Dr. Lyle L. Nelson

Department of Earth, Atmospheric & Planetary Sciences
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EDUCATION

Ph.D., Earth and Planetary Sciences, Johns Hopkins University, May 2022
Thesis: Integrated stratigraphy of the Cryogenian and the Ediacaran-Cambrian boundary: Perspectives from southwestern North America and southern Africa
Advisor: Dr. Emily F. Smith

A.B., *magna cum laude* with highest honors, Earth and Planetary Sciences, Harvard University, May 2015
Thesis: Characterizing the provenance of pre-Mississippian strata in the North Slope subterrane of Arctic Alaska
Advisor: Dr. Francis A. Macdonald

PROFESSIONAL EXPERIENCE

Assistant Professor, Massachusetts Institute of Technology
Cambridge, Massachusetts (7/2024-present)

Assistant Professor, Carleton University
Ottawa, Ontario (7/2022-6/2024)

Postdoctoral Fellow, Johns Hopkins University
Baltimore, Maryland (6/2022)

Graduate Research and Teaching Assistant, Johns Hopkins University
Baltimore, Maryland (1/2018-5/2022)

Geologist, Teck American Incorporated
Red Dog Mine, Alaska (3/2017-12/2017)

Field Assistant, Smithsonian Institution
California, Nevada, Namibia, South Africa, Mexico (7/2016-9/2016; 12/2016-3/2017)

Alex G. Booth Postgraduate Fellow, Harvard University
California, Nevada (*10/2015-6/2016*)

Field Assistant, Teck American Incorporated
Red Dog Mine, Alaska (5/2015-9/2015)

Research Assistant, Macdonald Group, Harvard University
Cambridge, Massachusetts (9/2012-5/2015; 10/2016-11/2016)

Research Assistant, Pearson Group, Harvard University
Cambridge, Massachusetts (2/2012-9/2012)

AWARDS AND FELLOWSHIPS

Nominee for Council of Graduate Schools/ProQuest Distinguished Dissertation Award; single nominee for Johns Hopkins University in fields of Mathematics, Physical Sciences, and Engineering (2021-2022)

Florence Bascom Award, Johns Hopkins University; awarded for top departmental publication in geologic research in E&PS Department (2021)

NSF Graduate Research Fellowship (2019-2022)

Finalist for 2018 Excellence in Teaching Award, Johns Hopkins University Krieger School of Arts and Sciences (1 of 7 University-wide)
Owen Scholars Fellowship, Johns Hopkins University; awarded to most competitive applicant in each department; 2018)
Thomas T. Hoopes Prize, Harvard College; award for outstanding undergraduate thesis (2015)

FUNDING

Natural Sciences and Engineering Research Council of Canada (NSERC) Discovery Grant ($150,000 CAD; 2023-2028)
NSERC Discovery Launch Supplement ($12,500 CAD; 2023-2024)
NSERC Northern Research Supplement ($85,000 CAD; 2023-2028)
American Philosophical Society Lewis and Clark Field Scholarship ($5,000; 2022)
NSF AGeS2 Geochronology award ($8,078; 2020)
American Philosophical Society Lewis and Clark Field Scholarship ($5,000; 2020)
Johns Hopkins University Earth & Planetary Sciences Department grants for summer field research ($13,283; 2018-2021)
NSF EAR SGP (NSF #ID: 1827669). *Collaborative Research: Calibrating the end-Ediacaran extinction with U-Pb geochronology & chemostratigraphy at a new Precambrian-Cambrian Boundary site in Namibia & South Africa.* **Coauthor**. PIs E. Smith (JHU) and J. Ramezani (MIT). ($604,950; 2018-2021)
National Geographic Early Career Grant CP-002ER-17 ($5,000; 2017-2018)
Harvard University Alex G. Booth Postgraduate Fellowship ($12,000; 2015-2016)
Herchel Smith-Harvard Undergraduate Science Research Fellowship ($8,437; 2014)
Northeastern Section of the Geological Society of America Stephen Pollock Undergraduate Student Research Grant ($1,000; 2014)

