Sarah C. Elmendorf

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EMPLOYMENT

University of Colorado

2021- **Fellow**, Institute for Arctic and Alpine Research (INSTAAR)
2018- **Information Manager**, Niwot Ridge LTER
2013- **Research Associate**, Ecology and Evolutionary Biology Department

National Ecological Observatory Network (NEON)

2012-2018 **Staff Scientist,** Data Products Group

University of British Columbia

2008-2012 **Postdoctoral Research Fellow**, University of British Columbia Geography Department

EDUCATION

2008 **University of California, Davis.** Ecology, Ph.D., with Dr. Susan Harrison
1999 **Wesleyan University**. Biology, M.A., with Dr. Sonia Sultan
1998 **Wesleyan University**. Biology, B.A. Phi Beta Kappa.

GRANTS

2023-2026	**NSF** *ORCC: Uniting long-term field experiments and modern genomics to prepare sustainable crops for the future*. Co-PI; PI: Nolan Kane	$1,167,742
2022-2028	**NSF** *Long-term research on the dynamics of high-elevation ecosystems: A framework for understanding rates of ecological response to climate change*. Senior Personnel; PI: Nancy Emery	$7,650,000
2021	**Environmental Data Initiative (EDI) Summer Fellowship**, co-mentor with Dr. Chris Ray	$5500
2020-2024	**NSF** *Using the ITEX-AON network to document and understand terrestrial ecosystem change in the new Arctic.* (PI: Robert Hollister, w/subaward to CU Boulder)	$73,739
2017-2019	**U.S. Geological Survey** *Integrating and synthesizing national datasets to understand patterns and variability in phenology across the nation.* PI	$77,620
2014	**Synthesis Centre of Biodiversity Sciences (sDiv),** Germany. *Tundra ecosystem change: Scaling shrub expansion from site to biome.* Co-PI with Dr. Isla Myers-Smith	$41,000
2006	**Jastro-Shields Graduate Research Award**, UC Davis	$2300
2005	**Environmental Science and Policy Dept. Student Travel Grant**, UC Davis	$1500
2005	**Jastro-Shields Graduate Research Award**, UC Davis	$2200
2003	**Mildred E. Mathias Graduate Student Research Grant**, Univ. of California Natural Reserve System	$2000
2003	**Consortium for Research at the McLaughlin Reserve Grant**, UC Davis	$2400

PEER REVIEWED PUBLICATIONS (h-index = 34; 12597 citations; google scholar)

2025 Everest, J.G., … **S.C. Elmendorf**. Evaluating the utility of hyperspectral data to monitor local-scale functional turnover across space and time. Remote Sensing of the Environment 316: 114507.

2024 Bueno de Mesquito, C.B., **S.C. Elmendorf**, *et al*. Shifting alpine plant distributions with global change: testing the environmental matching hypothesis. Arctic, Antarctic and Alpine Research 56.

Collins, C.G., *et al.* **S.C. Elmendorf** .... Flowering time responses to warming drive reproductive fitness in a changing Arctic. Annals of Botany: mcae007.

Henn, J.J., *et al.* **S.C. Elmendorf**…. Long term alpine plant responses to global change drivers depend on functional traits. Ecology Letters 27: e14518

McDevitt-Gales, T., A.T. Degaetano, **S.C. Elmendorf**, et al. Partly cloudy with a chance of mosquitoes: developing a flexible approach to forecasting mosquito populations. In review at *Ecosphere* 15(12): e70074

Oldfather, M.F., S.C. Elmendorf *et al.* Divergent community trajectories with climate change across a fine-scale gradient in snow depth. Journal of Ecology, 112, 126–137.

2023 Jay, K.R., ., *et al*., **S.C. Elmendorf**….Topographic heterogeneity and aspect moderate exposure to climate change across an alpine tundra hillslope. JGR-Biogeosciences 128:e2023JG007664.

Sellers, H.L., S.A. Vargas Zesati, **S.C. Elmendorf** *et al.* Can plot-level photographs accurately estimate tundra vegetation cover in northern Alaska? Remote Sensing 15, 1972.

Elmendorf, S.C. and R.D. Hollister. Limits on phenological response to high temperature in the Arctic. Scientific Reports 13, 208.

