIs: Michael Erb, David Edge, and Diana Thatcher. Submitted to NSF’s Paleo Perspectives on Present and Projected Climate (P4CLIMATE) solicitation. Declined.
- 2021 | “Collaborative Research: GCR: Linking preindustrial with modern climate indicators to inform future climate change.” PIs: Darrell Kaufman, Michael Erb, John Fegyveresi, Deborah Huntzinger, Nicholas McKay, Cody Routson, Mike Smith, Melissa Kenney, John Williams, Natalie Burls, Jason Briner, Sophie Nowicki, Carrie Morrill, and Michael Evans. Submitted to NSF’s Growing Convergence Research (GCR) solicitation. Declined.
- 2017 | “Collaborative Research: Quantifying Holocene climate variations through data assimilation using proxies and GCM output.” PIs: Michael P. Erb, Nicholas P. McKay, Cody C. Routson, Shaun A. Marcott, and Nathan J. Steiger. Submitted to NSF’s Paleo Perspectives on Climate Change (P2C2) solicitation. Declined.
- 2014 | “Collaborative Research: Fingerprints of tropical radiative feedbacks affecting Quaternary proxies.” PIs: Charles S. Jackson, Michael P. Erb, David W. Lea, and Anthony J. Broccoli. Submitted to NSF’s Paleo Perspectives on Climate Change (P2C2) solicitation. Declined.

### SCIENTIFIC PRESENTATIONS

- 2023 | “PReSto, a Paleoclimate Reconstruction Storehouse – Increasing the utility of paleoclimate reconstructions through innovative online tools,” American Geophysical Union Fall Meeting, December, poster with N. McKay, D. Edge, D. Khider, J. Emile-Geay, C. Routson, and F. Zhu.

- 2022 “Reconstructing Holocene temperatures – Using paleoclimate data assimilation to explore Holocene climate in time and space,” American Geophysical Union Fall Meeting, December, talk with N. McKay, N. Steiger, S. Dee, C. Hancock, R. Ivanovic, L. Gregoire, and P. Valdes.
- 2021 “Holocene Temperature: A Spatial and Temporal Reconstruction using Paleoclimate Data Assimilation,” American Geophysical Union Fall Meeting, December, poster (virtual) with N. McKay, N. Steiger, S. Dee, C. Hancock, L. Gregoire, R. Ivanovic, and P. Valdes.
- 2021 “Reconstructing global temperature of the past 12,000 years using a network of proxy records,” SES Seminar, Northern Arizona University, Flagstaff, AZ, February, invited talk (virtual) with D. Kaufman, N. McKay, C. Routson, and the rest of the Temperature12k Group.
- 2020 “Mid-Holocene Warmth and Temperature Trends: Reconstructing Holocene Climate using a Global Proxy Database and Five Statistical Methods,” American Geophysical Union Fall Meeting, December, poster (virtual) with D. Kaufman, N. McKay, C. Routson, C. Dätwyler, P. S. Sommer, O. Heiri, and B. Davis.
- 2020 “Exploring U.S. drought dynamics using proxies and models in paleoclimate data assimilation,” American Geophysical Union Fall Meeting, December, talk (virtual) with J. Emile-Geay, G. Hakim, N. Steiger, and E. Steig.
- 2020 “Reconstructing global temperature of the past 12,000 years using a network of proxy records,” Department of Geology Zoom Guest Lecture, University at Buffalo, Buffalo, NY, November, invited talk (virtual) with the Temperature12k Group.
- 2019 “Synthesizing Climate12k data,” CLIMATE-12k workshop: How hot was the Holocene?, Sainte-Croix, Switzerland, June, talk.
- 2018 “Incorporating low resolution proxy records into paleoclimate data assimilation,” American Geophysical Union Fall Meeting, Washington, D.C., December, poster with N. McKay.
- 2018 “Exploring drought and climate over the past 1000 years through paleoclimate data assimilation,” SESES Seminar, Northern Arizona University, Flagstaff, AZ, February, invited talk with J. Emile-Geay, G. J. Hakim, R. Tardif, K. Horlick, W. A. Perkins, D. Noone, E. J. Steig, and D. M. Anderson.
- 2017 “Is recent warming unprecedented in the Common Era? Insights from PAGES2k v.2 data and the Last Millennium Reanalysis,” American Geophysical Union Fall

