

Sonia M. Ellison

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SUMMARY

Detail-oriented **geologist** working most recently in earthquake and landslide **hazards** with a large component of **GIS**. Background in structure/tectonics with extensive **field work** experience. Recent accomplishments include GIS-based ground failure **inventory publications** and creation and improvement of internal **workflows** for various instruments, products, and methods. Excels at **organization**. Strong belief in **science communication** and **collaboration**.

EDUCATION

Colorado School of Mines (CSM) Golden, CO December 2021
Master of Science in Geology, research in tectonics and geochronology GPA: 4.0

University of Minnesota, Morris (UMM) Morris, MN May 2014
Bachelor of Arts in Geology, minor in Mathematics, research in glaciology GPA: 3.2

RELEVANT EXPERIENCE

U.S. Geological Survey, Geologic Hazards Science Center (GHSC)

- **Geologist** Duties include: February 2022 - January 2026
 - Combine information from historical documents and scientific literature on ground failure triggered by historical and modern earthquakes and storm events to generate digital inventories using GIS software that can be used for ground failure model development. Assist in mapping and quality control of modern inventories compiled from remote sensing and field data. Help compile, analyze, and process other geospatial information as needed such as geotechnical data, artificial fill maps, surficial geology, precipitation data, and landslide and liquefaction susceptibility proxies. Assist with exploratory work on model development and improvement for ground failure situational awareness using the inventories and the compiled proxies.
 - Support Global ShakeMap (GSM) historical earthquake Atlas catalogue, adding critical datasets from missing, recent, and user-specified datasets (finite faults, macroseismic, and strong motion data). Support creation of ShakeMap scenario suites for different users.
 - Assist in the planning, organization, and method development for the Landslide Assessments, Situational Awareness, and Event Response Research (LASER) project landslide event response and post-event communication product development. Participate in remote and/or field earthquake and landslide responses and/or assist in field campaigns for various LHP research projects as needs arise. Contribute to mapping, remote sensing, communications, LIDAR, GIS, and logistics and safety teams.
- **Student Trainee, Physical Science (Pathways Intern):** Combined data from scientific literature and historical documents on earthquake-triggered ground failure to create digital inventories for historic events, including the 1964 Great Alaska Earthquake and the 1906 San Francisco Earthquake. May 2020 - February 2022

Colorado School of Mines

Research Assistantship: Included field work in SE New England, LA-ICP-MS U-Pb zircon preparation and analysis, interpreting zircon ages, and relating these to tectonic provenance. August 2018 - December 2021

Minnesota Geological Survey

Senior Technician: Field work included assisting with bedrock and glacial mapping, passive seismic data collection, rotary-sonic drilling/core logging, gamma ray logging, Giddings drill probe operation. Office and lab work included ArcGIS data management and mapping, core logging, point/grain counting, glacial sediment texture analysis. July 2017 - August 2018

University of Minnesota, Morris

Undergraduate Thesis: Research using differential GPS to map a glacier at the Tarfala Research Station in northern Sweden; analyzed data and created a digital elevation model for future comparison of ice volume loss. 2013 - 2014

Geology Teaching Assistant: Included grading assignments, answering lab questions, teaching lab in professor's absence, setting up and organizing lab and storage. 2012 - 2014

TECHNICAL SKILLS

Field: Topographic and geologic maps, geologic mapping (lithology, structure, landslides), Brunton compass, GPS/GNSS (RTK/DGPS), Terrestrial Laser Scanning, Wilderness First Aid + CPR, firearms safety, spectroradiometry, sediment coring, Giddings soil probe operation, Tromino passive seismic data collection

Computer: ArcGIS (including Pro, Online, and Field Maps, focusing on raster analysis, webmaps and dashboards, georeferencing techniques of historical and field data), Adobe Illustrator and Acrobat, Trimble Business Center, RiSCAN PRO (processing point cloud data to create DEMs), Windows Subsystem for Linux, relational databases, Microsoft 365 including Copilot, Python, SQLite, Windows, macOS

Laboratory: Mineral separation techniques (process from raw rock sample to mounted grains of interest), SEM (including CL, BSE, SE), LA-ICP-MS, x-ray diffraction, sediment settling analysis, thin section preparation

Relevant trainings: USGS Defensive Driving Awareness (for driving government vehicles), Wilderness First Aid + CPR, USGS Firearms for Defense from Wild Animals, USGS Safety Program Requirements, USGS Bear Spray Training for Defense Against Dangerous Animals, Natural Hazards Center Conducting Emotionally Challenging Research

FIELD WORK

USGS GHSC

Operate Terrestrial Laser Scanning (TLS) equipment including GNSS processing and analyze resulting data. Install, maintain, and remove debris flow monitoring equipment. Map landslide features and indicators and investigate potential triggering conditions. Map structural geology and lithology and collect rock mass characterization data. Spectral reflectance data collection and methodology development.