2022 Hollister, R.D. *et al*. **S.C. Elmendorf**…A review of open top chamber (OTC) performance across the ITEX Network. Arctic Science.

Collins, C.G., **S.C. Elmendorf**, *et al.* Global change re-structures alpine plant communities through interacting abiotic and biotic effects. Ecology Letters 25: 1813-1826.

Rixen, C., *et al*., **S.C. Elmendorf**, ….Winters are changing: snow effects on Arctic and alpine tundra ecosystems. Arctic Science, 1-37.

2021 Bjarke, N., *et al*., **S.C. Elmendorf**,….Catchment scale observations at the Niwot Ridge Long-Term Ecological Research site. Hydrological Processes 35 (9), e14320

Collins, C.G, **S.C. Elmendorf**, *et al*. Experimental warming differentially affects vegetative and reproductive phenology of tundra plants. Nature Communications 12: 1-12.

Prevéy, J.S., **S.C. Elmendorf**, *et al*. The tundra phenology database: more than two decades of tundra phenology responses to climate change. Arctic Science 1–14.

2020 **Elmendorf, S.C.** and A.K. Ettinger. Is photoperiod a dominant driver of secondary growth resumption? Proceedings of the National Academy of Sciences 117:32861-32864.

Thomas, H.D., A.J. Bjorkman, I.H. Myers-Smith, **S.C. Elmendorf** *et al.* Global plant trait relationships extend to the climatic extremes of the tundra biome. Nature Communications 11: 1-12.

Myers-Smith, I. H., *et al*. **S.C. Elmendorf**,…. Complexity revealed in the greening of the Arctic. Nature Climate Change 10:106–117.

2019 **Elmendorf, S.C**., T.M Crimmins, K.L Gerst, and J.F. Weltzin. Time to branch out? Application of hierarchical survival models in plant phenology. Agricultural and Forest Meteorology 279:07694.

Prevey, J, M., *et al.* **S.C. Elmendorf**,…Warming shortens flowering seasons of tundra plant communities. Nature Ecology and Evolution 3:45-52.

Thomas, H., I. Myers-Smith, A. Bjorkman, **S. Elmendorf**, *et al.* Traditional plant functional groups explain variation in economic but not size-related traits across the tundra biome. Global Ecology and Biogeography 28:78-95.

2018 Bjorkman A.D., I.H. Myers-Smith, **S.C. Elmendorf**, *et al.* Tundra Trait Team: A database of plant traits spanning the tundra biome. Global Ecology Biogeography. 27:1402-1411.

Kissling, W.D. *et al* **S.C. Elmendorf**,….Towards global data products of Essential Biodiversity Variables (EBVs) on species traits. Nature Ecology and Evolution 2:1531- 1540.

Bjorkman, A., I. Myers-Smith, **S. Elmendorf,** *et al.* Plant functional trait change across a warming tundra biome. Nature 562:57–62.

Dornelas, M. *et al.* **S.C. Elmendorf**,…. BioTIME: a database of biodiversity time-series for the Anthropocene. Global Ecology and Biogeography 27:760-786.

2017 Mayor, S.J, *et al.* **S.C. Elmendorf**…. How well are migratory birds keeping pace with shifting spring green-up? Scientific Reports 7:1902.

Prevéy, J., *et al.* **S.C. Elmendorf**….Greater temperature sensitivity of plant phenology at colder sites: implications for convergence across northern latitudes. Global Change Biology 23:2660-2671.

Vellend, M., *et al.* **S.C. Elmendorf**….Estimates of local biodiversity change over time stand up to scrutiny. Ecology 98:583-590

2016 Thorpe, A. S., *et al.* **S.C. Elmendorf**….Introduction to the sampling designs of the National Ecological Observatory Network Terrestrial Observation System. Ecosphere 7.

Walker, D.A., *et al.* **S.C. Elmendorf**….The Alaska Arctic Vegetation Archive (AK-AVA). Phytoecologia. doi:10.1127/phyto/2016/0128

Elmendorf, S.C., *et al.* The plant phenology monitoring design for the National Ecological Observatory Network. Ecosphere 7 (4).

Hinckley, E.L., *et al.* **S.C. Elmendorf**….Optimizing available network resources to address questions in environmental biogeochemistry. BioScience 66:317-326.