PUBLICATIONS

26. Evans, S.D., Smith, E.F., Vayda, P., **Nelson, L.L.**, Xiao, S., 2024, The Ediacara Biota of the Wood Canyon Formation: Latest Precambrian macrofossils and sedimentary structures from the southern Great Basin: *Global and Planetary Change*.
25. Ben-Israel, M., Holder, R.M., **Nelson, L.L.**, Smith, E.F., Kylander-Clark, A.R.C, Ryb, U., 2024, Late Palezoic oxygenation of marine environments supported by dolomite U-Pb isotope ratios: *Nature Communications*.
24. **Nelson, L.L.**, Crowley, J.L., Smith, E.F., Schwartz, D.M., Hodgin, E.B., and Schmitz, M.D., 2023, Cambrian Explosion condensed: High-precision geochronology of the lower Wood Canyon Formation, Nevada: *PNAS*.
23. Darroch, S.A.F., Smith, E.F., **Nelson, L.L.**, Craffey, M., Schiffbauer, J.D., Laflamme, M., 2023, Causes and consequences of end-Ediacaran extinction– an update: *Extinction*.
22. Smith, E.F., **Nelson, L.L.**, O'Connell, N., Eyster, A., and Lonsdale, M.C., 2023, The Ediacaran-Cambrian transition in the southern Great Basin, United States: *GSA Bulletin*.
21. **Nelson, L.L.**, Integrated stratigraphy of the Cryogenian and the Ediacaran-Cambrian boundary: Perspectives from southwestern North America and southern Africa, Ph.D.

Thesis, Department of Earth and Planetary Sciences, Johns Hopkins University, 2022: Baltimore, MD. p. 180.

20. **Nelson, L.L.,** Ramezani, J., Almond, J.E., Darroch, S.A.F., Taylor, W.L., Brenner, D.C., Furey, R.P., Turner, M., and Smith, E.F., 2022, Pushing the boundary: A calibrated Ediacaran-Cambrian stratigraphic record from the Nama Group in northwestern Republic of South Africa: *Earth and Planetary Science Letters*.
19. Runyon, K.D, **Nelson, L.L.**, and Moriarty., D.P., 2022, Identifying impact melt from Smythii crater: Towards an improved chronology for large lunar basin formation: *Planetary Science Journal*.
18. **Nelson, L.L.**, Ahm, A.C., Macdonald, F.A., Higgins, J.A., and Smith, E.F., 2021, Fingerprinting local controls on the Neoproterozoic carbon cycle with the isotopic record of Cryogenian carbonates in the Panamint Range, California: *Earth and Planetary Science Letters*.
17. Hodgin, E.B., **Nelson, L.L.**, Wall, C.J., Barrón-Díaz, A.J., Webb, L.C., Schmitz, M.D., Fike, D.A., Hagadorn, J.W., and Smith, E.F., 2021, A link between rift volcanism and end-Ediacaran extinction?: Integrated carbon isotope chemostratigraphy, biostratigraphy, and U-Pb geochronology from Sonora, Mexico: *Geology*.
16. Hoffman, P.F., Halverson, G.P., Schrag, D.P., Higgins, J.A., Domack, E.W., Macdonald, F.A., ... and **Nelson, L.L.**, 2021, Snowballs in Africa: sectioning a long-lived Neoproterozoic carbonate platform and its bathyal foreslope (NW Namibia): *Earth-Science Reviews*.
15. **Nelson, L.L.**, Smith, E.F., Hodgin, E.B., Crowley, J.L., Schmitz, M.D., and Macdonald, F.A., 2020, Geochronological constraints on Neoproterozoic rifting and onset of the Marinoan glaciation from the Kingston Peak Formation in Death Valley, California: *Geology*.
14. Tarhan, L.G., Myrow, P.M., Smith, E.F., **Nelson, L.L.**, and Sadler, P.M., 2020, Infaunal Augurs of the Cambrian Explosion: An Ediacaran Trace Fossil Assemblage from Nevada, USA: *Geobiology*.
13. Schiffbauer, J.D., Selly, T., Jacquet, S.M., Merz, R.A. **Nelson, L.L.**, Strange, M.A., Cai, Y.P, and Smith, E.F., 2020, Discovery of bilaterian-type through-guts in cloudinomorphs from the terminal Ediacaran Period: *Nature Communications*.
12. **Nelson, L.L.** and Smith, E.F., 2020, Reply: Tubey or not tubey: Death beds of Ediacaran macrofossils or microbially induced sedimentary structures?: *Geology*.
11. **Nelson, L.L.** and Smith, E.F., 2019, Tubey or not tubey: Death beds of Ediacaran macrofossils or microbially induced sedimentary structures?: *Geology*.
10. Selly, T., Schiffbauer, J.D., Jacquet, S.M., Smith, E.F., **Nelson, L.L.**, Andreasen, B.D., Huntley, J.W., Strange, M.A., O'Neil, G.R., Thater, C.A., Bykova, N., Steiner, M., Yang, B, and Cai, Y.P., 2019, A new cloudinid fossil assemblage from the terminal Ediacaran of Nevada, USA: *Journal of Systematic Paleontology*.
9. Smith, E.F, Tarhan, L.G., and **Nelson L.L.**, 2019, Ediacaran-Cambrian Transition of the Southwestern USA—Field Trip of the North American Paleontological Convention, June 19–22, 2019 (Supplement 2): *PaleoBios*, v. 36.
8. Moynihan, D.P.†, Strauss, J.V.†, **Nelson, L.L.**, and Padget, C.D., 2019, Upper Windermere Supergroup and the transition from rifting to continent-margin sedimentation, Nadaleen River area, northern Canadian Cordillera: *GSA Bulletin*.

