

# Stéphanie Arcusa, Ph.D.

School of Complex Adaptive Systems  
Thunderbird School of Global Management  
Center for Negative Carbon Emissions  
Arizona State University, Tempe, AZ 85287-5603  
sarcusa@asu.edu, +1(928) 221-0813  
ORCID ID 0000-0003-0694-9623

## Education

**2021 - 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

**12/2023- present – Assistant professor**  
Joint appointment between Thunderbird School of Global Management and the School of Complex Adaptive Systems, Arizona State University, Phoenix, Arizona  
Supervisors: Sanjeev Khagram and Manfred Laubichler

**08/2023-12/2023 - Faculty associate**  
Thunderbird School of Global Management, Arizona State University, Phoenix, Arizona  
Supervisor: Sanjeev Khagram

**01/2021-12/2023 - 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 interests**

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

### ***Current research projects***

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Advancing the certification of carbon removal. PI: Arcusa S. Arizona State University, Arizona, USA. 2021 – present. Responsibilities: Analyzing current status of certification, exploring topics relevant to certification of carbon removal, and developing measurement systems and their underlying policy architecture.

Monitoring, reporting and verification of zooplankton-mediated export pathways for carbon sequestration. PI: Stamieszkin, K. Bigelow Laboratory for Ocean Science, USA. Researcher, 2024 – present. Responsibilities: named investigator investigating the feasibility of carbon accounting for ocean iron fertilization at the interface between data and models.

Evaluating approaches to verify carbon removal: a gap analysis. PI: Arcusa, S. Arizona State University, Arizona, USA. 2024 – present. Responsibilities: investigating the various types of carbon accounting frameworks for carbon removal to assess their verifiability potential. \$45,811.00

### ***Completed research projects***

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Setting expectations for standards to yield a quality carbon removal export for Kenya and the African continent. PI: Arcusa S. Arizona State University, Arizona, USA. Lead, 2023-present. Responsibilities: convene a working group to define expectations, and deliver an options white paper for the Government of Kenya to bring to the African Climate Summit.

Climate change as waste management. PI: Lackner K., Kaiteki Institute, Arizona State University, Arizona, USA. Researcher, 2021-present. Responsibilities: Analyzing climate change as a waste management challenge and devising implementation strategies to reach negative emissions.

Intermountain west energy transitions and sustainability. PI: Guthrie G., Los Alamos National Laboratory, New Mexico, USA. Researcher, 2021-present. Responsibilities: Analyzing Direct Air Capture pathways to 2050, workforce needs for the energy transition, and certification for decarbonization technologies.

Dust-drought nexus in the Four Corners region, US Southwest. PI: McKay N., Northern Arizona University, Arizona, USA. Research assistant, 2016-2020. Responsibilities: Fieldwork for lake sediment and tree cores, development of Holocene-length dust records from multiple proxies, Earth system model investigation, and development of model to integrate radiocarbon with varve information.

Community greenhouse gas inventory. PI: Alatorre R., Office of Sustainability, City of Flagstaff, Flagstaff, Arizona. Intern, 2020-2020. Responsibilities: Compilation of the city of Flagstaff's greenhouse gas inventory and reporting to the Climate Disclosure Project.

Campus level greenhouse gas data visualization platform. PI: Arcusa S., Northern Arizona University, Arizona, USA. Manager, 2019-2020. Responsibilities: Conceptualization and project design of a platform to visualize campus greenhouse gas inventory.

Climatic change on the Potter Peninsula, Antarctica. PI: Roberts S., British Antarctic Survey. Research Assistant, 2015-2015. Responsibilities: Hyperspectral scanning of lake sediment cores.

Records of Holocene climate, volcanic eruptions and flooding from Cajas National Park, South Central Ecuador. PI: Grosjean M., University of Bern, Bern, Switzerland. Research assistant, 2014-2016. Responsibilities: Field work and development of tephrochronology and flood records from lake sediment using tephra and hyperspectral scanner.

Holocene wildfires, humans, and climate in Turkey. PI: Roberts N., University of Plymouth, Plymouth, UK. Research assistant, 2012-2014. Responsibilities: Development of wildfire record from lake sediment using charcoal covering the Glacial-Interglacial Transition.