2015 Bjorkman, A., **S. Elmendorf**, A. Beamish, M. Vellend and G. Henry. Contrasting effects of warming and increased snowfall on Arctic tundra plant phenology over the past two decades. Global Change Biology 21: 4561-4661.

Myers-Smith, I., **S.C. Elmendorf,** P. Beck, *et al.* Climate sensitivity of shrub growth across the tundra biome. Nature Climate Change 5:887–891.

Elmendorf, S.C. *et al.* Experimental, gradient and monitoring methods used to infer climate change effects on plant communities yield consistent patterns. Proceedings of the National Academy of Sciences 112:448-452.

Schmeller, D. *et al.* **S.C. Elmendorf**….Towards a global terrestrial species monitoring program. Journal for Nature Conservation 25:51-57.

2014 **Elmendorf, S.C.** 2014. Overview of the International Tundra Experiment (ITEX) data sets and discussion of point data. *In* Proceedings of the Alaska Vegetation Archive Workshop, Boulder, CO. CAFF Proceeding Series Report 11:31.

2013 Vellend, M., *et al.* **S.C. Elmendorf**….A global meta-analysis reveals no net change in local-scale plant biodiversity over time. Proceedings of the National Academy of Sciences 110:19456-19459.

Oberbauer, S.F., **S.C. Elmendorf**, *et al.* Phenological responses of tundra plants to background climate warming tested using the International Tundra Experiment (ITEX). Phil. Trans. R. Soc. B: 368.

2012 **Elmendorf**, **S.C.**, *et al.* Plot-scale evidence of tundra vegetation change and links to recent summer warming. Nature Climate Change 2:453-7.

Elmendorf, S.C., *et al.* Global assessment of climate warming effects on tundra vegetation: Heterogeneity over space and time. Ecology Letters 15:164-175.

2011 Myers-Smith, I. *et al* **S.C. Elmendorf**….Shrub expansion in tundra ecosystems: Dynamics, impacts and research priorities. Environment Research Letters 6:045509.

Moore, K.A., S.P. Harrison and **S.C. Elmendorf**. Can spatial isolation help predict dispersal-limited sites for native species restoration? Ecological Applications 6:2119-2128.

Elmendorf, S.C. and S.P Harrison. Is plant community richness regulated over time? Contrasting results from experiments and long-term observations. Ecology 92:602-609.

Moore, K.A. and **S.C. Elmendorf.** Plant competition and facilitation in systems with strong environmental gradients. In: *Serpentine as a Model System in Ecology and Evolution,* N. Rajakaruna and S. Harrison, eds. University of California Press.

2009 **Elmendorf, S.C.** and S.P. Harrison. Temporal variability and nestedness in California grassland species composition. Ecology 90:1492-1497.

2008 **Elmendorf, S.C**. and K.A. Moore. Use of community-composition data to predict the fecundity and abundance of species. Conservation Biology 22:1523-1532.

2007 **Elmendorf, S.C.**†and K.A. Moore†. Competition varies with community composition in edaphically complex landscape. Ecology 88:2640-2650.

Maron, J.L., **S.C. Elmendorf**, and M. Vila. Contrasting plant physiological adaptation to climate in the native and introduced range. Evolution 61:1912-1924.

Melbourne, B.A., *et al* **S. C. Elmendorf**….Invasion in a heterogeneous world: resistance, coexistence or hostile takeover? Ecology Letters 10:77-94.

2006 Moore, K.A.† and **S.C. Elmendorf**†. Propagule versus niche limitation: untangling the mechanisms behind plant species' distributions. Ecology Letters 9:797-804.

Maron, J.L., *et al* **S. C. Elmendorf**….An introduced predator alters Aleutian Island plant communities by thwarting nutrient subsidies. Ecological Monographs 76:3-24.

2005 Hastings, A., *et al* **S. C. Elmendorf**….The spatial spread of invasions: new developments in theory and evidence. Ecology Letters 8:91-101.

2004 Maron, J., M. Vilà, R. Bommarco**, S. Elmendorf**, and P. Beardsley. Rapid evolution of an invasive plant. Ecological Monographs 74:261-280.

