

NAOMIE E. LEVIN

DEPARTMENT OF EARTH AND ENVIRONMENTAL SCIENCES
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RESEARCH INTERESTS

Ecosystem and landscape responses to climate change; triple oxygen isotope geochemistry; plant-animal-climate interactions; isotope hydrology; environmental context for human evolution; paleoclimate proxy development; rift basin evolution.

EDUCATION

Ph.D., Geology, University of Utah, 2008

Thesis Title: *Isotopic Records of Plio-Pleistocene Climate and Environments in Eastern Africa*

Advisor: Thure Cerling

M.S., Geology, University of Arizona, 2002

Thesis Title: *Isotopic Evidence for Plio-Pleistocene Environmental Change at Gona, Ethiopia*

Advisor: Jay Quade

B.S., Geology, Stanford University, 2000

B.A., Anthropological Sciences, Stanford University, 2000

PROFESSIONAL POSITIONS

Associate Professor, University of Michigan, 2016–present

Associate Chair Graduate Studies, Earth & Environmental Sciences, U. Michigan 2018–present

Assistant Professor, Johns Hopkins University, 2009–2016

Postdoctoral Scholar, California Institute of Technology, 2008–2009

Research Assistant, University of Utah, 2004, 2006–2008

NSF GK12 Graduate Fellow, University of Utah, 2005–2006

Stokes Academic Scholar, University of Utah, 2003–2004

Technician, Paleomagnetism Laboratory, University of Arizona, 2003

NSF GK12 Graduate Fellow, University of Arizona, 2001–2002

CAREER BREAKS

Maternity leave: January – May 2014, January – April 2016

AWARDS

Geological Society of America, Fellow, 2014

Geological Society of America, Donath Medal – Young Scientist Award, 2013

Geological Society of America, Subaru Outstanding Woman in Science, 2011

Outstanding Ph.D. Student, Department of Geology & Geophysics, University of Utah, 2008

Deans' Award for Academic Achievement, Stanford University, 2000

GRANTS

Pending

Collaborative Research: Development of a 700,000 Year Record of Tropical Precipitation, Evaporation, and Temperature from Lake Junin Sediments and Regional Speleothems, co-PI, National Science Foundation P2C2, Total \$1,547,323 (UM portion, \$331,413).

Disentangling the drivers of human evolution: tectonics, climate and habitat, co-PI, Keck Foundation, Total \$1,000,000 (UM portion, \$137,027).

Past

- A Million Years of Climate Change in Eastern Africa, PI, Johns Hopkins University Catalyst Award, 2015–2016. Total award, \$74,736.
- Collaborative Research: Acheulean Hominin Behavior at Elandsfontein, South Africa, co-PI, National Science Foundation Archaeology (BCS 1219494), 2012–2015. Total award \$116,951 (Levin portion \$62,934).
- Collaborative Research: Pliocene Geology, Geochronology, and Paleontology of Woranso-Mille, Ethiopia, co-PI, National Science Foundation Physical Anthropology (BCS 1125345), 2012–2015. Total award \$580,927 (Levin portion \$47,625).
- Triple Isotope Water Analyzer for Extraplanetary Studies, sub-contract through Los Gatos Research, National Aeronautics and Space Administration (LGR12013), 2013–2015. Total award: \$100,000.
- Variations in $^{17}\text{O}/^{16}\text{O}$ and $^{18}\text{O}/^{16}\text{O}$ of Meteoric Waters from the Conterminous USA, PI, American Chemical Society, Petroleum Research Fund – Doctoral New Investigator Grant (52642DNI2), 2012–2015. Total award: \$100,000.
- Geochronology of *Ardipithecus ramidus* fossil sites at Gona, Afar Rift, Ethiopia, PI, National Geographic Research and Exploration Program (#8891-11), 2012. Total award: \$25,584.
- Geological Society of America Student Grant, 2006.
- Sigma Xi Student Grant, 2006.
- Associated Students of the University of Utah Travel Grant, 2005.
- International Association of Sedimentologists Student Grant, 2002.
- Undergraduate Research Grant, Stanford University, 1998 & 1999.

PUBLICATIONS

Citation metrics – 1/16/21

Scopus: h-index 29, citations 3026; Researcher ID (B-4124-2010): h-index 27, citations 2838; Google Scholar: h-index 30, citations 4370

* graduate student work, directly advised by Levin

postdoc work, directly advised by Levin

In Preparation

*Lehmann SB, Levin NE, Passey BH, Cerling TE, Johnson B, Hu HT, Miller M, Hoppe K, Arppe L, Sealy L, Luyt J, Beverly EJ. Triple oxygen isotope distribution in modern enamel and potential geologic applications, *Earth and Planetary Science Letters*, in preparation

In review

Aron PG, Poulsen CJ, Fiorella RP, Levin NE, Acosta RP, Yanites BJ, Cassel EJ. Spatiotemporal variability of stable water isotopes in central Andean precipitation. *Journal of Geophysical Research Atmospheres*, submitted 10/1/20.

#Beverly EJ, Levin NE, Passey BH, Aron PG, Yarian DA, Page M, Pelletier EM Triple oxygen and clumped isotopes in modern soil carbonate along an aridity gradient in the Serengeti, Tanzania. *Earth and Planetary Science Letters*, submitted 11/24/20. <https://www.essoar.org/doi/10.1002/essoar.10505405.1>

Accepted and In Press

*Aron PG, **Levin NE**, Beverly EJ, Huth TE, Passey BH, Pelletier EM, Poulsen CJ, Winkelstern IZ, Yarian DA. Triple oxygen isotopes in the water cycle, *Chemical Geology*, in press. <https://doi.org/10.1016/j.chemgeo.2020.120026>.