Climatological exploration of the climate of Amherst, Massachusetts. PI: Bradley R., University of Massachusetts, Amherst, USA. Research assistant, 2012. Responsibilities: Compilation, analysis, and display of climatological data.

## Publications

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

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	ALL
Citations	137
h-index	7
I10-index	4

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### ***Refereed Articles and Book Chapters***

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Lackner, K.S., **Arcusa, S.H.**, Azarabadi, H., Sriramprasad, V. and Page, R., 2023. Carbon accounting without life cycle analysis. *Energy & Environmental Science*. 10.1039/D3EE01138K

Heredia Barión, P. A., Strelin, J. A., Roberts, ... **Arcusa, S.**, ... & Kuhn, G., 2023. The impact of Holocene deglaciation and glacial dynamics on the landscapes and geomorphology of Potter Peninsula, King George Island (Isla 25 Mayo), NW Antarctic Peninsula. *Frontiers in Earth Science*, 10, 2463.

Hanna, R., Dugoua, E., Nuñez-Jimenez, A., Nock, D., **Arcusa, S.**, Castellanos, S., Davidson, M.R., Edwards, M.R., Galeazzi, C., Gao, X. and Graff, M., 2022. Support for climate policy researchers. *Science*, 378(6625), pp.1181-1181.

**Arcusa, S.H.** and S. Sprenkle-Hyppolite, 2022. Snapshot of the Carbon Dioxide Removal certification and standards ecosystem (2021–2022). *Climate Policy*, 1-14.

<https://doi.org/10.1080/14693062.2022.2094308>

**Arcusa, S.H.**, McKay, N.P., Wiman, C., Patterson, S, Munoz, S.E., and M. Aquino-Lopez. A Bayesian approach to integrating radiometric dating and varve measurements in intermittently indistinct sediment. *Geochronology*, 4, 409–433, <https://doi.org/10.5194/gchron-4-409-2022>, 2022

Routson, C. C., Kaufman, D. S., McKay, N. P., Erb, M. P., **Arcusa, S. H.**, Brown, K. J., ... and 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., and 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**

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Schulte, I., Burke, J., **Arcusa, S.**, Mercer, L., Hondeborg, D., 2024. Chapter 10: Monitoring, reporting and verification. in *The State of Carbon Dioxide Removal 2024 – 2nd Edition* (eds. Smith, S. M. et al.).

<https://www.stateofcdr.org>, doi:10.17605/OSF.IO/ADHP2.

**Arcusa S.**, Lackner K., Hagood, E., Page R., Sriramprasad V., 2022. A conceptual framework for the certification of carbon sequestration. December 2022. Arizona State University KEEP Repository,

<https://hdl.handle.net/2286/R.2.N.172390>.

**Arcusa S.**, Sprenkle-Hyppolite, S., Agrawal, A., 2022. Addressing open questions in the development of standards for the certification of carbon removal: Critical insights from an international consultation process. CNCE Working Paper No. 0002 November 2022. Arizona State University KEEP

Repository, <https://hdl.handle.net/2286/R.2.N.170838>.

**Arcusa S.**, Lackner K., Page R., Sriramprasad V., Hagood, E., 2022. Carbon removal accounting methodologies: how to rethink the system for negative carbon emissions. CNCE Working Paper No. 0001

November 2022. Arizona State University KEEP Repository. <https://hdl.handle.net/2286/R.2.N.170043>

**Arcusa S.H.**, Lackner K., Patil S., Sriramprasad V., Page R., Brandt W., 2022. Certification for Decarbonization Technologies. In: I-WEST Final Report. <https://iwest.org/wp-content/uploads/2022/12/I-WEST-Certification-Final-Report.pdf>

Page R., **Arcusa S.H.**, Lackner K., Patil S., Sriramprasad V., Talha M.A., 2022. Direct Air Capture. In: I-WEST Final Report. <https://iwest.org/wp-content/uploads/2022/12/I-WEST-DAC-Final-Report.pdf>

Page R., **Arcusa S.H.**, Lackner K., 2022. Workforce impacts. In: I-WEST Final Report. <https://iwest.org/wp-content/uploads/2022/12/I-WEST-DAC-Final-Report.pdf>

**Arcusa, S.H.**, Lackner, K., Page, R., Sriramprasad, V., Brandt, W., Moore, J., Green, M., and Patil, S., 2022. The socio-economic and technical context for Direct Air Capture in decarbonization pathways. Technical Workshop Report. January 2022. Center for Negative Carbon Emissions Collection, Arizona State University KEEP Repository, <https://keep.lib.asu.edu/items/170566>.

