

Sam Mark
University at Buffalo
University of Alaska Fairbanks
Institute of Northern Engineering
Water and Environmental Research Center
szmark@buffalo.edu/szmark@alaska.edu • 610-220-6648

Professional Appointments

2023-present NSF OPP Postdoctoral Fellow

University of Alaska Fairbanks and University at Buffalo

Assessing the contribution of permafrost-derived trace gases in greenhouse warming since the Last Glacial Maximum

Education

| | |
|-----------|--|
| June 2023 | University of Pittsburgh , Pittsburgh PA PhD Student in Geology and Environmental Sciences Graduate Researcher at the Dietrich School of Arts & Sciences Climate and Global Change Center Advisor: Prof. Mark Abbott. Dissertation: <i>Laminated Holocene lacustrine sediment records of ENSO and PDO-scale climate variability from the Pacific Basin.</i> |
| June 2016 | Bates College , Lewiston ME B.S with Honors in Geology Advisor: Prof. Michael Retelle. Thesis: <i>Holocene Sclerochronology of Ingoya, Finnmark, Norway.</i> |

Research Positions

| | |
|---------------------|---|
| Oct. 2023-present | University of Alaska Fairbanks and University at Buffalo , NSF OPP Postdoctoral Fellow |
| Sep. 2020-June 2021 | University of Pittsburgh , Andrew Mellon Predoctoral Fellow |
| Sep. 2017-2020 | University of Pittsburgh , Graduate student researcher |
| Jan.-May 2017 | Smithsonian Museum of Natural History , Research intern |
| May-Aug 2015 | NSF Summer Research Fellowship , Research intern |
| June-Aug 2015 | NSF REU Fellowship , University of Delaware, Undergraduate researcher |

Publications

1. **Mark S.Z.**, Whitlock C.W., Abbott M.B., Steinman B.A., Fernandez A. Steeple J.*, 2024. "The influence of multidecadal climate variability and abrupt landscape change on terrestrial ecosystem composition and fire regime in the semi-arid Upper Columbia River Basin". *Quaternary Science Reviews*.
<https://doi.org/10.1016/j.quascirev.2024.108668>
2. Bird B., Steinman B., Escobar, J., Correa-Metrio A., Holper K., Gibson D., **Mark S.Z.**, Fonseca H. "Synchronous and in-phase tropical Andean hydroclimate variability during the last millennium"
<https://doi.org/10.1029/2023JD040255>
3. **Mark S. Z.**, Abbott M. B., Steinman A. Wise E.K., Walsh M. K., Whitlock C., 2023 "A link between Hydroclimate Variability and Biomass Burning over the Last Millennium in the Interior Pacific Northwest" Submitted to *Geophysical Research Letters*. <https://doi.org/10.1029/2023GL105202>

4. Shelef E., Griffo M., **Mark S.Z.**, Lasher G.E., Abbott M.B., 2022. “Sensitivity of Erosion-Rate in Permafrost Landscapes to Changing Climate and Environmental Conditions Based on Lake Sediments From Northwestern Alaska” *Earth’s Future*. Vol. 10, 8. <https://doi.org/10.1029/2022EF002779>
5. **Mark S. Z.**, Abbott M. B., Rodbell D. T., Moy C. M., 2022. “XRF Analysis of Laguna Pallcacocha Sediments Yields New Insights into Holocene El Niño Development” *Earth and Planetary Science Letters*. 593, <https://doi.org/10.1016/j.epsl.2022.117657>
6. D. T. Rodbell, M. B. Abbott, R. G. Hatfield, C. Y. Chen, A. Woods, J. S. Stoner, D. McGee, P. M. Tapia, M. Bush, B.L. Valero-Garcés, S. B. Lehmann, **S. Z. Mark**, N. C. Weidhaas, A. L. Hillman, D. J. Larsen, G. Delgado, S. A. Katz, K. E. Solada, A. E. Morey, M. Finkenbinder, B. Valencia, A. Rozas-Davila, N. Wattrus, S. M. Colman, M. G. Bustamante, J. Kück, S. Pierdominici, 2022. “700,000-years of Tropical Andean Glaciers Forced by Northern High Latitudes.” *Nature*. 607, 301-306, <https://doi.org/10.1038/s41586-022-04873-0>
7. Finkenbinder M. S., Steinman B. A., Bird B. W., Heilman E. C., Aspey A. R., **Mark S. Z.**, Stansell N. D., Fernandez A., Halsor S. P., Abbott M. B., 2022. “A 5000 year lacustrine sediment oxygen isotope record of late Holocene climate change in Newfoundland, Canada”. *Quaternary Science Reviews*. 278, <https://doi.org/10.1016/j.quascirev.2022.107376>