Colorado School of Mines *SE New England, CO, CA* 2018-2019

Research included two weeks of sample collection in SE New England and a local field seminar on NE tectonics. Courses included Structural Field Research (a 'mini-Masters' small field-based research project), a few days of field work for Advanced Structural Geology, and four multi-day field courses and a week-long field trip in southern CA for Applied Stratigraphy.

Minnesota Geological Survey *across Minnesota* 2017-2018

Approximately 75% of this job (~40 weeks) was spent doing field work, including: bedrock mapping for county bedrock geology maps (including three weeks canoeing in the backcountry), glacial deposit mapping for county surficial geology maps, Tromino passive seismic data collection for depth-to-bedrock mapping, rock and soil sample collection including operating a Giddings soil probe rig, field cataloguing rotary-sonic drilled core, installing Distributed Acoustic Sensing cable, assisting with optically stimulated luminescence dating, assisting with water well logging.

Southern Illinois University, Carbondale *western MT, northern WY, eastern ID*

Geology field camp: Field study of the geology of various outcrops including structural geological mapping and creation of cross-sections in the northern Rocky Mountains. Summer 2014

Course audit: Fault Rocks of the Santa Rosa Mountains (field course, southern CA) March 2015

OUTREACH + COMMUNICATION

Prince William Sound landslide awareness *Valdez, AK* September 2023

- Two days guest teaching middle school science classes about landslide geology and field work
- Guest lecture at Prince William Sound College about field skills and protocols
- Guest lecture for high school science class about landslide hazards and field work
- Coffee With Scientists public event to discuss local landslide work and tsunami hazard

Landslide Hazards Program Social Media and Outreach Committee *USGS GHSC* Summer 2023 - present

Committee runs the LHP social media account and updates the LHP website

Community Connections Committee *USGS GHSC* December 2022 - present

Fostering a positive workplace environment through team building event planning and community space development

Geology of the Beartooth Mountains *Midwest Mountaineering, Minneapolis, MN* Fall 2016

Lecture at a local outdoors store

Geology of the St. Croix River *Minnesota Geological Survey, eastern MN* Summer 2017

Helped lecture for a field session for local university students about the glacial and bedrock geology along the St.

Croix River in eastern MN

UMM Geology Club Precambrian Field Weekend *Northern MN* October 2013

Club co-president: planning, preparing, and leading a long weekend field trip overviewing Precambrian bedrock geology, including the Canadian Shield, North Shore Volcanic Group, and Duluth Complex Layered Mafic Intrusion

Canoe Guide-in-Training *Northern Lakes Girl Scout Canoe Base, Ely, MN* Summers, 2007-2009

Planning, preparing, and leading 5-10 day trips in the Boundary Waters Canoe Area Wilderness

AWARDS

Group Special Thanks for Achieving Results (STAR) awards (USGS GHSC)

- Hurricane Helene landslide response 2025
- Community Connections Committee, fostering a positive workplace environment 2025
- Haiti Earthquake Landslide Response 2022

CSM Graduate Research and Discovery Symposium long form presentation winner: Geology 2020

Geochronology and tectonics research in SE New England

University of Minnesota Undergraduate Research Opportunities Program (UROP) grant 2013

Glaciology research in northern Sweden

UMM Prairie, Alworth, and Sweetman merit scholarships 2009 - 2013

SELECTED PUBLICATIONS

Ellison, S.M., Thompson, E.M., Allstadt, K.E., and Delius, I., 2026, Geotechnical database for Anchorage, Alaska and surrounding areas: U.S. Geological Survey data release, <https://doi.org/10.5066/P1GKCOOZ>.

Burgi, P.M., Toney, L.D., Collins, E.A., Murphy, C.R., **Ellison, S.M.**, Schmitt, R.G., Allstadt, K.E., Bedinger, E.C., Belair, G.M., Bilderback, E.L., Dunlap, L.R.C.C., Cattanach, B., Crawford, M.M., Einbund, M.M., Fitzpatrick, F.A., Frost, D. J., Grant, A.R.R., Hageman, S. J., Hartman, C., Heckert, A.B., Hoch, O.J., Johnson, B., Jones, E.S., Jurgeovich, J., Karantanellis, E., Korte, D., Martinez, S.N., Mersch, A.J., Miles, C.P., Sas, R., Schaefer, L.N., Scheip, C., Soobitsky, R., Trantham, B., Witt, A., 2025, Preliminary Landslide Inventory for Landslides Triggered by Hurricane Helene (September 2024): U.S. Geological Survey data release, <https://doi.org/10.5066/P14CHGKS>.