Levin NE, Simpson SW, Quade J, Everett ME, Frost SR, Rogers MJ, Semaw S. The 6-million-year record of ecological and environmental change at Gona, Afar Region, Ethiopia, *African Paleoecology and Human Evolution*, Cambridge University Press, SC Reynolds and R Bobe (editors), accepted June 2018. Editors submitted full book to publisher in Dec. 2019. *This is an invited, peer-reviewed article.*

Peer-reviewed publications

51. Passey BH, **Levin NE**. 2121. Triple oxygen isotopes in meteoric waters, carbonates, and biological apatites: implications for continental paleoclimate reconstruction. *Reviews in Mineralogy & Geochemistry* v. 86, 429-462
50. Potts R, Dommain R, #**Moerman JW**, Behrensmeyer AK, Deino AL, Riedl S, Beverly EJ, Brown ET, Deocampo D, Kinyanjui R, Lupien R, Owen RB, Rabideaux N, Russell JM, Stockhecke M, deMenocal P, Faith JT, Garcin Y, Noren A, Scott JJ, Western D, Bright J, Clark JB, Cohen AS, Keller CB, King J, Levin NE, Brady SK, Muiruri V, Renaut RW, Rucina SM, Uno K, 2020. Increased ecological resource variability during a critical transition in hominin evolution. *Science Advances* 6, eabc8975.
49. Faith JT, Braun DR, Davies B, DeSantis LRG, Douglass MJ, Esteban I, Hare V, **Levin NE**, Luyt J, Pickering R, Power MJ, Sealy J, Deano S. 2020. Ecometrics and the paleoecological implications of Pleistocene faunas from the western coastal plains of the Cape Floristic Region, South Africa, *Journal of Quaternary Science*, doi:10.1002/jqs.3247.
48. Frost SR, Simpson SW, **Levin NE**, Quade J, Rogers MJ, Semaw S. 2020. Fossil Cercopithecidae from the early Pliocene Sagantole Formation at Gona, Ethiopia. *Journal of Human Evolution*, 144: 102789. doi.org/10.1016/j.jhevol.2020.102789.
47. Semaw S, Rogers MJ, Simpson, SW, **Levin NE**, Quade J, Dunbar N, McIntosh WC, Cáceres I, Stinchcomb GE, Holloway RL, Brown FH, Butler RF, Stout D, Everett M. 2020. Co-occurrence of Acheulian and Oldowan artifacts with *Homo erectus* cranial fossils from Gona, Afar, Ethiopia. *Science Advances*, Vol. 6, no. 10, eaaw4694.
46. #Bedaso ZK, *DeLuca NM, **Levin NE**, Zaitchik BF, Waugh DW, Wu S-Y, Harman CJ, Shanko D. 2020. Spatial and temporal variation in the isotopic composition of Ethiopian precipitation. *Journal of Hydrology*: <https://doi.org/10.1016/j.jhydrol.2019.124364>.
45. Saylor BZ, Gibert L, Deino A., Alene, M, **Levin NE**, Melillo SM, Peaple MD, Feakins SJ, Bourel B, Barboni D, Novello A, Sylvestre F, Mertzman SA, Haile-Selassie Y, 2019. Age and context of mid-Pliocene hominin cranium from Woranso-Mille, Ethiopia. *Nature* 573, 220-224.
44. Simpson SW, **Levin NE**, Quade J, Rogers MJ, Semaw S. 2019. *Ardipithecus ramidus* postcranial fossils from the Gona Project Area, Afar Regional State, Ethiopia. *Journal of Human Evolution*, 129: 1-45.
43. Potts R, Behrensmeyer AK, Faith JT, Tryon CA, Brooks AS, Yellen JE, Deino AL, Kinyanjui R, Clark JB, Haradon C, **Levin NE**, Meijer HJM, Veatch EG, Owen RB, Renaut RW. 2018. Environmental dynamics during the onset of the Middle Stone Age in eastern Africa. *Science* 360 (6384): 86-90.
42. Forrest FL, Stynder DD, Bishop LC, **Levin NE**, *Lehmann SB, Patterson DB, Braun DR. 2018. Zooarchaeological reconstruction of newly excavated Middle Pleistocene deposits from Elandsfontein, South Africa. *Journal of Archaeological Science: Reports* 17: 19-29.