**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 Repository. <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***

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**Arcusa, S.H** and Lackner, K., 2023. EPA's crackdown on power plant emissions is a big first step – but without strong certification, it will be hard to ensure captured carbon stays put. The Conversation, May 16, 2023. <https://theconversation.com/epas-crackdown-on-power-plant-emissions-is-a-big-first-step-but-without-strong-certification-it-will-be-hard-to-ensure-captured-carbon-stays-put-204889>

**Arcusa, S.H.**, 2023. Carbon removal certification is the next climate frontier. The Academic, February 14, 2023. <https://theacademic.com/carbon-removal-certification/>

**Arcusa, S.H.**, 2022. MRV: first perspective. In: Scaling direct air capture: deployment stage. Climeworks Report. [https://climeworkscom.cdn.prismic.io/climeworkscom/36ce544c-7134-4c4f-9c94-ca514315e841\\_Climeworks+-+Industry+snapshot\\_dec+2022.pdf](https://climeworkscom.cdn.prismic.io/climeworkscom/36ce544c-7134-4c4f-9c94-ca514315e841_Climeworks+-+Industry+snapshot_dec+2022.pdf)

**Arcusa, S.H.**, 2022. Scoping the space of carbon removal standards and certification. LightWorks News, July 18<sup>th</sup>, 2022. <https://sustainability-innovation.asu.edu/lightworks/news/archive/scoping-the-space-of-carbon-removal-standards-and-certification/>

**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***

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McKay, N.P., Kaufman, D.S., **Arcusa, S.H.**, Kolus,H., Edge,D., Erb, M.P., Hancock,C., Routson,C.C., Żarczyński, M., Marshall, L.P., Roberts, G., Telles, F. The 4.2 ka event is not remarkable in the context of Holocene climate variability. Nature Communications. (under review)

Hanna, R., Hanna, R., Dugoua, E., Nuñez-Jimenez, A., Nock, D., **Arcusa, S.**, Castellanos, S., Davidson, M.R., Edwards, M.R., Galeazzi, C., Gao, X. and Graff, M. Practices and strategies for early-career researchers who want to be policy relevant: Insights from a Washington DC bootcamp on climate policy and technology innovation. In preparation.

**Arcusa, S.**, Hagood, E. Definitions and mechanisms for managing durability and reversals in standards and procurers of carbon dioxide removal. OSF Preprints, 1 Jul 2023. (under review)

<https://doi.org/10.31219/osf.io/6bth5>

**Arcusa, S.H.** and K.S. Lackner. Intergenerational equity and responsibility: a call to internalize impermanence into certificates of carbon sequestration. OSF Preprints, 23 Feb 2022. (under review)

<https://doi.org/10.31219/osf.io/b3wkr>

**Arcusa, S.H.**, K.S. Lackner, S. Sprenkle-Hyppolite, V. Sriramprasad. The role of additionality in certifying carbon removal. In 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.**, E. Hagood, K.S. Lackner, S. Sprenkle-Hyppolite. A review of expected storage duration, process times, and risks of carbon sequestration across reservoirs. In preparation.

**Arcusa, S.H.**, K.S. Lackner, V. Sriramprasad, E. Hagood, M. Green. A blueprint to operationalize carbon neutrality goals. In preparation.

**Arcusa, S.H.**, V. Sriramprasad, K.S. Lackner. What makes Carbon Dioxide Removal fit-for-purpose? In preparation.

***Other Creative Products***

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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)**

**2024**

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Metrology needs for environmental and industrial carbon sequestration. **Arcusa, S.**, Lackner K.S. 1st Stakeholder Meeting of the CIPM Sectorial Task Group on Climate Change and Environment, virtual poster, September, 2024.