Manuscripts in review

1. **Mark S.Z.**, Gaglioti B.V., Thomas E.K., Mann D.H., Otiniano G.A., Hancock C.L., McKay N.P. “Evidence from the last global deglaciation reveals the dynamics constraining a permafrost-carbon feedback.” In review at *Nature*.
2. Özpolat E., Shelef E., Abbott M.B., **Mark S.Z.**, Mishra U., Wondoloski N. “Enhanced Erosion in Areas of Discontinuous Permafrost Compared to Continuous Permafrost in Alaska”. Submitted to *Geology*.
3. Otiniano G.A., Thomas E.K., Castañeda I.S., Acharya S., **Mark S.Z.** “chromatoPy: An open-source tool for chromatographic peak deconvolution and integration applied to glycerol dialkyl glycerol tetraether.” Submitted to *Paleoceanography and Paleoclimatology*.

Manuscripts in preparation (*Undergraduate mentee)

4. **Mark S.Z.**, Abbott M.B., Rodbell D.T., Shelef E.S., Moy C.M., 2024. “Holocene-scale El Niño frequency and intensity signals preserved in 3 Andean lakes”. In preparation for submission to *Earth and Planetary Science Letters*.
5. Shaffer, O.*, **Mark S.Z.**, Abbott M.B., 2024. “6,800 Year Fire and Drought History from Blue Lake, NV”. In preparation for submission to *The Holocene*.
6. Abbott, M.B., Marchetti, D.W., Anderson, L., Brunelle, A.R., Stoner, J.S., Reilly, B.T., Vornlocher J.R., Morris, J.L., Carter, V.A., Power, M.J., Hatfield, R.G., Sinon, H., Finkenbinder, M.S., Peters W*, Ritter, C., Larsen, D.J., Lasher, G.E., **Mark, S.Z.**, Werne, J.P. “A 30,000-Year Glacial History and Water Balance Record from Fish Lake, Utah.” In preparation for submission to *Quaternary Science Reviews*.
7. Gaglioti B.V., Quinn C., **Mark S.Z.**, Hansen W.D., Hall J., Mann D.H. “The nature and limits of fuel self-regulation in Alaska.” In preparation for submission to *Environmental Research Letters*.

Grants and Awards

| | |
|------|---|
| 2023 | National Science Foundation Office of Polar Programs Postdoctoral Research Fellowship (\$325,875) |
| 2022 | University of Pittsburgh Henry Leighton Memorial Graduate Award (\$2,500) |
| 2020 | Andrew Mellon Predoctoral Fellowship (\$24,456) |
| 2019 | University of Pittsburgh Climate and Global Change Center Travel Grant (\$3,000) |

| | |
|------|--|
| 2018 | University of Pittsburgh Climate and Global Change Center Travel Grant (\$1,990) |
| 2018 | University of Pittsburgh Climate and Global Change Center Research Fellowship (\$22,896) |

Invited Talks and Seminars

- 1.) **AGU Fall Meeting 2025**, “Session #251810: Advances in Arctic Carbon Cycling: Perspectives from Multiple Proxies, Timescales, and Methods”
- 2.) **International Quaternary Webinar**, Nov. 2025
- 3.) **Dartmouth College Department of Earth Sciences seminar (via Zoom), Apr. 2025.** *Did thawing permafrost contribute to deglacial greenhouse gas increases?*
- 4.) **Rowan University Paleoclimate seminar (via Zoom) Feb. 2025.** *El Niño driven flood deposits in the Ecuadorian Andes*
- 5.) **University of Alaska Anchorage Geology Seminar (via Zoom, Apr. 2024.** *How important was permafrost carbon to deglacial greenhouse gas increases?*