7. **Nelson, L.L.**, Strauss, J.V., Crockford, P.W., Cox, G.M., Johnson, B.G., Ward, W., Colpron, M., McClelland, W.C., and Macdonald, F.A., 2018, Geochemical constraints on the provenance of pre-Mississippian sedimentary rocks in the North Slope subterrane of Yukon and Alaska: *GSA Special Paper 541*.
6. Strauss, J.V., Johnson, B.G., Colpron, M., **Nelson, L.L.**, Perez, J.L., Benowitz, J.A., Ward, W.P., and McClelland, W.C., 2018, Pre-Mississippian stratigraphy and provenance of the North Slope subterrane of Arctic Alaska II: Basinal rocks of the northeastern Brooks Range and their significance in circum-Arctic evolution: *GSA Special Paper 541*.
5. **Nelson, L.L.**, Loughrey, L.E., 2018, Red Dog Regional Exploration Program 2017 Technical Report. 60 p. *Teck Resources Limited*. (internal/proprietary)
4. Smith, E.F., **Nelson, L.L.**, Tweedt, S.M., Zeng, H., and Workman, J., 2017, A cosmopolitan late Ediacaran (ca. 550–541 Ma) biotic assemblage: New fossils from Nevada and Namibia support a global biostratigraphic link: *Proceedings of the Royal Society B*.
3. Strauss, J.V., Hoiland, C.W., and **Nelson, L.L.**, 2017, Field report: Exploring the Doonerak fenster of the central Brooks Range, Alaska, USA: *Geoscience Frontiers*.
2. Strauss, J.V., Hoiland, C.W., Ward, W., Johnson, B.G., **Nelson, L.L.**, and McClelland, W.C., 2017, Orogen transplant: Taconic-Caledonian arc magmatism in the central Brooks Range of Alaska: *GSA Bulletin*.
1. Smith, E.F., **Nelson, L.L.**, Strange, M.A., Eyster, A.E., Rowland, S.M., Schrag, D.P., and Macdonald, F.A., 2016, The end of the Ediacaran: Two new exceptionally preserved body fossil assemblages from Mount Dunfee, Nevada, USA: *Geology*.