\*Overcoming the Three Biggest Challenges to Creating Effective Markets for GGR:

Verification, Permanence, & Economics. **Arcusa S.** Citizen Climate Lobby, Greenhouse Gas Removal Action Team Meeting, virtual presentation, June 26, 2024.

A systematic review on the monitoring, reporting, and verification of Carbon Dioxide Removal. **Schulte, I., Arcusa, S., Fuss, S., Hondeborg, D., Lück, S., Mercer, L., Minx, J.** 3<sup>rd</sup> International Conference on Negative CO<sub>2</sub> Emissions 2024, presentation, Oxford University, UK, June 18-21, 2024.

A systematic review on the monitoring, reporting, and verification (MRV) of Carbon Dioxide Removal. **Schulte, I., Arcusa, S., Fuss, S., Hondeborg, D., Lück, S., Mercer, L., Minx, J.** What Works Climate Solutions Summit, presentation, TU Berlin, June 9-12, 2024.

A systematic evaluation of carbon dioxide removal methodologies. **Hondeborg, D., Arcusa, S., Mercer, L., Olmos van Velden, M., Schulte, I., Probst, B.** [CONFERENCE]

## 2023

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\*Carbon Removal Deployment: Law and Policy from Planning to Project. **Arcusa, S.**, 3rd Annual Carbon Dioxide Removal Law & Policy Conference, virtual, November 9, 2023.

\* Carbon Management: Breaking Down Climate Mitigation Complexity. **Arcusa, S.**, School of Complex Adaptive System Seminar, Arizona State University, Tempe, September 13, 2023.

\*I-WEST Seminar: Why should I trust you?: The why, what, and how of carbon sequestration certification. **Arcusa, S.** I-WEST seminar series, virtual, June 1, 2023.

A conceptual framework for the certification of carbon sequestration. **Arcusa, S.** and Lackner, K. Carbon Capture, Utilization and Storage Gordon Research Conference, Les Diablerets, Switzerland, May 28 – June 6, 2023.

\*The state of Carbon Dioxide Removal Science and Standards: A Focus on Enhanced Weathering. **Arcusa, S.** GFZ Potsdam, virtual, April 17, 2023.

Certified Carbon Removal is Critical to an Effective and Resilient Response for Stabilizing the Climate. **Arcusa, S.** and Lackner, K. Battelle Conference on Innovations in Climate Resilience, Columbus, Ohio, March 28-30, 2023.

Terrestrial carbon removal activities, standards, certifications, and their expected durations. **Sprenkle-Hypolite S., Arcusa S., Hagood E., Cardinael R., Funk J., Roopsind A.** Anthromes, CO<sub>2</sub>, and Terrestrial Carbon: From the deep past to net-zero, Washington, USA, May 27-30, 2023.

Was the 4.2 ka event unusual in context of global Holocene climate variability? McKay, N., Kaufman, D., **Arcusa, S.**, Kolus, H. EGU General Assembly 2023, Vienna, Austria, 24–28 Apr 2023, EGU23-9455, <https://doi.org/10.5194/egusphere-egu23-9455>, 2023.

\*The State of play: carbon removal science and standards. **Arcusa, S.** National Workshop on Carbon Removal. Nairobi Radisson Blu Hotel, Upper Hill, Kenya, February 27-28, 2023.

\*The certification of carbon sequestration: moving the yardstick on permanence. **Arcusa, S.** New Carbon Economy Consortium Annual Meeting. Arizona State University in Tempe, AZ at the Rob and Melani Walton Center for Planetary Health, February 6-8, 2023.

**2022**

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\*What will it take to build trust in Carbon Dioxide Removal. **Arcusa, S.** Frontiers, Exponential, LowerCarbon Ventures Workshop to Catalyze Collaborative and Cross-Pathway Measurement, Reporting, and Verification for Carbon Dioxide Removal. San Francisco, November 2-4, 2022.

\* Session 1. What is good MRV? Lessons from soil carbon, wind and other sectors. **Freeman S., Stimpson C., Oikawa P., Cohen Brown N., Duke P., Eisaman M., Arcusa S.H.** Marine Carbon Dioxide Removal: Essential Science and Problem Solving for Measurement, Reporting, and Verification Workshop. Ocean Carbon and Biochemistry Program. Virtual panel presenter. September 27, 2022.