† Co-first author

OTHER PUBLICATIONS

2021 Gries, C., *et al.* **S.C. Elmendorf**….2021. Data Package Design for Special Cases ver 1. Environmental Data Initiative. https://doi.org/10.6073/pasta/9d4c803578c3fbcb45fc23f13124d052.

2010 Henry, G. and **S. Elmendorf.** Greening of the Arctic. In: *Arctic Biodiversity Trends 2010 – Selected indicators of change.* CAFF International Secretariat, Akureyri, Iceland.

AWARDS AND FELLOWSHIPS

2011	**Travel Award**, Association of Polar Early Career Scientists	$750
2002	**Graduate Research Fellowship**, National Science Foundation	$110,000
	First-year Fellowship, UC Davis	$35,000
	Long-term Fellowship, National Science Foundation IGERT on Biological Invasions, UC Davis	$63,300
	Block Grant, UC Davis Graduate Group in Ecology (declined)	$60,000
1998	**Howard Hughes Summer Research Fellowship**, Wesleyan University	$3500

OUTREACH

2022 Science Elevated Speaker Series: Tundra Plants in a Warming World. Betty Ford Alpine Garden, Vail CO. (**public presentation**)

2021 Long-term Ecological Data from Boulder's Mountain Ecosystems. University of Colorado Center for Sustainable Landscapes and Communities. (**public webinar**)

2020 Our Living Landscape: Exploring Boulder's Watershed (**Museum Exhibit**, Museum of Boulder)

2015 Women in STEM (**blog post**)
https://www.neonscience.org/impact/observatory-blog/women-stem-sarah-elmendorf

2014 More than Scientists. Climate scientists in their own words on how they think & feel about climate change. **Video** clip at: http://morethanscientists.org/scientist/sarah-elmendorf/

2014 Insect ecology (**K-5 Presentation**)

2013 - 2015 Climate change in the Arctic (**K-5 Presentations ~** annually)

2006 Flag in the Ground Productions. *Fear and Fishing in Lake Davis.* A documentary **film** exploring the scientific and social issues surrounding the eradication of invasive Northern Pike in California. Directed, produced, filmed, and edited by J.E. Byrnes, E.C. Chamberlin, **S.C. Elmendorf,** J.R. Fischer, S.V. Olyarnik and A.N. Wright. (c) 2006 Regents of the University of California.
Available online at:
http://www.igert.org/stories/10 (preview);
https://video.ucdavis.edu/media/Fear+and+Fishing+in+Lake+Davis/1_ihfx7bkd/25823582 (full length film)

SERVICE

Scientific Journal Editorship

2021- **Associate Editor** *Arctic, Antarctic, and Alpine Research.*

Reviewer

Journals:

Agricultural and Forest Meteorology, Ambio, American Naturalist, Annals of Botany, Applications in Plant Science, Applied Vegetation Science, Arctic, Antarctic, and Alpine Research, Biogeosciences, Biological Conservation, Biological Invasions, Biology Letters, Bioscience, Climate Change, Ecological Applications, Ecology, Ecology Letters, Ecosphere, Environmental Research Letters, Geophysical Research Letters, Global Change Biology, Global Ecology and Biogeography, International Journal of Biometeorology, Journal of Applied Ecology, Journal of Ecology, Journal of Geophysical Research: Biogeosciences, Methods in Ecology and Evolution, Molecular Ecology, Molecular Ecology Resources, National Park Service Natural Resource Report Series, Nature Climate Change, Nature Communications, New Phytologist, Oecologia, Oikos, PNAS, Plant Ecology, Progress in Physical Geography, Restoration Ecology, Scientific Data.