41. *Lehmann SB, **Levin NE**, Braun DR, Stynder DD, Zhu M, le Roux P, Sealy J. 2018. Environmental and ecological implications of strontium isotope ratios in mid-Pleistocene fossil teeth from Elandsfontein, South Africa. *Palaeogeography, Palaeoclimatology, Palaeoecology* 490: 84-94.
40. Blumenthal SA, **Levin NE**, Brown FH, Brugal J-P, Chritz, KL, Harris, JM, Jehle GE, Cerling TE, 2017. Aridity and hominin environments. *Proceedings of the National Academy of Sciences USA*, 114: 7331-7336.
39. *Li S, **Levin NE**, Soderberg K, Dennis KJ, Caylor KK. 2017. Triple oxygen isotope composition of leaf waters in Mpala, central Kenya. *Earth and Planetary Science Letters*, 468: 38-50.
38. Haile-Selassie Y, Melillo SM, Ryan TM, **Levin NE**, Saylor BZ, Deino A, Mundil R, Scott G, Alene M, Gibert L. 2016. Dentognathic remains of *Australopithecus afarensis* from Nefuraytu (Woranso-Mille, Ethiopia): comparative description, geology, and paleoecological context. *Journal of Human Evolution*, 100: 35-53.
37. *Lehmann SB, Braun DR, Dennis KJ, Patterson DB, Stynder DD, Bishop LC, Forrest F, **Levin NE**. 2016. Stable isotopic composition of fossil mammal teeth and environmental change in southwestern South Africa during the Pliocene and Pleistocene, *Palaeogeography, Palaeoclimatology, Palaeoecology*, 457: 396-408.
36. *Patterson DB, *Lehmann SB, Matthews T, **Levin NE**, Stynder D, Bishop LC, Braun DR. 2016. Stable isotope ecology of Cape dune mole-rats (*Bathyergus suillus*) from Elandsfontein, South Africa: implications for C₄ vegetation and hominin paleoecology in the Cape Floral Region. *Palaeogeography, Palaeoclimatology, Palaeoecology*. 457: 409-421.
35. **Levin NE**, Haile-Selassie Y, Frost SR, Saylor BZ. 2015. Dietary change among hominins and cercopithecids in Ethiopia during the early Pliocene. *Proceedings of the National Academy of Sciences USA*, 112: 12304-12309.
34. Cerling TE, Andanje SA, Blumenthal SA, Brown FH, Chritz KL, Harris JM, Hart JA, Kirera F, Kaleme P, Leakey LN, Leakey MG, **Levin NE**, Manthi FK, Passey BH, Uno KT. 2015. Dietary changes of large herbivores in the Turkana Basin, Kenya from 4 to 1 million years ago. *Proceedings of the National Academy of Sciences USA*, 112: 11467-11472.
33. **Levin NE**. 2015. Environment and climate of early human evolution. *Annual Review of Earth and Planetary Sciences*, 43: 405-429.
32. *Li S, **Levin NE**, Chesson LA. 2015. Continental scale variation in ¹⁷O-excess of meteoric waters in the United States. *Geochimica et Cosmochimica Acta*, 164: 110-126.
31. Haile-Selassie Y, Gibert L, Melillo SM, Ryan TM, Alene M, Deino A, **Levin NE**, Scott G, Saylor BZ. 2015. New species from Ethiopia further expands middle Pliocene hominin diversity, *Nature*, 521: 483-488.
30. Simpson SW, Kleinsasser L, Quade J, **Levin NE**, McIntosh WC, Dunbar N, Semaw S, Rogers M. 2015. Late Miocene hominin teeth from the Gona Paleoanthropological Research Project area, Afar, Ethiopia. *Journal of Human Evolution*, 81: 68-82.
29. **Levin NE**, Raub TD, Dauphas N, Eiler JM. 2014. Triple oxygen isotope variations in sedimentary rocks, *Geochimica et Cosmochimica Acta*, 139: 173-189.
28. Passey BH, Hu H, Ji H, Montanari S, *Li S, Henkes GA, **Levin NE**. 2014. Triple oxygen isotopes in biogenic and sedimentary carbonates, *Geochimica et Cosmochimica Acta*, 141: 1-25.
27. Simpson SW, Quade J, **Levin NE**, Semaw S. 2014. The female *Homo erectus* pelvis from Gona: Response to Ruff. 2010. *Journal of Human Evolution*, 68: 32-35.
26. Eiler JM, Bergquist B, Bourg I, Cartigny P, Farquhar J, Gagnon A, Guo W, Halevy I, Hofmann A, **Levin N**, Schauble E, Stolper D. 2014. Frontiers of stable isotope geoscience. *Chemical Geology*, 372: 119-143.

25. Berman ESF, **Levin NE**, Landais A, *Li S, Owano T. 2013. Measurement of $\delta^{18}\text{O}$, $\delta^{17}\text{O}$, and ^{17}O -excess in water by off-axis integrated cavity output spectroscopy and isotope ratios mass spectrometry. *Analytical Chemistry*, 85(21): 10392-10398.
24. Braun DR, **Levin NE**, Stynder D, Herries AIR, Archer W, Forrest F, Roberts DL, Bishop LC, Matthews T, *Lehmann SB, Pickering R, Fitzsimmons K. 2013. Mid-Pleistocene hominin occupation at Elandsfontein, Western Cape, South Africa. *Quaternary Science Reviews*, 82: 145-166.
23. Feakins, SJ, **Levin NE**, Liddy HM, Sieracki A, Eglinton TI, and Bonnefille R. 2013. Northeast African vegetation change over 12 m.y. *Geology* 41: 295-298.
22. Quade J and **Levin NE**. 2013. East African hominid paleoecology: isotopic evidence from paleosols. In: *Early Hominin Paleoecology* (eds. M Sponheimer, J Lee-Thorp, K Reed, P Ungar). University of Colorado Press, pp. 59-102.
21. Zaitchik BF and **Levin NE**. 2013. Understanding the Dynamics of the Tropical African Climate. *Eos*, 94 (23): 209.
20. Haile-Selassie, Y, Saylor BZ, Deino A, **Levin NE**, Alene M, and Latimer BM. 2012. A new hominin foot from Ethiopia shows multiple Pliocene bipedal adaptations. *Nature*, 483, 565-569.
19. **Levin NE**, Brown FH, Behrensmeyer AK, Bobe R, Cerling TE. 2011. Paleosol carbonates from the Omo Group: isotopic records of local and regional environmental change in East Africa. *Palaeogeography, Palaeoclimatology, Palaeoecology*, 307: 75-89.
18. Cerling TE, Wynn JG, Andanje SA, Bird MI, Korir DK, **Levin NE**, Mace W, Macharia AN, Quade J, and Remien CH. 2011. Woody cover and hominin environments in the past 6 million years, *Nature*, 476, 51-56.
17. Cerling, TE, **Levin NE**, and Passey BH. 2011. Stable Isotope Ecology in the Omo-Turkana Basin, *Evolutionary Anthropology*, 20(6), 228-237.
16. Passey BH, **Levin NE**, Cerling TE, Brown FH, and Eiler JM. 2010. High-temperature environments of human evolution in East Africa based on bond ordering in paleosol carbonates. *Proceedings of the National Academy of Sciences USA*, 107: 11245-11249.
15. Braun DR, Harris JWK, **Levin NE**, McCoy JT, Herries AIR, Bamford MK, Bishop LC, Richmond BG, Kibunjia M. 2010. Early hominin diet included diverse terrestrial and aquatic animals 1.95 Ma in East Turkana, Kenya. *Proceedings of the National Academy of Sciences USA*, 107: 10002-10007.
14. Cerling TE, **Levin NE**, Quade J, Wynn JG, Fox DL, Kingston JD, Klein RG, Brown FH. 2010 Comment on the Paleoenvironment of *Ardipithecus ramidus*. *Science*, 328: 1105-d.
13. Cerling TE, Harris JM, Leakey MG, Passey BH, **Levin NE**. 2010. Stable carbon and oxygen isotopes in East African Mammals: modern and fossil, in Werdelin L, and Sanders WJ, eds., *Cenozoic Mammals of Africa*, University of California Press, p. 949-960.
12. **Levin NE**, Zipser EJ, Cerling TE. 2009. Isotopic composition of waters from Ethiopia and Kenya: insights into moisture sources for eastern Africa. *Journal of Geophysical Research - Atmospheres*, 114, D23306.
11. **Levin NE**, Simpson SW, Quade J, Cerling TE, Frost SR, 2008, Herbivore enamel carbon isotopic composition and the environmental context of *Ardipithecus* at Gona, Ethiopia, in Quade J, and Wynn JG, eds., *The Geology of Early Humans in the Horn of Africa: Geological Society of America Special Paper 446*, p. 215-234.
10. Quade J, **Levin NE**, Simpson SW, Butler R, McIntosh WC, Semaw S, Kleinsasser L, Dupont-Nivet G, Renne P, Dunbar N, 2008, The Geology of Gona, Ethiopia, in Quade J, and Wynn JG, eds., *The Geology of Early Humans in the Horn of Africa: Geological Society of America Special Paper 446*, p. 1-31.
9. Kleinsasser LL, Quade J, McIntosh WC, **Levin NE**, Simpson SW, Semaw S. 2008. Stratigraphy and geochronology of the late Miocene Adu-Asa Formation at Gona, Ethiopia,