\* Getting serious about carbon management: why we should internalize impermanence in the certification of carbon removal. **Arcusa, S.H.** Virtual presentation. ITIF Junior Scholars Seminar Series. September 16, 2022.

\*Counting tons: Policy decisions in quantifying and standardizing carbon removal. **Arcusa, S.H.** Virtual workshop organizer and presenter. Fourth Annual Climate Restoration Forum workshop. September 14, 2022. Available at: <https://www.youtube.com/watch?v=oqL6psMd6wY&list=PLrvu7-AJMaCXPUvsymAYci-Gb2mGkARo&index=12>

\*Challenges to sustainable development during decarbonization: lessons learned from research on the certification of carbon sequestration and decarbonization pathways. **Arcusa, S.H.** Virtual presentation. National Academies of Sciences, Engineering, and Medicine workshop for study on Operationalizing Sustainable Development: Global Strategies. May 16, 2022. Available at: <https://www.nationalacademies.org/event/05-16-2022/operationalizing-sustainable-development-information-gathering-workshop-2-global-strategies-part-2>

Consultation series conclusion and tabled topics. **Arcusa, S.H., Agrawal, A., Khagram, S., and S. Sprenkle-Hyppolite.** Virtual consultation developer and organizer. Addressing open questions in the development of standards of carbon sequestration. April 21, 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.

Consultation 4: Permanence, its risks and governance. **Arcusa, S.H., Agrawal, A., Khagram, S., and S. Sprenkle-Hyppolite.** Virtual consultation developer and organizer. Addressing open questions in the development of standards of carbon sequestration. March 31, 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.

Consultation 3: Instrument choice and tracking of carbon removal. **Arcusa, S.H., Agrawal, A., Khagram, S., and S. Sprenkle-Hyppolite.** Virtual consultation developer and organizer. Addressing open question in the development of standards of carbon sequestration. March 10, 2022.



Consultation 2: What is the role of additionality in carbon removal? **Arcusa, S.H., Agrawal, A., Khagram, S., and S. Sprenkle-Hyppolite.** Virtual consultation developer and organizer. Addressing open questions in the development of standards of carbon sequestration. February 24, 2022.

Consultation 1: Avoidance, reduction, and removal – what’s the difference? **Arcusa, S.H., Agrawal, A., Khagram, S., and S. Sprenkle-Hyppolite.** Virtual consultation developer and organizer. Addressing open questions in the development of standards of carbon sequestration. February 10, 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.

Pre-consultation. **Arcusa, S.H., Agrawal, A., Khagram, S., and S. Sprenkle-Hyppolite.** Virtual consultation developer and organizer. Addressing open questions in the development of standards of carbon sequestration. January 6 2022.

## **2021**

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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.earthtxtv.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**

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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**

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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**

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\* 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.

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### **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.

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### **2016**

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

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### **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.

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### **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.

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### **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.

[https://www.academia.edu/3377026/Long\\_Term\\_Changes\\_in\\_The\\_Climate\\_of\\_Amherst\\_Massachusetts](https://www.academia.edu/3377026/Long_Term_Changes_in_The_Climate_of_Amherst_Massachusetts)

## **Teaching**

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### **Primary instructor**

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**Spring 2024 Associate professor, Arizona State University**

Big Data in the Global Economy (TGM312), Undergraduate Level

**Fall 2023 Faculty associate, Arizona State University**

Big Data in the Global Economy (TGM312), Undergraduate Level

**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***

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**Spring 2023 Guest Instructor, Arizona State University**

Carbon storage (CEE 598), Undergraduate and Graduate level, class instructor, 3 classes

Topic: Carbon storage

**Fall 2022 Guest Instructor, Arizona State University**

Carbon capture (CEE 598), Undergraduate and Graduate level, class instructor, 2 classes

Topic: Carbon capture

**Spring 2019 Guest Instructor, Northern Arizona University**

Environmental Challenges and Solutions (ENV101), Undergraduate Level, class instructor, 1 class

Topic: Climate change

***Curriculum development***

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Applied Complexity in Carbon Management (CAS598), Undergraduate Level

