

Stéphanie Arcusa, Ph.D.

Center for Negative Carbon Emissions
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Education

2020 - Doctor of Philosophy, Earth Science and Environmental Sustainability, with distinction
School of Earth and Sustainability, Northern Arizona University, Flagstaff, Arizona
Committee: Nicholas McKay (supervisor), Darrell Kaufman, Toby Ault, and Cody Routson
Dissertation: *Dust-drought nexus in the southern Rocky Mountains: integrating lake paleodust records and climate models*

2016 - Master of Science, Climate Science, summa cum laude
Oeschger Center, University of Bern, Bern, Switzerland
Supervisor: Martin Grosjean
Thesis: *Late Holocene flood history and tephrochronology using lake sediments from Cajas National Park, south central Ecuador*

2014 - Bachelor of Science, Earth Science, summa cum laude
Biological, Earth & Environmental Sciences, University College Cork, Cork, Ireland
Advisors: Una NiChaoimh, Ed Jarvis, and Neil Roberts
Final year project: *Wildfire Response to Climate Change during the Late Glacial: Interglacial Transition (LGIT) in central Turkey*

Employment

01/2021-Present - Postdoctoral researcher
Center for Negative Carbon Emissions, Arizona State University, Tempe, Arizona
Supervisor: Klaus Lackner

05/2020-08/2020 – Greenhouse gas inventory and energy intern
City of Flagstaff Sustainability Section, Flagstaff, Arizona
Supervisor: Ramon Alatorre

05/2020-12/2020 – Data analysis graduate assistant
School of Earth and Sustainability, Northern Arizona University, Flagstaff, Arizona
Supervisor: Nicholas McKay

09/2016-05/2020 – Teaching assistant
School of Earth and Sustainability, Northern Arizona University, Flagstaff, Arizona
Supervisors: David Elliott, Robert Lenegan, Nancy Riggs

01/2015-05/2016 – Assistant paleolimnologist
Oeschger Center, University of Bern, Bern, Switzerland
Supervisor: Martin Grosjean

Research and teaching interests

Climate Change, Carbon Management and Accounting, Climate Science and Policy Interface, New Carbon Economy, Climate Mitigation, Paleoclimatology, Paleolimnology, Dust-Drought Nexus, Climate and Wildfires.

Publications

Google Scholar: <https://scholar.google.com/citations?hl=en&user=XO3TyEUAAAAJ>

	ALL	Since 2017
Citations	34	34
h-index	3	3
I10-index	1	1

Refereed Articles and Book Chapters

Routson, C. C., Kaufman, D. S., McKay, N. P., Erb, M. P., **Arcusa, S. H.**, Brown, K. J., ... & Cumming, B. F., 2021. A multiproxy database of western North American Holocene paleoclimate records. *Earth System Science Data*, 13(4), 1613-1632.

Arcusa, S. H., McKay, N. P., Carrillo, C. M., & Ault, T. R., 2020. Dust-Drought Nexus in the Southwestern United States: A Proxy-Model Comparison Approach. *Paleoceanography and Paleoclimatology*, 35(12), e2020PA004046.

Arcusa, S.H., Schneider, T., Mosquera, P.V., Vogel, H., Kaufman, D., Szidat, S. and Grosjean M., 2020. Late Holocene tephrostratigraphy from Cajas National Park southern Ecuador. *Andean Geology*, 47(3). <http://www.andeangeology.cl/index.php/revista1/article/view/V47n3-3301>.

Arcusa, S.H., McKay, N.P., Routson, C.C. and Munoz, S.E., 2019. Dust-drought interactions over the last 15,000 years: A network of lake sediment records from the San Juan Mountains, Colorado. *The Holocene*, 30(4), 559-574. <https://journals.sagepub.com/doi/full/10.1177/0959683619875192>.

Broadman, E., Thurston, L.L., Schiefer, E., McKay, N.P., Fortin, D., Geck, J., Loso, M.G., Nolan, M., **Arcusa, S.H.**, Benson, C.W. and Ellerbroek, R.A., 2019. An Arctic watershed observatory at Lake Peters, Alaska: weather–glacier–river–lake system data for 2015–2018. *Earth System Science Data*, 11(4). <https://essd.copernicus.org/articles/11/1957/2019/>.

Routson, C.C., **Arcusa, S.H.**, McKay, N.P. and Overpeck, J.T., 2019. A 4,500-Year-Long Record of Southern Rocky Mountain Dust Deposition. *Geophysical Research Letters*, 46(14), pp.8281-8288. <https://agupubs.onlinelibrary.wiley.com/doi/full/10.1029/2019GL083255>.