Funding Agencies:

European Research Council, German Centre for Integrative Biodiversity Research (iDiv), National Science Foundation

Advisory

2024- Member, International Union for the Conservation of Nature (IUCN) Species Survival Commission (SSC) Specialist Group focused on alpine plants

2023- Executive Committee Co-Chair, **LTER Information Management**

2022- Executive Committee Member, **LTER Information Management**

2017- Member, **NEON** plant phenology and diversity technical working group

2017- 2019 Member-at-large, **ESA Long Term Studies Section**

2015 Member, Vegetation Expert Network for the **Circumpolar Biodiversity Monitoring Program** – Terrestrial Plan.

Departmental

2023 INSTAAR Justice Equity, Diversity and Inclusion Committee

2021- INSTAAR Seminar Committee (co-chair)

2023

TEACHING AND MENTORSHIP

Co-Instructor

Synthesis Skills for Early Career Researchers (2024-2025; LTER)
Ecological Forecasting Graduate Seminar (2020; University of Colorado)

Postdocs

Dr. Eliza Clark. Co-supervised with Dr. Nolan Kane; 2024-present.
Dr. Courtney Collins. University of Colorado. Co-supervised with Dr. Katie Suding; 2019-2021.
Dr. Anne Bjorkman. iDIV. C-supervised with Dr. Isla Myers-Smith; 2015.

Graduate Students

Joseph Everest, University of Edinburgh. Committee member 2021-2022; co-supervisor 2023-2024.
Caitlin White. University of Colorado. Co-supervisor, GRA. 2022.
Sarah Ansbro. Grand Valley State University. Committee member, 2021.
Gary Qin. Environmental Data Initiative Summer Fellow, 2021.

Undergraduate students

Miles Moore, University of Colorado Honors thesis, primary mentor. 2023
Kevin Sacca, Rochester Institute of Technology, NEON Undergraduate Intern Program co-supervisor. 2014.
Stephanie Cortes, Universidad de los Andes, Bogotá, Colombia, NEON Undergraduate Intern Program co-supervisor. 2014

WORKSHOPS

2023 **ESIIL** (Environmental Data Science Innovation and Inclusion Lab) Innovation Summit. University of Colorado, Boulder, CO. *Workshop participant.*

2021-2022 **Forecasting Mosquito Phenology in a Shifting Climate: Synthesizing Continental-scale Monitoring Data**. John Wesley Powell Center, Fort Collins, CO (remote) *Workshop participant.*

2019 **HilDEN** (High Latitude Drone Ecology Network) workshop. Neukom Institute for Computational Science, Dartmouth University, Hanover, NH. *Workshop participant.*

2018 **Creating EML with R and publishing data packages in the EDI repository**. University of New Mexico, Albequerque, NM. *Workshop participant.*

2017 **ARCFUNC** (Functional biogeography of Arctic plant diversity: trajectories in space and time). Aarhus, Denmark. *Workshop participant.*
GLOBIS-B workshop on Species Traits. Amsterdam, Netherlands. *Workshop participant.*

2016 **Vegetation Index & Land Surface Phenology**. CEOS Working Group on Calibration and Validation, Fort Collins, CO. *Workshop participant.*
USA-NPN Phenology modeling workshop. Tucson, AZ. *Workshop participant.*
Plant phenology ontology workshop. Powell Center, Fort Collins, CO. *Workshop participant.*

2015 **Global Treeline Range Expansion Experiment (G-TREE).** Dunkeld, Scotland. *Workshop participant.*
sTundra II: Tundra ecosystem change: Scaling shrub expansion from site to biome. sDIV. Leipzig, Germany. *Workshop organizer.*

2014 **sTundra: Tundra ecosystem change: Scaling shrub expansion from site to biome.** sDIV. Leipzig, Germany. *Workshop organizer.*

2013 **NEON 2013 Phenocam workshop.** Boulder, CO. *Workshop participant*.
Greenland ecosystem monitoring upscaling workshop. Sonnerupgaard Gods, Denmark. *Workshop participant.*
Alaska Arctic vegetation archive. Boulder, CO. *Workshop participant*.
Scaling Up: Population and community ecology workshop for early career scientists, Ecological Society of America, Linthicum Heights, MD. *Workshop participant*.
Bayesian modeling for practicing ecologists, Colorado State University, Fort Collins, CO. *Workshop participant*.
Applied Bayesian Regression, Spatio-temporal Workshop, NEON, Boulder, CO. *Workshop participant*.

2011 **Integrated Arctic Terrestrial Vegetation Monitoring**, Environment Canada, Yellowknife, NWT, Canada. *Workshop participant.*

2010 **Tundra Vegetation Change,** University of British Columbia, Vancouver, BC, Canada. *Workshop organizer*.