Presentations and Posters

- 6.) **Pacific Climate Workshop (PACCLIM), Pacific Grove CA, Feb. 2025.** *North Pacific decadal variability during the Common Era and its impact on ecosystems* (talk)
- 7.) **American Geophysical Union Fall Meeting, Washington DC, Dec. 2024.** *Rapid climate change from the Northern Brooks Range during the late Pleistocene/early Holocene: preliminary results from Schrader Lake, Alaska.* (poster)
- 8.) **Arctic Workshop, Amherst MA, Mar 2024.** *Testing the strength of the Permafrost Carbon Feedback during the last deglaciation.* (talk)
- 9.) **American Geophysical Union Fall Meeting, San Francisco CA, Dec 2023.** *The frequency and intensity of el Niño events reconstructed from 3 independent sedimentary sequences.* (talk)
- 10.) **Geophysical Society of America Fall Meeting, Pittsburgh PA, Sep 2023.** *Climate, fuel, and fire in the Great Basin: mid- to late-Holocene perspectives from Blue Lake, NV.* (talk)
- 11.) **American Geophysical Union Fall Meeting, Chicago IL, Dec 2022.** *Hydroclimate and Biomass Burning in the Interior Pacific Northwest During the Medieval Climate Anomaly and Little Ice Age: Reconciling Different Proxy Archives.* **Mark, S.Z.**, Abbott M.B., Steinman B.A., Fernandez A., Walsh M.K., Whitlock C. (talk)
- 12.) **American Geophysical Union Fall Meeting, Dec 2022.** *Holocene Lake Level Changes Identified from Shifts in Carbonate and Organic Matter Concentrations and Stable Isotopes in Celestine Lake, Alberta, Canada.* Sinon, H., Abbott M.A., Steinman B.A., Christiansen S., Mark S.Z.*, Woods A., Finkenbinder M. (poster)
- 13.) **University of Pittsburgh Geology and Environmental Science Colloquium, Oct 2022.** *Climate, Fire and People in the Pacific Northwest over the last millennium.* **Mark, S.Z.**, Abbott M.B., Steinman B.A., Fernandez A., Walsh M.K., Whitlock C. (talk).
- 14.) **American Geophysical Union Fall Meeting, 2021.** *Sensitivity of erosion-rate in permafrost landscapes to environmental conditions based on a sedimentary record from Burial Lake, AK.* Shelef E., Griffore M., **Mark S.Z.**, Coleman T., Wondolowski N. A., Lasher G.E., Abbott M.B. (poster)
- 15.) **American Geophysical Union Fall Meeting, 2019.** *The influence of geomorphology and land use on the preservation of an El Niño frequency and intensity signal in three Andean lakes.* **Mark S.Z.**, Abbott M.B., Rodbell D.T., Moy C.M. (poster)
- 16.) **PAGES PaleoENSO Workshop, 2019.** *Geomorphology, land use, and ENSO-induced flooding signals in Andean lake sediments.* (talk)
- 17.) **University of Pittsburgh Student Research Fair, 2019.** *Four centuries of drought in the Pacific Northwest.* **Mark S.Z.**, Abbott M.B. (talk)
- 18.) **American Geophysical Union Fall Meeting, 2018.** *Basin Scale Geomorphology and its Influence on the Preservation of ENSO-Induced Flood Deposits in El Cajas National Park, Ecuador.* (poster)

- 19.) **American Geophysical Union Fall Meeting, 2018.** *Holocene lake level History of Celestine Lake, Jasper National Park, Alberta.* Christiansen S., Bustamante, M. G., Lehmann S. B., Woods A., **Mark S.Z.**, Steinman B. A., Abbott M.B. (talk).
- 20.) **American Geophysical Union Fall Meeting, 2018.** *A 5,000 year record of late Holocene climate change in Newfoundland reconstructed using oxygen isotope analysis of lake sediment cores.* Finkenbinder M.S., Weber E.C., Aspey A.R., Bird B.W., Steinman B.A., **Mark S.Z.**, Halsor S.P. (poster)

Skills and experience

Software and computational: MATLAB, R, ArcGIS, QGIS, time series analysis

Laboratory: Gamma spectroscopy for ^{137}Cs and ^{210}Pb dating, ^{14}C sample preparation, EA-IRMS, GC-FID, Dionex ASE

Geotek CoreLogger, compound specific isotope analysis.