- Meeting, New Orleans, LA, December, talk with J. Emile-Geay, N. McKay, G. Hakim, E. Steig, and K. Anchukaitis.
- 2017 “Constraints on U.S. drought dynamics from the Last Millennium Reanalysis,” Third Annual LMR Workshop, Boulder, CO, October, talk with J. Emile-Geay, G. J. Hakim, R. Tardif, K. Horlick, W. A. Perkins, D. Noone, E. J. Steig, and D. M. Anderson.
- 2017 “Climate and drought over the past 1000 years in the Last Millennium Reanalysis,” 5<sup>th</sup> Past Global Changes (PAGES) Open Science Meeting (OSM), Zaragoza, Spain, May, poster with J. Emile-Geay, G. J. Hakim, R. Tardif, K. Horlick, W. A. Perkins, D. Noone, E. J. Steig, and D. M. Anderson.
- 2017 “Climate and drought over the past 1000 years in the Last Millennium Reanalysis,” European Geosciences Union General Assembly 2017, Vienna, Austria, April, talk with J. Emile-Geay, G. J. Hakim, R. Tardif, K. Horlick, W. A. Perkins, D. Noone, E. J. Steig, and D. M. Anderson.
- 2016 “Climate and drought over the past 1000 years in the Last Millennium Reanalysis,” American Geophysical Union Fall Meeting, San Francisco, CA, December, talk with J. Emile-Geay, G. J. Hakim, R. Tardif, K. Horlick, W. A. Perkins, D. Noone, E. J. Steig, and D. M. Anderson.
- 2016 “Climate and drought over the past 1000 years in the Last Millennium Reanalysis,” Paleoenvironmental seminar, University of Southern California, Los Angeles, CA, November, talk with J. Emile-Geay, D. M. Anderson, G. J. Hakim, K. Horlick, D. Noone, W. A. Perkins, E. J. Steig, and R. Tardif.
- 2015 “Obliquity and Precession in the Quaternary: Analyzing Climate Responses Using Single-Forcing GCM Simulations and Bayesian Model-Proxy Comparison,” American Geophysical Union Fall Meeting, San Francisco, CA, December, poster with C. S. Jackson, A. J. Broccoli, and D. W. Lea.
- 2015 “Simulating the Response to Astronomical Forcing with a Coupled Atmosphere-Ocean Model,” American Geophysical Union Fall Meeting, San Francisco, CA, December, poster with A. J. Broccoli and B. Raney.
- 2015 “Using single-forcing simulations and proxy data to explore Quaternary climate change,” Pacific Northwest National Laboratory, Richland, WA, October, invited talk with C. S. Jackson, A. J. Broccoli, and D. W. Lea.
- 2015 “Impacts of orbital, greenhouse gas, and ice sheet variations on Quaternary climate change,” University of Texas Institute for Geophysics Brown Bag talk, Austin, TX, October, talk with C. S. Jackson, A. J. Broccoli, and D. W. Lea.



- 2015 “Is linearity a sufficient model for interpreting long-term climate variability of the late Quaternary?” XIX INQUA 2015, Nagoya, Japan, July-August, poster with C. S. Jackson, A. J. Broccoli, and P. J. Valdes.
- 2015 “Using idealized GCM simulations and proxy data to investigate the Quaternary response to obliquity,” XIX INQUA 2015, Nagoya, Japan, July-August, talk with C. S. Jackson, A. J. Broccoli, and D. W. Lea.
- 2015 “The influence of obliquity on Quaternary climate,” 20<sup>th</sup> Annual CESM Workshop, Breckenridge, CO, June, talk with C. S. Jackson and A. J. Broccoli.
- 2014 “Using idealized GCM simulations to reconstruct and interpret past precipitation and temperature changes,” American Geophysical Union Fall Meeting, San Francisco, CA, December, poster with C. S. Jackson, A. J. Broccoli, and D. W. Lea.
- 2014 “Climate change in the United States: Findings of the U.S. National Climate Assessment and the IPCC,” Rotary Club, Austin, TX, June, talk.
- 2014 “Using idealized GCM simulations to reconstruct (and interpret) past climate change,” 19<sup>th</sup> Annual CESM Workshop, Breckenridge, CO, June, talk with C. S. Jackson, A. J. Broccoli, and D. W. Lea.
- 2014 “The response of radiative feedbacks and equatorial Pacific seasonality to orbital forcing,” University of Texas Institute for Geophysics Seminar Series, Austin, TX, March, talk with A. J. Broccoli, B. R. Lintner, N. T. Graham, A. C. Clement, A. T. Wittenberg, and G. A. Vecchi.
- 2013 “The response of radiative feedbacks, equatorial Pacific seasonality, and wetlands to orbital forcing in model simulations,” Rutgers University Ph.D. defense, New Brunswick, NJ, November, talk with A. J. Broccoli, B. R. Lintner, N. T. Graham, Y. F. Reinfelder, H. Li, A. C. Clement, A. T. Wittenberg, G. A. Vecchi, and Y. Rosenthal.
- 2012 “Response of the Equatorial Pacific Seasonal Cycle to Orbital Forcing,” American Geophysical Union Fall Meeting, San Francisco, CA, December, talk with A. J. Broccoli, A. T. Wittenberg, and G. A. Vecchi.
- 2012 “The Influence of Orbital Forcing on Past Climate Change,” The Rutgers Climate Symposium, New Brunswick, NJ, November, poster with A. J. Broccoli, A. C. Clement, A. T. Wittenberg, and G. A. Vecchi.