in Quade J, and Wynn JG, eds., *The Geology of Early Humans in the Horn of Africa: Geological Society of America Special Paper 446*, p. 33-65.

8. Simpson SW, Quade J, **Levin NE**, Butler R, Dupont-Nivet G, Everett M, Semaw S. 2008. A Female *Homo erectus* Pelvis from Gona, Ethiopia. *Science*, 322: 1089-1092.
7. Cerling TE, Harris JM, Hart JA, Kaleme P, Klingel H, Leakey MG, **Levin NE**, Lewison RI, Passey BH. 2008. Stable Isotope Ecology of *Hippopotamus amphibius* in East Africa. *Journal of Zoology*, 276: 204-212.
6. Passey BH, Cerling TE, **Levin NE**. 2007. Temperature dependence of oxygen isotope acid fractionation in modern and fossil tooth enamels. *Rapid Communications in Mass Spectrometry*, 21: 2853-2859.
5. **Levin NE**, Cerling TE, Passey BH, Harris JM, Ehleringer JR. 2006. A stable isotope aridity index for terrestrial environments. *Proceedings of the National Academy of Sciences, USA*, 103: 11201-11205.
4. Stout D, Quade J, Semaw S, Rogers MJ, **Levin NE**. 2005. Raw Material selectivity of the earliest stone toolmakers at Gona, Afar, Ethiopia. *Journal of Human Evolution*, 48: 365-380.
3. Semaw S, Simpson SW, Quade J, Renne PR, Butler RF, McIntosh WC, **Levin N**, Dominguez-Rodrigo M, Rogers MJ. 2005. Early Pliocene hominids from Gona, Ethiopia. *Nature*, 433: 301-305.
2. **Levin NE**, Quade J, Simpson SW, Semaw S, Rogers MJ. 2004. Isotopic evidence for Plio-Pleistocene environmental change at Gona, Ethiopia. *Earth and Planetary Science Letters*, 219: 93-110.
1. Quade J, **Levin N**, Semaw S, Stout D, Renne PR, Rogers MJ, Simpson SW. 2004. Paleoenvironments of the earliest stone toolmakers, Gona, Ethiopia. *Geological Society of America Bulletin*, 116 (11-12): 1529-1544.

Data Compilations (not peer-reviewed)

Levin, NE. 2013. Compilation of East Africa Soil Carbonate Stable Isotope Data. Integrated Earth Data Applications. doi: 10.1594/IEDA/100231.

CONFERENCE PRESENTATIONS (invited)

First Author Presentations

Levin NE, Saylor BZ, Gibert L, Deino A, Alene, M, Melillo SM, Peaple MD, Feakins SJ, Bourel B, Barboni D, Novello A, Sylvestre F, Mertzman SA, Haile-Selassie Y, A wet basin during dry times: a new Pliocene lake record from the Afar region, Ethiopia. Session PP025-01, *American Geophysical Union Fall Meeting (Virtual)*, December 1–17, 2020

Levin NE, Beverly EJ, Katz SA, Passey BH, Pelletier EM, Poulsen CJ, Quade J, Rech JA. Triple oxygen isotopes, aridity and uplift: a case study from the Atacama. *American Geophysical Union Fall Meeting*, San Francisco, CA USA, December 2019.

Levin NE, Bedaso ZK, Beverly EJ, Cerling TE, Lehmann SB, Moerman JW, Passey BH, Quade J. Hotter, drier, and more open? Geochemical perspectives on 10 myr of environmental change and humane evolution in Africa. *Geological Society of America Annual Meeting*, Indianapolis, IN USA, November 2018. (Pardee keynote session)

Levin NE. A Ground-Level View of African Climate During the Pliocene. *American Geophysical Union Fall Meeting*, San Francisco, CA USA, December 2016.

Levin NE, DeLuca NM, Passey BH, Ji H, Abbott MB, Polissar P, Rodbell DT. Constraining Holocene Hydroclimate in the Tropical Andes Using Δ_{47} and $\Delta^{17}\text{O}$ in Lacustrine Carbonates. *American Geophysical Union Fall Meeting*, San Francisco, CA USA, December 2016.

Levin NE, Li S. Triple oxygen isotopic variation in continental waters and potential applications to paleoclimate research. *American Geophysical Union Fall Meeting*, San Francisco, CA USA, December 2014.