Field: Livingstone coring, Uwitec percussion coring, freeze coring, surface coring, Solinst Levelogger and Barologger deployment

Teaching and Mentoring

University at Buffalo

- Summer 2025 Mentored undergraduate researcher Aspen Marshann (University of Utah '26) and Camryn Nelson (Embry-Riddle Aeronautical University '26) for UB Geologic and Climate Hazards Center REU program
- Fall 2023 Mentored undergraduate researcher Dephil Jones (UB '23) as part of CSTEP internship program

University of Pittsburgh

- Spring 2023 Teaching assistant for GEOL 1030-Atmospheres, Oceans, and Climate
- Spring 2022 Mentored undergraduate researcher Jen Steeple for senior thesis "*Linkages Revealed Between Wildfires and Mercury Accumulation in Lake Sediments from Eastern Washington*", guided pilot study to develop record of Hg deposition from Round Lake, WA.
- Fall 2021-present Mentored undergraduate researcher Owen Shaffer for senior thesis "*6800 Year Fire History of Blue Lake, NV*"
- Spring 2021 Committee member for Carissa Root's undergraduate thesis "*Drought History of Northwestern Montana from Studies of Rock Lake Sedimentology and Oxygen Isotopes*"
- Fall 2019-Spring 2020 Mentored undergraduate research assistant William Hollar, began pilot project studying organic carbon isotopes from Round Lake, WA, USA
- Summer 2018 Mentored undergraduate researchers Nadine French and Aidan Conway, developed two high resolution carbonate oxygen isotope records from eastern Washington, USA
- Spring 2017 Lecturer and laboratory manager for GEOL 0870-The Planets
- Fall 2017 Teaching assistant and laboratory manager for GEOL 1445-Introduction to GIS

Bates College

- Spring 2015 Teaching assistant for GEOL 103-Earth Surface Environments and Environmental Change
- Fall 2015 Teaching assistant for GEOL 107-Katahdin to Acadia: Field Geology in Maine

Professional Experience and Service

Reviewer: Quaternary Research, Geophysical Research Letters, Geology, Paleoceanography and Paleoclimatology, Paleoceanography and Paleoclimatology, JGR-Atmospheres, Scientific Reports

American Geophysical Union Fall Meeting, 2024. Chair of session: *The deglacial carbon cycle: reconciling greenhouse gas records with marine and terrestrial data*

American Geophysical Union Fall Meeting, 2019. Co-chair of session: *Insight into El Niño Southern Oscillation Dynamics from Paleoclimate Records, Modern Observations, and Modeling Studies*

University of New Mexico Center for Stable Isotopes IsoCamp, 2022. Participant

Field work

| | | |
|-----------------------|--|--|
| June 2024 | | Glacier Bay National Park and Baranof Island, AK |
| August 2023 | | Yellowstone National Park, MT and WY, USA |
| July 2023 | | Azuay Province, Ecuador |
| September 2022 | | Pine Forest Range, NV and Thousand Lake Mountains, UT, USA |
| September 2021 | | La Sal and Thousand Lake Mountains, Utah, USA |
| March-April 2021 | | Northern Brooks Range and North Slope, Alaska, USA |
| February 2020 | | Fish Lake, Utah, USA |
| August-September 2019 | | Southeastern Oregon, Northern Nevada, USA |
| July-August 2018 | | Interior Alaska, USA |
| July 2018 | | Eastern Cascade Mountains, USA |
| June-July 2018 | | Cajas Parque Nacional, Ecuador |
| February 2018 | | Eastern Cascade Mountains, USA |
| July-August 2017 | | Western North America, Canada and USA |
| June 2017 | | Cajas Parque Nacional, Ecuador |
| June 2015 | | Ingoya and Rolvsøya, Finnmark, Norway |