Topics: complexity science, carbon accounting and management

Big Data and the Global Economy (TGM312), Undergraduate Level

Topics: data, analytics, Tableau software

Geologic Communications (GLG350), Undergraduate Level

Topics: GIS, Adobe Illustrator, Adobe Photoshop

**Mentoring**

***Graduate Student Research Assistant Supervision***

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Vishrudh Sriramprasad, MSc. Engineering, Fall 2021 – Spring 2023, Arizona State University

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

***Undergraduate Student Research Assistant Supervision***

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Emily Hagood, BSc. Materials Science and Engineering, Fall 2021 – Spring 2023, Arizona State University

Makenzie Sanchez, Spring 2018, Northern Arizona University

***Completed Undergraduate Student Capstone Supervision***

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Fallon Born, BSc. Environmental Science, Fall 2019 – Spring 2020, Northern Arizona University

***Additional Supervisory and Mentorship Experience***

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Hermance Luff, BSc. Sustainable Energy, Materials, and Technologies, Fall 2023, Arizona State University

Isabel Rennie, BMS Global Management, Honors Contract, Fall 2023, Arizona State University

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

## Research Grants and Fellowships

- NNCI Winter School Fellowship, Saguaro Lake Ranch, Arizona, 01/2023
- ITIF Energy Boot Camp Fellowship, Washington DC, 06/2022
- GRC Conference Support, \$2,000, 04/2022
- 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

- ASU CNCE poster competition 1<sup>st</sup> place, \$100, 08/2023
- NAU Graduate Sustainability Leadership Award, 1st place, 04/2020
- NAU Graduate Student of the Month, 08/2020
- 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
- European Union Erasmus Scholarship, €1000, 2013
- UMass Amherst William L. Markey Scholarship, \$2000, 2011

## Service

### *Organized events*

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- 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*

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- Board advisor, Emergent Climate Risk Laboratory, Cornell University, Fall 2023-present.
- Discussion leader, Gordon Research Seminar, Les Diablerets, Switzerland, June 2023.
- Advisor on carbon accounting to Ali D Mohamed, Special Climate Envoy for Kenya, Government of Kenya, Spring 2023.
- National Oceanographic Partnership Program marine Carbon Dioxide Removal proposal reviewer, Spring 2023.
- Governance expert reviewer for Frontier Carbon Dioxide Removal purchase, Fall 2022, Summer 2023.
- Discussion leader, Gordon Research Seminar, Ventura, CA, USA, April 2022.
- 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***

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- Nature Communications (2023)
- PLOS Climate (2023)
- Journal Geophysical Research (2019, 2022)
- Climatic Change (2021)
- The Holocene (2019)

### ***Professional organization memberships***

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- Arizona State University Global Future Laboratory Postdoctoral Fellow Society
- Secretariat member of the 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***

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- Postdoctoral Fellows' Teaching Internship, University British Columbia's Centre for the Integration of Research, Teaching and Learning (CIRTL), Spring-Fall 2022.
- Writing an Effective Teaching Philosophy Statement, CIRTL Workshop, 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***

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- 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***

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- First Aid/CPR, November 2023.
- Sierra Rescue International River Rescue Certification course, Spring 2023.
- Certified Wilderness First Aid, Spring, 2017.

## **Public/Community Research Talks and Events (invited \*)**

### ***Talks***

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\*Carbon offsets. **Arcusa, S.H.** Interviews 4 Future. November, 2022. <https://interviews-4-future.podigee.io/87-i4f>

\*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.** Cimpatico 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**

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

### **Media coverage**

Online article, Alliance for Science, [Global climate experts convene in Kenya for first national workshop on carbon removal](#), February 28, 2023.

Feature, Box 6-2 Certification of Carbon Removal and Sequestration. In: National Academies of Sciences, Engineering, and Medicine 2022. Operationalizing Sustainable Development to Benefit People and the Planet. Washington, DC: The National Academies Press. <https://doi.org/10.17226/26654>.

Feature, online newsletter, Carbon180, [Mind the Map](#), The Carbon Copy, August 30, 2022.

Interview, online article, Grist, [Why Boulder County and Flagstaff are enlisting cities to suck carbon out of the atmosphere](#), May 17, 2022.

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.