Reports, Theses, and White Papers

Arcusa, S.H., 2021. The road to a carbon neutral Intermountain West. Arizona Stakeholder Workshop Report. September 2021. Center for Negative Carbon Emissions Collection, Arizona State University KEEP. <https://hdl.handle.net/2286/R.2.N.160793>

Arcusa, S.H., 2020. Dust-Drought Nexus in the Southern Rocky Mountains: Integrating Lake Paleodust Records and Climate Models. Northern Arizona University. ProQuest Dissertations Publishing, 2020. 28263807.

Arcusa, S.H., 2016. Two thousand years of tephrochronology and flood frequency using lake sediments from Cajas National Park, Ecuador. University of Bern.
<https://occrdata.unibe.ch/students/theses/msc/195.pdf>

Non-refereed and Popular Publications

Arcusa, S.H., 2022. Why should I trust you (sequestration)? Robust certification schemes crucial to carbon sequestration. I-WEST, blog. <https://iwest.org/certification-of-carbon-sequestration/>

Arcusa, S.H., 2021. Explainer: the what, why, and when of carbon dioxide removal. OpenAir, video. <https://youtu.be/0wT10LDwe64>

Arcusa, S.H., 2021. Strengthening the certification process of carbon sequestration: a collaborative effort to identify gaps and offer solutions. Center for Negative Carbon Emissions Collection, Arizona State University. DOI: 10.13140/RG.2.2.23345.51049.

Arcusa, S.H., Miller, A., B. Stevens, 2020. Climate Action Metric proposal.
<https://docs.google.com/document/d/1Tewfzu6Ki5s7rfjPW06rKs0ff-McOG8HRcG-cer0968/edit?usp=sharing>

In Review, Revision, or Preparation

Arcusa, S.H. and K.S. Lackner. Long-term carbon management through responsibility transfer in the certification of carbon sequestration. In preparation.

Arcusa, S.H. and S. Sprenkle-Hyppolite. Snapshot of the Carbon Sequestration Certification Market Ecosystem. OSF Preprints. Doi: 10.31219/osf.io/fu59w.

Arcusa, S.H. and K.S. Lackner. Intergenerational equity and responsibility: a call to internalize impermanence into certificates of carbon sequestration. OSF Preprints. Doi: 10.31219/osf.io/b3wkr.

Arcusa, S.H., McKay, N.P., Wiman, C., Patterson, S, Munoz, S.E., and M. Aquino-Lopez. 3300-year clastic varve chronology from Columbine Lake, Colorado. *Geochronology Discuss.*,
<https://doi.org/10.5194/gchron-2021-15>, 2021. In revision.

Other Creative Products

Who certifies carbon sequestration? Network analysis created on Kumu Platforms by **S.H. Arcusa**.
<https://sarcusa.kumu.io/who-certifies-carbon-sequestration?token=6GVVJ5QPMzcrHgm1>

Professional, Scholarly, and Policy Engagement (invited marked with *, presenter bolded)

2022

Building a preliminary framework for the certification of carbon sequestration. **Arcusa, S.H., K. Lackner, S. Sprenkle-Hyppolite, E. Hagood**. Poster presentation. Gordon Research Seminar and Conference, Ventura CA, April 3-8, 2022.

*Developing a robust certification industry to trust carbon sequestration as a workable climate change mitigation solution. **Arcusa, S.H.**, School of Earth and Sustainability Department Seminar, Northern Arizona University, Flagstaff, AZ, March 24, 2022.

A framework for the certification of carbon sequestration. **Arcusa, S.H.** Virtual presentation. New Carbon Economy Consortium Annual Meeting, February 10-11, 2022.

Direct Air Capture Technical Workshop. Workshop for the I-WEST project. **Arcusa, S.H., Brandt, W., Green, M., Hanneman, M., Lackner, K.S., Moore, J., Page, R., Patil, S., and V. Sriramprasad.** Virtual workshop organizer and facilitator. January 19, 2022.

2021

Challenges and Opportunities from a Semester of Anti-Racist Geoscience Curriculum: Lessons from the School of Earth & Sustainability URGE Pod at Northern Arizona University. **Broadman, E., Arcusa, S.H., Baransky, E., Klein, Z., Lynch, E.M., Marshall, L., Riche, A.T., Riggs, N., Schottenfels, E., Wiman, C.** Poster presentation. American Geophysical Union Fall Meeting, December 13-17, 2021.