- Levin NE. The Pleistocene expansion of C₄ grasses in eastern Africa and the role of atmospheric pCO₂. *Goldschmidt Conference*, Sacramento, CA USA, June 2014.
- Levin NE, Haile-Selassie Y, Frost SR. Hominin and cercopithecoid diet and niche partitioning at 3.8–3.2 Ma: new insights from Woranso-Mille, Ethiopia. *American Association of Physical Anthropologists Annual meeting*, Calgary, CA, April 2014.
- Levin NE. Early human landscapes in eastern Africa amidst regional and global change. *Geological Society of America Annual Meeting*, Denver, CO, USA, October 2013.
- Levin NE, Bedaso ZK, Passey BH, Quade J. Pliocene warmth and ecosystem change in eastern Africa. *Geological Society of America Annual Meeting*, Denver, CO, USA, October 2013.
- Levin NE, Li S, Brooks JR, Welker JM. Variations in triple oxygen isotopes in precipitation and river waters in the continental U.S. *Goldschmidt Conference*, Florence, Italy, August 2013.
- Levin NE, Raub TD, Dauphas N, Eiler JM. 2010. ¹⁷O anomalies in sedimentary silica and oxides. *Goldschmidt Conference*, Knoxville, TN, USA, June 2010.
- Levin NE, Cerling TE, Harris JM. Isotopic patterns in extant mammalian herbivore teeth from eastern Africa. *Geological Society of America Annual Meeting*, Portland, OR, USA, October 2009.
- Levin NE, Simpson SW, Quade J, Cerling TE, Frost SR. Carbon isotope evidence for *Ardipithecus* habitat at Gona, Ethiopia. *Society of Vertebrate Paleontology Annual Meeting*, Cleveland, OH, USA, October 2008.
- Levin NE, Manthi FK, Kaleme P, Cerling TE. Tiny teeth and the big picture: carbon and oxygen isotope ratios of micromammal teeth from eastern Africa. *The 6th International Conference on Applications of Stable Isotope Techniques to Ecological Studies*, Honolulu, HI, USA, 2008.
- Levin NE and Cerling TE. Getting to the source of the high isotopic values of Ethiopian precipitation. *American Geophysical Union Fall Meeting*, San Francisco, CA, USA, December 2007.
- Levin NE, Cerling TE, Brown FH. A paleosol carbonate isotope record from the Shungura Formation, Ethiopia. *Geological Society of America Annual Meeting*, Salt Lake City, UT, USA, October 2005.
- Levin NE, Quade J, Simpson SW, Semaw S. Early Pliocene environments at Gona, *Geological Society of America Annual Meeting*, Denver, CO, USA, November 2004.
- Levin NE, Quade J, Semaw S, Simpson SW, Schick K, Toth N. Plio-Pleistocene environments of Gona Ethiopia: the isotopic record of pedogenic carbonate and fossil teeth. *Geological Society of America Annual Meeting*, Boston, MA, USA, November 2001.

Student and Postdoc Advisee First Author Presentations (a selection)

- Huth TE, Passey BH, Cole JE, Lachniet MS, Levin NE, Using triple oxygen isotopes to constrain speleothem paleorecord interpretation in western USA cave systems. Session PP048, *American Geophysical Union Fall Meeting (Virtual)*, December 1–17, 2020.
- Katz SA, Levin NE, Rodbell DT, Gillikin DP, Passey B, Reconstructing precipitation d18O from lacustrine carbonates using δ¹⁸O, Δ₄₇, and Δ¹⁷O: a modern case study from Junin, Peru, with implications for paleoclimate. Session PP048, *American Geophysical Union Fall Meeting (Virtual)*, December 1–17, 2020.
- Beverly EJ, Levin NE, Passey BH, Aron PG, Page M, Yarian D, Pelletier E, A new proxy for regional paleo-aridity using clumped and triple oxygen isotopes of modern soil carbonates from the Serengeti Ecosystem, Tanzania. Session T59, *Annual Meeting of the Geological Society of American (GSA Connects Online)*, 26–30 October, 2020.
- Aron PG, Poulsen CJ, Levin NE, Winkelstern IZ, Beverly EJ, Yarian DA. Variability of Triple Oxygen Isotopes in Meteoric Waters. Session PP22A, *American Geophysical Union Fall Meeting*, December 9–13, 2019