INVITED PRESENTATIONS

University of Namibia Departmental Seminar, Keetmanshoop, Namibia, August 2024
MIT Departmental Seminar, Cambridge, MA, April 2023
UC Riverside Departmental Seminar, Riverside, CA, March 2023
University of Toronto Mississauga Departmental Seminar, Toronto, ON, March 2023
University of Ottawa Departmental Seminar, Ottawa, ON, February 2023
The Geological Society of Washington, Washington, D.C., November 2022
University of Washington Departmental Seminar, Seattle, WA, May 2022
GSA Cordilleran Section Meeting, Las Vegas, NV, March 2022
Virtual Seminars for Precambrian Geology, online, February 2022
Queens University Departmental Seminar, Kingston, ON, November 2021
The Geological Society of Namibia, Windhoek, Namibia, October 2021
Carleton University Departmental Seminar, Ottawa, ON, February 2021

SELECT PROFESSIONAL PRESENTATIONS

16. **Nelson, L.L.**, Crowley, J.L., Smith, E.F., Schwartz, D., Hodgin, E., Schmitz, M.D., New age constraints for the basal Cambrian Period: Geochronology of the lower Wood Canyon Formation, Nevada, USA. GSA Annual Meeting, Pittsburgh, PA, October 2023 (oral).
15. **Nelson, L.L.**, Smith, E.F., Darroch, Simon A.F., Turk, K., Baillie, I., Ramezani, J., Stratigraphy of the Nomtsas Formation in the Witputs subbasin, southern Namibia:

Implications for the placement of the Ediacaran-Cambrian boundary in the Nama Group. GSA Annual Meeting, Denver, CO, October 2022 (oral).

14. Dawson, J., **Nelson, L.L.**, Moore, K.R., Orozbaev, R., Smith, E.F., Pruss, S.B., 2022, Tubular microfossils from cap carbonates of Kyrgyzstan. GSA Annual Meeting, Denver, CO, October 2022 (poster).
13. Chanchai, W., Smith, E., **Nelson, L.**, Lonsdale, M., Hardisty, D., Burke, J., Lau, K., Multi-proxy redox reconstructions of Ediacaran-Cambrian carbonate successions. GSA Annual Meeting, Denver, CO, October 2022 (oral).
12. Wong, C., **Nelson, L.L.**, Schiffbauer, J.D., Selly, T., Pruss, S.B., Tubular fossils from the late Ediacaran La Ciénega Formation, Sonora, Mexico. GSA Annual Meeting, Portland, OR, October 2021 (poster).
11. **Nelson, L.L.**, Smith, E.F, Hodgin, E.B., Crowley, J.L., Schmitz, M.D., Macdonald, F.A., Cryogenian rifting in Death Valley, California (USA). GSA Annual Meeting, Montreal, QC, October 2020 (online; oral).
10. **Nelson, L.L.**, Ramezani, J., Almond, J.E., Taylor, W.L., Brenner, D.C., Smith E.F., Calibrating the Ediacaran-Cambrian transition in South Africa. GSA Annual Meeting, Phoenix, AZ, September 2019 (oral).
9. Webb, L.C., **Nelson, L.L.**, Hodgin, E.B., Smith E.F., Geochemical constraints on the provenance of Ediacaran–Cambrian sedimentary rocks from the southwestern margin of Laurentia. GSA Annual Meeting, Phoenix, AZ, September 2019 (poster).
8. **Nelson, L.L.**, Ahm, A-S.C., Macdonald, F.A., Higgins, J.A., Smith, E.F., The Cryogenian carbon isotope record of Death Valley, California. Goldschmidt, Barcelona, Spain, August 2019 (oral).
7. **Nelson, L.L.**, Ahm, A-S.C., Macdonald, F.A., Higgins, J.A., Smith, E.F., Isotopic effects of dolomitization on Cryogenian strata in the Panamint Range, California. AGU Fall Meeting, Washington, DC, December 2018 (oral).
6. **Nelson, L.L.**, Smith E.F., Soft-bodied Ediacaran macrofossils or strange sedimentary structures? Deciphering three-dimensional corrugated tubes from the Great Basin, California. GSA Annual Meeting, Indianapolis, IN, November 2018 (oral).
5. **Nelson, L.L.**, Macdonald, F.A., and Smith, E.F., Neoproterozoic syn-sedimentary tectonism in Death Valley. GSA Cordilleran Section Meeting, Flagstaff, AZ, May 2018 (oral).
4. **Nelson, L.L.**, Smith, E.F., Macdonald, F.A., Hodgin, E.B., A porpoising Cryogenian basin in the Panamint Range, California. GSA Annual Meeting, Seattle, WA, October 2017 (oral).
3. **Nelson, L.L.**, Smith, E.F., Macdonald, F.A., The effects of dolomitization on carbon isotopes within Cryogenian non-glacial interlude strata in the Panamint Range, California. GSA Annual Meeting, Denver, CO, September 2016 (poster).
2. **Nelson, L.L.**, Strauss, J., McClelland, W.C., Colpron, M., Cox, G., Crockford, P., and Macdonald, F., Characterizing the sedimentary provenance of pre-Mississippian stratigraphy on the North Slope subterrane of Arctic Alaska. GSA Annual Meeting, Vancouver, British Columbia, October 2014 (poster).
1. **Nelson, L.L.**, Strauss, J.V., Macdonald, F.A., Cox, G.M., and McClelland, W.C., Geochemical and paleontological ties between the North Slope of Arctic Alaska and the Greenland Caledonides. Northeastern Geobiology Symposium, Yale University, March 2014 (poster).