- 2012 “The Effect of Orbital Forcing on Seasonality in the Equatorial Pacific,” Paleoclimate Modelling Intercomparison Project, Phase 3, 2<sup>nd</sup> General Meeting, Crewe, UK, May, talk with A. J. Broccoli, G. A. Vecchi, A. T. Wittenberg, D. W. Oppo, and M. Khodri.
- 2011 “The Role of Feedbacks in Precession and Obliquity-driven Climate Change,” American Geophysical Union Fall Meeting, San Francisco, CA, December, poster with A. J. Broccoli and A. C. Clement.
- 2011 “The Role of Feedbacks in Precession and Obliquity-driven Climate Change,” Princeton Geosciences Graduate Research Symposium, Princeton, NJ, November, invited talk with A. J. Broccoli and A. C. Clement.
- 2011 “The Role of Feedbacks in Precession and Obliquity-driven Climate Change,” Graduate Climate Conference, Woods Hole, MA, October, talk with A. J. Broccoli and A. C. Clement.
- 2011 “4.5 Billion Years of Extremes: A (Brief) Introduction to the Study of Past Climates,” Rutgers University, New Brunswick, NJ, May, talk.
- 2010 “The Astronomical Forcing of Climate Change: Forcing and Feedbacks,” Paleoclimate Modelling Intercomparison Project, Phase 3, 1<sup>st</sup> General Meeting, Kyoto, Japan, December, poster with A. J. Broccoli and A. C. Clement.
- 2010 “Orbital Forcing of Climate: The Role of Obliquity in Driving Natural Climate Change,” Urbino Summer School in Paleoclimatology, Urbino, Italy, July, poster with A. J. Broccoli and A. C. Clement.
- 2009 “Orbital Forcing of Climate: The Role of Obliquity in Driving Natural Climate Change,” American Geophysical Union Fall Meeting, San Francisco, CA, December, poster with A. J. Broccoli and A. C. Clement.
- 2006 “A Case Study of Hurricane Katrina: Rapid Intensification in the Gulf of Mexico,” National Conference on Undergraduate Research, Asheville, NC, April, talk with C. C. Hennon.

## WORKSHOPS

- 2023 “Paleo DA Workshop,” online, August. A two-and-a-half-day workshop with live talks and interactive programming activities, aimed at helping early-career scientists learn about paleoclimate data assimilation, proxies, models, and more. I was the main organizer of the workshop, which included leading several talks and activities, creating most of the interactive programming notebooks,

	and leading organization of the workshop. The workshop accepted 111 applicants from 27 different countries.
2022	“Paleo DA Workshop,” online, August. The 1 <sup>st</sup> Paleo DA Workshop, as described above. This workshop accepted 60 applicants from 19 different countries.
2017	“LMR Hackathon,” Third Annual LMR Workshop, Boulder, CO, October. A one-day hands-on workshop for attendees to become more familiar with the Last Millennium Reanalysis (LMR) output and code. I ran the Hackathon, showing attendees how to analyze LMR output and run the code.

## TEACHING EXPERIENCE

### Northern Arizona University

Physical and Chemical Processes in the Atmosphere and Hydrosphere (Fall 2022)  
 Climate Dynamics (Spring 2020, Spring 2022)  
 Topics in Quaternary Science, guest lecturer (Spring 2021)  
 Global Climate Change, fill-in lecturer (Fall 2018)

### Rutgers University

Meteorological Analysis II, teaching assistant (Spring 2009, Spring 2011, Spring 2012)  
 Meteorological Analysis I, teaching assistant (Fall 2011)  
 Atmospheric Thermodynamics, teaching assistant (Fall 2009)  
 Dynamics of the Atmosphere, teaching assistant (Spring 2009)  
 Physical Principles of Climate Change, fill-in lecturer (Spring 2010)  
 Byrne Seminar, fill-in lecturer (Fall 2009)

## MANUSCRIPT REVIEWS

Climate Dynamics, Climate of the Past, Communications Earth & Environment, Earth and Planetary Science Letters, Journal of Climate, Journal of Geophysical Research: Oceans, Journal of Quaternary Science, Nature Communications, Nature Geoscience, Paleoceanography

## OUTREACH

2021	“The Weather Detectives” by Michael Erb, <i>Tumblehome, Inc.</i> , 279 pp. – A fiction book for kids, ages 9-12, to get readers interested in weather and science. The book combines a fictional mystery with real weather, science, and stories from history.
------	--

- 2012 | “Kelvin McCloud and the Seaside Storm” by Michael Erb, *Tumblehome Learning, Inc.*, 244 pp. – A fiction book for kids, ages 9-12, which discusses real weather and other science, written to get kids interested in these topics.

**MEDIA COVERAGE**

- 2020 | TV interview on The Weather Channel about our recent Science Advances paper “Atmospheric dynamics drive most interannual U.S. droughts over the last millennium.”
- 2019 | Radio interview with “This Green Earth” on KPCW about our recent Nature Geoscience paper, “Consistent multidecadal variability in global temperature reconstructions and simulations over the Common Era.”