- Aron PG, Poulsen CJ, Levin NE, Winkelstern IZ. Triple oxygen isotopes in Central Andean Precipitation. Session PP21F, *American Geophysical Union Fall Meeting*, December 1–14, 2018.
- Beverly EJ, Levin NE, Passey BH, Winkelstern IZ. Reconstructing aridity and evaporation in East Africa using triple oxygen isotopes in soil carbonates. *Geological Society of America Annual Meeting*, Indianapolis, IN USA, November 2018.
- Beverly EJ, Levin NE, Passey BH, Quade J. Developing a new proxy for paleo-aridity in paleosols using triple oxygen isotopes. *The 28th V.M. Goldschmidt Conference*, Boston, USA, August, 2018.
- Moerman JW, Levin NE, Behrensmeier AK, Deino AL, DeLuca NM, Lehmann SB, Passey BH, Potts R. Triple oxygen isotopes and clumped isotope thermometry applied to East African water balance over the last 500ky. *American Geophysical Union Fall Meeting*, San Francisco, CA USA, December 2016.
- DeLuca NM, Bedaso ZK, Levin NE, Zaitchik BF, Waugh D, Harman CJ, Shanko D. Spatial and Temporal Variation in the Isotopic Composition of Ethiopian Rainfall. *American Geophysical Union Fall Meeting*, San Francisco, CA USA, December 2016.
- Li S, Passey BH, Henkes GA, Levin NE. Evaluation of isotopic equilibrium fractionation between synthetic carbonate and water: insights from triple oxygen and clumped isotope measurements. *The 26th V.M. Goldschmidt Conference*, Yokohama, Japan, June, 2016.
- Lehmann SB, Levin NE, Passey BH, Cerling TE. Triple oxygen isotopes in teeth: implications for reconstructing paleoaridity. *Geological Society of America Annual Meeting*, Baltimore, MD USA, November 2015.
- DeLuca NM, Levin NE, Bedaso ZK, Zaitchik BF, Waugh DW, Harman C, Shanko D. Spatial and temporal variation in the isotopic composition of Ethiopian rainfall. *Geological Society of America Annual Meeting*, Baltimore, MD USA, November 2015.
- Li S, Levin NE, Brooks JR, Welker JM. The triple oxygen isotopic composition of precipitation in the western United States. *American Geophysical Union Fall Meeting*, San Francisco, CA, USA, December 2014.
- Lehmann SB, Levin NE, Braun DR, Dennis KJ, Stynder DD, Bishop LC, Forrest, F. A Plio-Pleistocene record of vegetation, climate, and hydrology in western South Africa using carbon and oxygen isotopic compositions of fossil tooth enamel. *4th Southern Deserts Conference*, Mendoza, Argentina, November 2014.
- Bedaso ZK, Levin NE, Passey BH, Quade J. Clumped isotope records of East African paleosol carbonate as a climate proxy for the last 4.5 Ma, implications for human evolution. *The 24rd V.M. Goldschmidt Conference*, Sacramento, CA USA, June, 2014.
- Bedaso ZK, Levin NE, Zaitchik BF, Shanko D. Temporal and spatial variability of water isotopes in Ethiopian rainfall and its implication for moisture sources. *American Geophysical Union Fall Meeting*, San Francisco, USA. December 2013.
- Li S, Levin N, Soderberg K, Dennis KJ, Caylor KK. The triple oxygen isotope compositions of leaf waters in Mpala, central Kenya. *American Geophysical Union Fall Meeting*, San Francisco, USA. December 2013.
- Lehmann SB, Patterson DB, Braun DR, Matthews T, Levin NE. Regional and landscape-scale Pleistocene paleoecology using carbon and oxygen isotopes from in situ macro- and micromammal tooth enamel at Elandsfontein, Western Cape, South Africa. *Society of Vertebrate Paleontology Annual Meeting*, Los Angeles, CA, USA, Oct 30 - Nov 2, 2013.
- Lehmann SB, Levin NE, Dennis KJ, Bishop LC, Stynder DD, Braun DR. Trends in climate and vegetation of Plio-Pleistocene South Africa: Using fossil enamel isotopic data to address questions of regional environmental change. *Geological Society of America Annual Meeting*, Denver, CO, USA, 27 - 30 October 2013.
- Lehmann SB, Levin NE, Stynder DD, Bishop LC, Forrest F, and Braun DR. New tooth enamel isotopic data from the West Coast of South Africa and a comparison of terrestrial and marine

- records of Plio-Pleistocene climate change. *American Geophysical Union Fall Meeting*, San Francisco, USA. December 2012.
- Li S, Levin NE, Chesson LA. Spatial distribution of ^{17}O -excess of tap waters in the conterminous United States. AGU Fall Meeting, San Francisco, California, USA. December 2011.
- Kraft RA, Levin NE, Passey BH, Rose KD, Chew AE. Early Eocene paleoenvironments in Wyoming based on stable isotope ecology of fossil mammals. *Geological Society of America Annual Meeting*, October 2011.
- Li S, Levin NE, Chesson LA. Triple oxygen isotope composition of tap waters from the conterminous United States, Isoscapes Meeting, Lafayette, Indiana (Purdue University), 2011.
- Kraft RA, Levin NE, Mueller RG, Passey BH, Joyce A. Isotopic record of Holocene paleoclimate from paleosols in Nochixtlan Valley, Oaxaca, Mexico. *Geological Society of America Annual Meeting*, 2010.

INVITED SEMINARS

- Department of Geology & Geophysics, University of Utah, Nov 2020 (virtual).
- Department of Anthropology, Rutgers University, Nov. 2019.
- Department of Geosciences, University of Arizona, Oct. 2019.
- Department of Biology, Boise State University, Oct. 2018.
- Department of Geological Sciences, University Colorado Boulder, Oct. 2018.
- Department of Earth and Planetary Sciences, Johns Hopkins University, June 2018.
- Department of Earth, Planetary, and Space Sciences, Univ. California Los Angeles, Dec 2017.
- Department of Earth, Atmospheric, and Planetary Sciences, Purdue University, April 2017.
- Department of Ecology and Evolutionary Biology, University of Michigan, Nov. 2016.
- Department of Atmospheric, Oceanic and Earth Sciences, George Mason University, Nov. 2015.
- Department of Geology and Planetary Science, University of Pittsburgh, October 2015.
- Department of Earth and Planetary Sciences, University of New Mexico, September 2015.
- Department of Earth, Atmospheric and Planetary Sciences, MIT, May 2015.
- Department of Earth and Environmental Sciences, University of Michigan, January 2015.
- Gap in seminars in 2014 due to maternity leave and sabbatical.*
- Department of Anthropology, Smithsonian Institution, November 2013.
- Division of Biology and Paleo-Environment, Lamont-Doherty Earth Observatory, May 2013.
- Department of Earth and Environmental Sciences, University of Michigan, October 2012.
- Department of Geosciences, Princeton University, April 2012.
- Department of Geosciences, Stony Brook University, April 2012.
- Center for the Advanced Study of Hominid Paleobiology, George Washington Univ., Dec. 2011.
- Department of Earth Sciences, University of Southern California, October 2011.
- Geochemistry Seminar, University of Maryland, October 2011.
- Department of Geological Sciences, University of North Carolina, September 2011.
- Center for Functional Anatomy and Evolution, Johns Hopkins University, February 2011.
- Geological Society of Washington, November 2010.
- Department of Geology, University of Maryland, September 2010.
- Department of Earth and Planetary Sciences, Rutgers University, March 2010.
- Department of Geology, Baylor University, March 2010.
- Department of Geology, SUNY Binghamton, November 2009.
- Geophysical Laboratory, Carnegie Institution of Washington, July 2009.
- Division of Geological and Planetary Sciences, California Institute of Technology, October 2007.
- Department of Geology, University of Nairobi, February 2007.