TEACHING AND MENTORSHIP EXPERIENCE

Massachusetts Institute of Technology

Ph.D. Supervisor

Dana Polomski (2024-)

Carleton University

Postdoctoral Fellow

Nabil Shawwa (2024) [Geochronology of the Huronian Supergroup]

M.Sc. Co-supervisor

Ashan Ayanarajan (2022-2024) [Horn size and its relationship to climate in Bison bison]

Ph.D. Committee Member

Nabil Shawwa (2024) [Depositional environments of the upper Huronian Supergroup, Cobalt Basin, Ontario and Quebec: A host to Earth's earliest terrestrial red beds]

M.Sc. Committee Member

Alexandra Pipe (2023, *University of Ottawa*) [Sediment provenance using detrital zircons and Nd-Sr isotopes: Implications for sediment routing in the Neoproterozoic Windermere Supergroup, southern Canadian Cordillera]

Mitchell Richardson (2022) [Investigation of daily to seasonal variation in greenhouse gas emission and cycling in agricultural riparian zone soils]

Undergraduate Honours Theses

Rizzieri Balestra (2024-2025; NSERC Undergraduate Student Research Award) [Ediacaran chemostratigraphy of Ellesmere Island, Nunavut]

Elim Herx ([2023-2024) [Assessing changes in chemical weathering intensity in the Cryogenian]

Michelle Stevens (2023-2024; NSERC Undergraduate Student Research Award) [Assessing global and local controls on the Rhyacian carbon cycle]

Courses

ERTH 2314, Sedimentation and Stratigraphy

ERTH 3206, Sedimentary Depositional Systems

ERTH 3203, Sedimentary Geology in the Field [field course in Nevada and California]

ERTH 4807, Advanced Field Geology [field course in the Grand Canyon]

Johns Hopkins University

Teaching Assistant

AS.270.411: Geological Field Studies in California (Jan. Term/Spring 2020)

AS.270.381: Seminar in Field Geology (Spring 2019)

AS.270.220: The Dynamic Earth: An Introduction to Geology (Fall 2018)

AS.270.221: The Dynamic Earth Laboratory (Fall 2018)

Honors Thesis co-advisor (unofficial)

Lucy Webb, (2019-2020), [Geochemical constraints on the provenance of Ediacaran–Cambrian strata in Southwest Laurentia]

High School Baltimore Ingenuity Project Advisor

Jacob Thompson (2019-2021) [Geochemistry of Ediacaran–Cambrian carbonates from Mexico]

Harvard University

Teaching Fellow

EPS74: Field Geology of Death Valley (Jan. Term/Spring 2015)

FIELD EXPERIENCE

Extended field work (>2 weeks each year listed in each location):