2009 **Phenological Changes in Tundra Plants in Response to Climate Warming**. National Center for Ecological Analysis and Synthesis, Santa Barbara, CA. *Workshop participant*.

INVITED PRESENTATIONS

2023 **Elmendorf, S.C.** Biodiversity and climate change through a big data lens. Earth Lab. University of Colorado, Boulder, CO.

2022 **Elmendorf, S.C.** More better faster? Tundra plant growth in a changing climate. Dept. of Ecology and Evolutionary Biology. University of Colorado, Boulder, CO.

2021 **Elmendorf, S.C.** Warming impacts on Arctic and alpine plants. University of Colorado Institute of Arctic and Alpine Research (INSTAAR).

2020 **Elmendorf, S.C.** Using citizen science and national-scale monitoring programs to understand drivers of plant phenology across the U.S. Genophenoenvo research group, University of Arizona

2018 **Elmendorf, S.C.** Using citizen science and national-scale monitoring programs to understand drivers of plant phenology across the U.S American Geophysical Union. Washington, DC.
Elmendorf, S.C. Plant responses to climate change: insights from long-term records and coordinated monitoring networks. School of Forestry. Northern Arizona University. Flagstaff, AZ.

2017 **Elmendorf, S.C.** and R. Zulueta**.** NEON Resources in the ABoVE Region. ABoVE Science Team Meeting. Boulder, CO.
Elmendorf, S.C. Leveraging long-term and multisite monitoring data for biodiversity research. Biodiversity Dynamics in Space and Time Mini-Conference, Aarhus University, Aarhus, Denmark.

2016 **Elmendorf, S.C.** NEON 101. NIWOT LTER Science Meeting. Boulder, CO.
Elmendorf, S.C. Leveraging multisite monitoring networks for global change research. URPP Global Change and Biodiversity Conference: Global Change and Biodiversity: Integrating Mechanisms of Interactions, Feedbacks and Scale. Ascona, Switzerland. (Keynote)

2015 **Elmendorf, S.C.** Large-scale ecological monitoring from national programs to grass roots initiatives. German Centre for Integrative Biodiversity Research. Leipzig, Germany.
Elmendorf, S.C. Big data, little plants: a collaborative, multi-site effort to understand terrestrial change in the Arctic. Dept. of Ecology and Evolutionary Biology. University of Colorado, Boulder, CO.
Elmendorf, S.C. Using multi-site data to detect climate change impacts on plants over space and time. University of Colorado Institute of Arctic and Alpine Research (INSTAAR). Boulder, CO.

2013 **Elmendorf, S.C.**, K. Jones, H. Luo, and S. Parker. Phenology at NEON: Phenocams and Beyond. NEON 2013 Phenocam Workshop. Boulder, CO.
Elmendorf, S.C. Multi-site ecological observatories for up-scaling and forecasting.

Greenland Ecosystem Monitoring Upscaling workshop. Sonnerupgaard Gods, Denmark.

Elmendorf, S.C. Overview of the International Tundra Experiment (ITEX) data sets and discussion of point data. Alaska Arctic Vegetation Archive Workshop, Boulder, CO.

Elmendorf, S.C. Thermophilization of tundra plant communities in response to ambient and experimental warming. 21st ITEX meeting. Bergün, Switzerland.

2012 **Elmendorf, S.C.** Beyond growth forms: changing tundra species composition under ambient and experimental warming. 20th ITEX meeting. University of Texas at El Paso. El Paso, TX.

2011 **Elmendorf, S.C.** Plant communities in a warming tundra: experimental and monitoring perspectives. Geography Dept, University of British Columbia. Vancouver, BC.

Elmendorf, S.C. Plant communities in a warming tundra: experimental and monitoring perspectives. National Ecological Observatory Network (NEON). Boulder, Colorado

2010 Henry, G., **Elmendorf, S.** and the Tundra Vegetation Change Group. Recent changes in tundra vegetation: synthesis of monitoring data from experimental and long-term plots. Outcomes of the International Polar Year, Edmonton, AB, November 2010 (Plenary)

2009 **Elmendorf, S.,** and G. Henry. Vegetation response to climate warming: analyses from the International Tundra Experiment (ITEX). International Polar Year 'Back to The Future' (IPY-BTF) project meeting, El Paso, TX.