*How Local Governments Can Drive Carbon Dioxide Removal Innovation. Together. OpenAir Collective. **Neidl, C., Alatorre, R., Strife, S., Zelikova, J., Arcusa, S.** Virtual presentation and panel discussion. November 10, 2021. <https://www.youtube.com/watch?v=qjJZf0oBbdU>

*Advances in the Partnership for Carbon Removal. Third Annual Global Climate Restoration Forum. Foundation for Climate Restoration. **Dodds, E., Khagram, S., Garay, H., Bromaghim, E., Arcusa, S.H., and A. Parameswaran.** Virtual panel discussion. September 30, 2021. <https://video.earthxtv.com/shows/foundation-climate-restoration/season/1/episode/2>

*Climate Competent Board Certificate Program. **Bank Jorgensen, H., Arcusa, S.H. and K.S. Lackner.** Virtual fire chat discussion. September 14, 2021. <https://competentboards.com/wp-content/uploads/2021/09/Climate-Competent-Boards-Brochure-2021-1.pdf>

The road to a carbon neutral Intermountain West. Arizona Stakeholder Workshop for the I-WEST project. **Arcusa, S.H., Azarabadi, H., Lackner, K.S., Mayes, K., Green, M., Hanneman, M., and J. McGowen.** Virtual workshop presentation and facilitator. September 1, 2021.

*New Carbon Economy – What business needs to know. UNGC Leaders Summit. **Merida W., Lackner, K.S. and S.H. Arcusa.** Virtual fire chat discussion. July 13, 2021.

*Dust-drought nexus in the southern Rocky Mountains: integrating lake paleodust records and climate models. **Arcusa, S.H.** Water Climate and Environment Seminar, University of Texas, Austin, virtual talk. February 5, 2021.

2020

Constraining the role of age uncertainty in event relationships in data-model comparison. **Arcusa, S.H.** and N.P. McKay. American Geophysical Union Fall Meeting virtual talk. December 10-17, 2020.

Regional Wildfire Inferred from Micro-Charcoal Over Past 15,000 years in Southern Colorado USA. **Born, F., Arcusa, S.H., McKay, N.P., and S.R. Anderson.** American Geophysical Union Fall Meeting virtual poster. December, 2020.

Dust-Drought Nexus in the Four Corners Region and Implications for Society. **Arcusa, S.H.** Arizona Dust Workshop, Coolidge, AZ, talk. March 3, 2020.

2019

Examining environmental impact from mining using multiple proxies on a sediment core from Clear lake, Colorado, USA. **Chaffeur, J.M.**, Arcusa, S.H. and N.P. McKay. Geological Society of America Annual Meeting, Phoenix, AZ poster. October, 2019.

Minimal impact of modeled drought on natural dust emission in the Southwest United States. **Arcusa, S.H.**, McKay, N.P., Carrillo, C., and Ault, T. 16th Colorado Plateau Biennial Conference, Flagstaff, AZ poster. September, 2019.

Minimal impact of modeled drought on natural dust emission and deposition in the Southwest United States. **Arcusa, S.H.**, McKay, N.P., Carrillo, C., and T.R. Ault. INQUA XX Congress, Life on the Edge, Dublin, Ireland, poster. August, 2019.

Time, space, and causality in past wildfire regimes: a paired-lake study from central Anatolia. **Roberts, C.N.**, Arcusa, S.H., Eastwood, W.J, Turner, R. and M. Perez. INQUA XX Congress, Life on the Edge, Dublin, Ireland, talk. August, 2019.

Minimal impact of modeled drought on natural dust emission on the Colorado Plateau, Southwest United States. **Arcusa, S.H.**, McKay, N.P., Carrillo, C., and T.R. Ault. Northern Arizona University Graduate Student Symposium, Flagstaff, AZ, poster. April, 2019.

2018

* Dust-climate interaction over the past 15,000 years in the San Juan Mountains, CO: a network of lake sediment records. **Arcusa, S.H.**, Routson, C.C. and N.P. McKay. United States Geological Survey Sweet Science Seminar, Flagstaff, AZ, talk. June 5, 2018.

Temporal variability of dust deposition from Holocene lake sediment records in the San Juan Mountains, CO. **Arcusa, S.H.**, Routson, C.C. and N.P. McKay. American Geophysical Union Fall Meeting, Washington DC, poster. December 13-17, 2018.

Dust-climate interaction over the past 15,000 years in the San Juan Mountains, CO: a network of lake sediment records. **Arcusa, S.H.**, Routson, C.C. and N.P. McKay. Graduate Climate Conference, Seattle, WA, talk. November 2-4, 2018.