Namibia- Gariep Belt, Naukluft Mountains, Nama Basin, Kaokoland (2016, 2018-2019, 2021-2023, 2024)
South Africa- Cape Province, Kango Inlier (2016-2019, 2021, 2024)
Northwest Territories, Canada- Great Slave Lake (2024)
Southwestern USA- CA, NV (2015-2021, 2023)
Kyrgyzstan- Tien Shan (2018, 2023)
Morocco- Anti-Atlas Mountains (2023)
Alaska, USA- Brooks Range (2014-2015, 2017, 2021)
Wyoming, USA- Medicine Bow Mountains (2020)
Mid-Atlantic, USA- VA, MD (2020)
Kazakhstan- Karatau (2018)
Mexico- Sonora (2017-2018)
Madagascar- Mananjary region (2016)
Yukon Territory, Canada- Ogilvie, Wernecke, British, and White Mountains (2013-2014)

Field trips and short courses (*denotes leader or co-leader):

*Death Valley (Carleton University ERTH 3203, Sedimentary Geology in the Field, 2023)
*Grand Canyon (Carleton University ERTH 4807, Advanced Field Geology, 2023)
AGeS Geochronology Workshop (2022)
Grand Canyon field forum (2021)
*Death Valley, CA (JHU Field Camp, 2020)
*Gold Point, NV and Death Valley, CA (JHU field course, 2019)
Detrital Zircon Geochronology (University of Arizona; GSA 2018)
Central Appalachians (Johns Hopkins University, Appalachian Tectonics, 2018)
Naukluft Mountains, Namibia (Agouron Advanced Geobiology Field Course, 2018)
*Ediacaran-Cambrian Stratigraphy of the SW USA (Ediacaran Subcommission, 2018)
*Gold Point, NV and Death Valley, CA (JHU undergraduate field trip, 2018)
*Neoproterozoic strata of the Panamint Range, CA (McGill University, Field Camp, 2016)
*Death Valley, CA (Harvard University, Field Camp, 2015)
Newfoundland (Harvard University, Appalachian Tectonics, 2014)
New England Appalachians (Harvard University, Appalachian Tectonics, 2014)
Big Island, Hawaii (Harvard University, Igneous Geology, 2014)
New England Appalachians (Harvard University, Structural Geology, 2013)
Sicily, Italy (Harvard University, Geobiology, 2013)
Death Valley, CA (Harvard University, Field Camp, 2013)
Canadian Rockies (Harvard University, Structural Geology, 2012)
Umbre Marche, Italy (Harvard University, Sedimentology and Stratigraphy, 2012)
New England Appalachians (Harvard University, Introductory Geology, 2011)

OUTREACH AND SERVICE

Carleton University

Ottawa-Carleton Geoscience Centre seminar organizer (Fall 2022-Spring 2024)
Geological Association of Canada—representative for Carleton University
Geological Society of America—representative for Carleton University
Scholarship and Awards Committee
Strategic Planning and Priorities Committee
Geoheritage Day field site host/interpreter
Black Youth in STEM event

External

Journal reviewer: *Nature Communications*, *Science Advances*, *Geology*, *GSA Bulletin*, *GSA Today*, *Communications Earth & Environment*, *Geological Magazine*, *Precambrian Research*, *Palaegeography-Palaeoclimatology-Palaeoecology*, *Global and Planetary Change*, *Marine and Petroleum Geology*, *Earth Science Reviews*

Ad-hoc reviewer: National Geographic Society Early Career Grants

Member of the Namibian Committee for Stratigraphy (2024- present)

Baltimore Ingenuity Project mentor for high school student; 15-month commitment for 12 hours/week (2019-2021)

Maryland Science Olympiad test writer for regional and state exams (2019-2021)

Institute for the Study of Mongolian Dinosaurs- Guest lecture and activities for Mongolian high school students on sedimentary petrography (2020)

Co-organizer and -leader for Ediacaran Subcommission field trip to Ediacaran-Cambrian boundary sites around Nevada for 30+ international scientists (April-May 2018)