WORKSHOPS

- NSF African Rift Valley Research Consortium Field Review workshop, Afar Regional State, Ethiopia, January 2019 (invited participant).
- Cleveland Museum of Natural History, *The Paleobiology, Taxonomy, and Paleoecology of Early Australopithecus: a Collaborative Approach to Synthesizing the Evidence*, Cleveland, OH, September 2013 (invited participant).
- LacCore, University of Minnesota, *Ologesailie Core Sampling Workshop*, Minneapolis, MN, April 2013 – the first meeting of the full scientific team associated with the Ologesailie Drilling Project during which the scientific agenda was discussed and initial processing of the cores was performed (invited participant).
- Science* magazine reported on this workshop: Pennisi E (2013) Out of the Kenyan Mud, an Ancient Climate Record *Science* 341: 476-479.
- Johns Hopkins University, *Climate Dynamics of Tropical Africa: present understandings and future directions*, Baltimore, MD, November 2012 (co-organizer).
- NSF GeoPRISMS Planning Workshop for the East African Rift Primary Site, Morristown, NJ, October 2012 (attendee).
- Lamont-Doherty Earth Observatory, *Did Climate Change Shape Human Evolution?* Palisades, NY, April 2012 (invited speaker),
- Turkana Basin Institute, *Climate and Human Evolution*, Turkana, Kenya, August 2011 (invited participant).
- DOE BES Earth Science Council Workshop, *The chemistry of novel isotope effects in the geosciences*, San Francisco, CA, December 2010 (invited speaker).
- NSF Paleoclimates and Human Evolution Workshop, Front Royal, VA, November 2005 (invited speaker).

FIELD EXPERIENCE

- Ologesailie, Kenya: mapping, stratigraphy, field course instruction, isotope geochemistry, and drilling project team member, 2002–present.
- Woranso-Mille, Afar Region, Ethiopia: paleoecology and isotope geochemistry, 2011–present.
- Elandsfontein, Western Cape Province, South Africa: mapping, stratigraphy, and sample collection for stable isotopic analysis, coordinating geological team, 2010–present.
- Gona, Afar Region, Ethiopia: geological mapping, stratigraphy of archaeological and paleontological sites, and stable isotopic studies of fossil teeth and soil carbonates, coordinating geological team, 2001–present.
- Turkana Basin, northern Kenya and southern Ethiopia: isotopic studies of fossil teeth and soil carbonates, and stratigraphy of archaeological sites, 2002–present.
- Oaxaca, Mexico: collection of Holocene soils for stable isotopic analysis, 2008.
- Ethiopia and Kenya: collections of modern waters, plants, and mammal teeth for isotopic study, 2004–2008.
- Korinth, Greece: mapping, Eastern Korinthia Archaeological Survey, 1999 & 2001.
- Tobacco Root Mountains, Montana: Indiana University Field Camp, 2000.
- Chavín de Huántar, Peru: archaeological excavations Stanford Chavín Project, 1998.

LABORATORY EXPERIENCE

- Isotopologue Paleosciences Laboratory, University of Michigan: co-director of facility that operates two Nu Perspective mass spectrometers equipped to measure singly and multiply substituted isotopologues of CO₂ and O₂ gases. Peripherals include off-line vacuum extraction lines, a gas chromatograph, a common acid bath for extraction of CO₂ from carbonates, and a fluorination line for extraction of O₂ from water, and a reduction line to facilitate analysis of triple oxygen isotopes of CO₂ and CO₃, 2017–present.
- Stable Isotope Laboratory, Johns Hopkins University: co-director of facility that operates a

Thermo MAT 253 mass spectrometer equipped to measure singly and multiply substituted isotopologues of CO₂ and O₂ gases, 2009–2016.
Isotope Geochemistry Laboratory, Caltech: method development for precise ¹⁷O measurements of silicates via laser fluorination, 2008–2009.
Cerling Stable Isotope Facility, University of Utah: student user and lab manager responsible for lab maintenance, on and off-line extractions, dual inlet and continuous flow IRMS measurements of carbonates, bioapatite, waters, gases and organics, 2004–2008.
Desert Laboratory & Environmental Isotope Laboratory, University of Arizona: on and off-line extractions and stable isotopic measurements of carbonates and bioapatites, 2000–2003.
Paleomagnetism Laboratory, University of Arizona: sample thermal demagnetization and magnetometer operation, 2003.

TEACHING

University of Michigan

EARTH 111/ENVIRON 112 Climate & Humankind (F17, F18, W21)
EARTH 144 Climate & Humans (F17)
EARTH 202 Introduction to Environmental Science at Camp Davis (S19)
EARTH 467 Stratigraphy & Basin Analysis (W17, W18, W19, W20)
EARTH 531 First Year Graduate Student Seminar (F18, F19, F20)

Johns Hopkins University

270.210 Environmental Field Methods (co-taught), Spring 2013
270.268 Field Seminar (co-taught), Spring 2015
270.311 Geobiology – Fall 2010, Fall 2012, Spring 2015
270.350 Sedimentary Geology – Fall 2009, Fall 2011, Fall 2013, Fall 2016
270.366 Advance Topics in Isotope Geochemistry (co-taught) – Fall 2010, Fall 2011, Fall 2012
270.377 Climates of the Past (co-taught) – Spring 2011
207.607 Topics in African Climate (co-taught) – Spring 2012
270.644 Physics of Climate Variability (co-taught) – Fall 2011

Guest lectures in Conversations with Earth (2011–2013) and Planets, Life & Universe (2011–2013, 2015).

Other Teaching

University of Utah: Stable Isotope Ecology Short Course, instructor, 2006, 2008, 2011–2013, 2015, 2017.
University of Utah: NSF GK12 Program, graduate fellow, 2005–2006.
Smithsonian Institution: Microstratigraphy and Taphonomy Field Course, Olorgesailie, Kenya, instructor, 2004.
Monterey, Carmel and Pacific Grove School Districts, California: High School Science and Math, substitute teacher, Fall 2002.
University of Arizona: NSF GK12 Program, graduate fellow, 2001–2002; Geologic Perspectives, teaching assistant, 2000–2001.
Stanford University: Outdoor Education Program, instructor, 1999–2000; Introduction to Prehistoric Archaeology, teaching assistant, 1999.