Spatial and temporal variability of dust deposition in the San Juan Mountains, CO. **Arcusa, S.H.**, Routson, C.C. and N.P. McKay. Dust Impact on Climate and the Environment, Las Cruces, Chile, poster. January 8-10, 2018.

2017

Spatial and temporal variability of dust deposition in the San Juan Mountains, CO: a network of Late Holocene lake sediment records. **Arcusa, S.H.**, Routson, C.C. and N.P. McKay. American Geophysical Union Fall Meeting, New Orleans, talk. December 11-15, 2017.

14,000 year lake sediment dust record from the San Juan Mountains, CO. **Arcusa, S.H.**, Routson, C.C. and N.P. McKay. 14th Colorado Plateau Biennial Conference, Flagstaff, AZ, talk. September 9-12, 2017.

2016

Paleolimnological analysis of Ecuadorian sediment cores. **Arcusa, S.H.** 17th Swiss Global Change Day, Bern, Switzerland, poster. April 12, 2016.

2015

Determining human impact on the environment from lake sediment cores using scanning reflectance spectroscopy: two case studies from Chile and the Sub-Antarctic. Arcusa, S.H., Pinninghoff, J.P.A., **Saunders, K.M.**, Hernandez-Almeida, I., M. Grosjean. INQUA XIX Congress, Quaternary Perspectives on Climate Change, Natural Hazards and Civilization, Japan, poster. July 26- August 2, 2015.

Wildfire response to climate change during the Late Glacial: Interglacial Transition (LGIT) in Central Turkey. **Arcusa, S.H.**, Allcock, S., Perez, M., and N. Roberts. 16th Swiss Global Change Day, Bern, Switzerland, poster. April 1, 2015.

2014

Wildfire response to climate change during the Late Glacial: Interglacial Transition (LGIT) in Central Turkey. **Arcusa, S.H.**, Allcock, S., Perez, M., and N. Roberts. 57th Irish Geological Research Meeting, Dublin, Ireland, talk. February 28 – March 2, 2014.

2012

Long-term changes in the climate of Amherst, 1836-2011. **Arcusa, S.H.**, Rawlins, M., and R.S. Bradley. 18th Annual Undergraduate Research Conference for the Commonwealth of Massachusetts, Amherst, MA, poster. April 27, 2012.

Teaching

2016-2020 Lab assistant and instructor, Northern Arizona University

Environmental Challenges and Solutions (ENV101), Undergraduate Level, lab instructor, 1 semester
Geologic Communications (GLG350), Undergraduate Level, lab instructor, 3 semesters
Paleontology (GLG225), Undergraduate Level, lab assistant, 1 semester

Guest Teaching

Spring 2022 Guest Instructor, Arizona State University

Carbon Storage (SOS 494/SOS 598/CEE 598), Undergraduate and Graduate level, class instructor, 1 class
Topic: Carbon sequestration

Spring 2019 Guest Instructor, Northern Arizona University

Environmental Challenges and Solutions (ENV101), Undergraduate Level, class instructor, 1 class
Topic: climate change

Curriculum development

Geologic Communications (GLG350), Undergraduate Level
Topics: GIS, Adobe Illustrator, Adobe Photoshop

Mentoring

Graduate Student Research Assistant Supervision

Vishrudh Sriramprasad, MSc. Engineering, Fall 2021, Arizona State University

Sourabh Patil, MSc. Engineering, Fall 2021, Arizona State University

Undergraduate Student Research Assistant Supervision

Emily Hagood, BSc. Materials Science and Engineering, Fall 2021, Arizona State University
Makenzie Sanchez, Spring 2018, Northern Arizona University

Completed Undergraduate Student Capstone Supervision

Fallon Born, BSc. Environmental Science, 2019-2020, Northern Arizona University

Additional Supervisory and Mentorship Experience

Jenna Chaffeur, BSc. Geology, Louis Stokes Alliance for Minority Participation, 2018-2019,
Northern Arizona University

Research Grants and Fellowships

- ITIF Energy Boot Camp Fellow, Washington DC, 06/2022
- NSPN Professional Development Award, \$462, 04/2022
- NAU Presidential Fellowship, \$36,000, 2016-2020
- NAU Bedwell Earth Physics research award, \$500, 04/2019
- Graduate Climate Conference travel award, \$275, 11/2018
- NAU Henry Hooper Student research award, \$1000, 04/2018
- NAU Bedwell Earth Physics research award, \$1000, 04/2018
- PAGES Dust Impact on the Environment and Climate travel award, \$1000, 01/2018
- NAU Graduate Student Governmental travel award, \$450, 12/2017