Ellison, S.M., Allstadt, K.E., Thompson, E.M., Martinez, S.N., Baxstrom, K., 2024, Ground failure triggered by the M9.2 1964 Great Alaska Earthquake: U.S. Geological Survey data release, <https://doi.org/10.5066/P9IHCAR6>.

Martinez, S.N., Allstadt, K.E., Thompson, E.M., **Ellison, S.M.**, Schaefer, L.N., and Baxstrom, K., 2024, Earthquake-triggered ground-failure inventory associated with the M7.1 2018 Southcentral Alaska earthquake: Earthquake Spectra 40(3):2161-2178, <https://doi.org/10.1177/87552930241240461>.

Hough, S.E., Blair, L., **Ellison, S.M.**, Graves, R.W., Haefner, S., Thompson, E.M., van der Elst, N., Page, M., and Wald, D.J., 2023, Modern Products for a Vintage Event: An Update on the 1933 Long Beach, California, Earthquake: The Seismic Record 3 (2), p. 171–181, <https://doi.org/10.1785/0320230015>.

Schaefer, L.N., and **Ellison, S.M.**, 2023, Spectral reflectance data of rock and soil in southcentral Alaska: U.S. Geological Survey data release, <https://doi.org/10.5066/P96VBU9U>.

Kuiper, Y.D., Murray, D.P., **Ellison, S.M.**, and Crowley, J.L., 2022, U-Pb detrital zircon analysis of sedimentary rocks of the Southeastern New England Avalon Terrane in the U.S. Appalachians: Evidence for a separate crustal block: New Developments in the Appalachian-Caledonian- Variscan Orogen, [https://doi.org/10.1130/2021.2554\(05\)](https://doi.org/10.1130/2021.2554(05)).

Schmitt, R., Collins, E., Schaefer, L.N., and **Ellison, S.M.**, 2021, Landslides triggered by the August 14, 2021, magnitude 7.2 Nippes, Haiti, earthquake: U.S. Geological Survey Open-File Report 2021–1112, 17 p., <https://doi.org/10.3133/ofr20211112>.

SELECTED PRESENTATIONS

Ellison, S.M., Allstadt, K.E., Thompson, E.M., Martinez, S.M., 2024, A Regional Earthquake-Triggered Landslide Susceptibility Map of the Cook Inlet Region, Southcentral Alaska: Seismological Society of America annual conference abstract, Seismological Research Letters v.95 n.2B. (oral presentation)

Ellison, S.M., Allstadt, K.E., Thompson, E.M., Martinez, S.M., 2023, The Great Alaska Inventory: A Digital Compilation of Ground Failure Triggered by the 1964 Great Alaska Earthquake: Seismological Society of America annual conference abstract, Seismological Research Letters v.94 n.2B. (oral presentation)

Ellison, S.M., Allstadt, K.E., Thompson, E.M., Martinez, S., Baxstrom, K., 2022, October 9. The Great Alaska Inventory: Ground Failure triggered by the 1964 Great Alaska Earthquake: Geological Society of America Abstracts with Programs. (poster)

Ellison, S.M., Kuiper, Y.D., Crowley, J.L., and Murray, D.P., 2020, Investigating the boundaries of the Southeastern New England Avalon Terrane: New La-ICP-MS U-PB zircon dates from igneous and Metasedimentary Rocks: Geological Society of America Abstracts with Programs, <https://doi.org/10.1130/abs/2020se-345455>. (oral presentation)

Ellison, S.M., Cotter, J.F., Brugger, K.A., 2014, Ice volume change in Sydöstra Kaskasatjåkkaglaciären, Swedish Arctic, 1980-2013: University of Minnesota, Morris Undergraduate Thesis. (oral presentation)

PROFESSIONAL AFFILIATIONS

Rocky Mountain Association of Geologists

Seismological Society of America

Geological Society of America

American Geophysical Union

Society of Economic Geologists Colorado School of Mines student chapter

REFERENCES

Kate Allstadt, recent supervisor	(607) 725-8211	kallstadt@usgs.gov
David Wald, recent colleague	(303) 638 6000	wald@usgs.gov
Eric Ferré, professor	(575) 646-5000	eferre@nmsu.edu
Elaine Collins, colleague	(303) 881-7966	ecollins@usgs.gov