Honors, Scholarships, and Evidence of Merit

- NAU Graduate Sustainability Leadership Award, 1st place, 04/2020
- NAU Graduate Student of the Month, 08/2020
- European Union Erasmus Scholarship, €1000, 2013
- UMass Amherst William L. Markey Scholarship, \$2000, 2011
- NAU School of Earth and Sustainability 3MRP 2nd place, \$100, 04/2020
- NAU School of Earth and Sustainability 3MRP 1st place, \$400, 04/2018
- University of Bern Oeschger Center poster competition 1st place, 300 CHF, 2014
- University College Cork Devoy Prize for top-ranking undergraduate project, €50, 2014

Service

Organized events

- Organizing committee, First Climate Career Evening, Climate Science Student Council, April 28, 2016.
- Organizing committee, National Student Action Day, Climate Science Student Council, March 7, 2016.
- Organizer, Climate Communication Project, Climate Science Student Council, December, 2015.

Professional service

- Volunteer expert reviewer, Intergovernmental Panel on Climate Change AR6 WG1, Spring 2020.

- Evaluation committee, Outstanding Graduate Coordinator Award, Northern Arizona University, April 2020.
- Vice president, Graduate Student Government, Northern Arizona University, 2019-2020.
- Student poster judge, CEFNS 2017 Undergraduate Research and Design Symposium (UGRADS), Northern Arizona University, April 28, 2017.
- Co-president, Climate Science Student Council, University of Bern, 2015-2016.

Scientific manuscript reviews

- Journal Geophysical Research (2022)
- Climatic Change (2021)
- The Holocene (2019)
- Journal Geophysical Research (2019)

Professional organization memberships

- Arizona State University Global Future Laboratory Postdoctoral Fellow Society
- Arizona State University Thunderbird School of Global Management Global Carbon Removal Partnership
- National Science Policy Network
- Arizona Science Policy Network

Professional Development: Workshops and Specialized Training

Pedagogical development and educational skills

- Writing an Effective Teaching Philosophy Statement, CIRTL Workshop, Spring 2022.
- Postdoctoral Fellows' Teaching Internship, University British Columbia's Centre for the Integration of Research, Teaching and Learning (CIRTL), Spring 2022.
- Unlearning Racism in Geoscience, URGE GEOSCIENCE, Spring 2021.
- Bystander Intervention Training, Hollaback!, September 2020.
- Academic Integrity, Northern Arizona University, August, 2019.

Skills extension

- AWS Services online hackaton, ECRL, Cornell University, Spring, 2019.
- Fortran hackaton, ECRL, Cornell University, Fall, 2018.
- GeochronR Workshop, Paleoclimate Dynamics Lab, Northern Arizona University, August 15-17, 2017.

Continuing education

- Certified Wilderness First Aid, Spring, 2017.

Public/Community Research Talks and Events (invited *)

Talks

*Combining nature and technology: Solutions and pathways for climate action and restoration. **Arcusa, S.H.** Gardens at Ocotillo Senior Living, talk. March 2, 2022.

*Understanding climate science and solutions. **Arcusa, S.H.** Gardens at Ocotillo Senior Living, talk. June 24, 2021.

*A deep dive into dust. US Southwest at the dustiest point in 11,000 years. **Arcusa, S.H.** Highlands Center for Natural History virtual talk. May 24, 2021.

*An introduction to Carbon Dioxide Removal. City of Flagstaff Carbon Neutrality Plan. **Arcusa, S.H.** Virtual presentation. April 30, 2021. <https://www.youtube.com/watch?v=ECBLTu4Uz2U>

*US Southwest sees the dustiest time in 11,000 years. **Hathaway, K. and S.H. Arcusa.** Cimpatco Studio virtual fire chat. September 16, 2020.

*Understanding environmental sustainability through climate science. **Arcusa, S.H.** Northern Arizona University Green Jacks Better World Series, Flagstaff, AZ, talk, 2018.

Events

Guest instructor, Environmental Education Outreach Program, K-12 Saturday Academy, February 2020.

Media coverage

Interview, online article, The NAU Review, [Studying effects of dust and drought on climate change](#), April 12, 2022.

Interview, online article, Press Release, [Arizona State University: ASU Celebrates Postdocs During National Postdoc Appreciation Week](#), October 1, 2021.

Online article, The Lumberjack, [A day on campus with José Luis Cruz](#), February 19, 2021.

Online article, Cornell Chronicle, [Braudy Foundation funds Phase II of dust and drought research](#), September 28, 2020.