ADVISING

Undergraduate Research Advisees

Elise Pelletier (UM Class 2020), 2018–2020, Senior Thesis Fall 2020.
Bobby Stafford (JHU Class 2017), 2015–2016.
Eric Ryberg (JHU Class of 2015), 2014–2015, Senior Thesis Spring 2015.

Gabrielle Stephens (JHU Class of 2017), 2013–2014.
Edward Kardish (JHU Class of 2014), 2013–2014, Senior Thesis Spring 2014.
Ben Kahn (University Michigan Class of 2015), Summer 2013.
Laila Nasr (JHU Class of 2013), Summer 2011.
Magdalena Nowosadko (JHU Class of 2011), 2010–2011, Senior Project.

Graduate Advisees

Sarah Katz, Ph.D. student UM 2018–present
Jada Langston, M.S. Student UM 2020–present
Mara Page (M.S. 2020, UM), Thesis title: Stable isotope ecology of mammals in the southern Kenyan Rift.
Nicole DeLuca Ph.D. student JHU 2014–2016; Ph.D. JHU 2019 (did not move to UM, stayed at JHU, changed research focus)
Sophie Lehmann (Ph.D. 2016, JHU), Thesis title: Studies of Carbon, Oxygen and Strontium Isotopes in Tooth Enamel: Evaluating Paleoenvironmental Change in South Africa and Expanding the Paleoclimate Toolkit. Currently postdoc at University of Pittsburgh.
Shuning Li (Ph.D. 2015, JHU), Thesis title: Triple Oxygen Isotope Distributions in Meteoric Waters, Plant Waters and Laboratory Precipitated Calcite. Currently postdoc at UCLA.
Rebecca Kraft (Ph.D. 2012, JHU), Thesis title: Reconstruction of Holocene and Early Eocene Terrestrial Environments Using Multiple Stable Isotope Proxies. Currently staff scientist at NIST.

PhD Committees

in progress UM (EES): Alexander Thompson, Nikolas Midttun, Kirk Townsend
in progress UM (Anthropology): Kyra Pazan, James Munene, Lauren Pratt,
in progress non-UM: Amanda Leiss (Yale, Anthropology)

2020: Phoebe Aron, Molly Ng, Rebekah Stein, Xiaojing Du - University of Michigan
2019: Julia Krawielicki – Department of Earth Sciences, ETH Zürich; Irisa Arney – Anthropology, University of Michigan
2017: Amelia Villasenor – Department of Anthropology, George Washington University
2016: Haoyuan Ji – Earth and Planetary Sciences, Johns Hopkins University
2015: Chi-Han Chang – Earth and Planetary Sciences, Johns Hopkins University

Qualifying Exam Committees

University of Michigan

2020: Sarah Katz
2018: Rebecca Dzombak, Nikolas Midttun, James Saulsbury, Rebekah Stein, Alexander Thompson
2017: Phoebe Aron, Andrew Vande Guchte, Molly Ng, Bian Wang

Johns Hopkins

2016: Nicole Deluca
2015: Kristen Prufrock, Xu Yang, Kaya Zelazny
2014: Se Jong Cho
2013: Haoyuan Ji, Sophie Lehman, Kirby Runyon
2012: Heather Ahrens
2011: Scott Pitz
2010: Shuning Li, Claire Patterson

Postdoctoral Advisees

Julia Kelson, 2019–present, NSF-EAR Postdoctoral Fellow, co-advised by Petersen & Passey
Tyler Huth, 2019–present, co-advised by Passey
Emily Beverly, 2017–8, NSF-EAR Postdoctoral Fellow, currently Assistant Professor University
of Houston
Jessica Moerman, 2015–2017, NSF-AGS Postdoctoral Fellow, currently AAAS Fellow.
Zelalem Bedaso, 2011–2013, currently Assistant Professor, University of Dayton.

PROFESSIONAL AFFILIATIONS

American Geophysical Union; Geological Society of America; Geochemical Society.

SERVICE

University of Michigan

Earth & Environmental Sciences Departmental Activities

Associate Chair for Graduate Studies, 2018–present.

Member, Curriculum Committee, 2019–present.

GeoClub Advisor, 2019–present.

Member, Departmental Executive committee, 2017–2018.

Chair, Diversity, Equity and Inclusion Committee, 2017–2018.

Faculty Ally, 2017–2018.

Member, Graduate Admissions Committee, 2017.

Member, EARTH Fall Preview Committee, 2016–present.

University Activities

Member, Faculty Transition Team, School of Environment and Sustainability, 2016-2017.

Johns Hopkins University

Director, Undergraduate Studies E&PS, August 2012–2016.

Faculty Advisor, JHU SGE honor society chapter, 2013–2016.

Member, E&PS Faculty Search Committees, 2012–2013, 2014-2015.

Member, Organizing Committee, Space Telescope Science Institute 2013 May Symposium.

Speaker, Dean's Zelicof Dinner with Undergraduates, April 2013.

Lecturer, Odyssey Program, Johns Hopkins University, May 2011.

Contributor to white paper, Space Initiative working group, Johns Hopkins University, 2011.

Profession

Editorial positions: editorial board member, *Quaternary Science Reviews* (2018 – present)

Reviewer for the journals *Am. J. Phys. Anthro.*, *Basin Research*, *Biology Letters*, *Chemical Geology*, *Earth & Planetary Science Letters*, *Ecosphere*, *Functional Ecology*, *Geochimica et Cosmochimica Acta*, *Geology*, *Geophysical Research Letters*, *GSA Bulletin*, *J. Climate*, *J. Human Evolution*, *Oecologia*, *Palaeo3*, *Paleoanthropology*, *Paleobiology*, *Proc. Nat. Acad. Sci. USA*, *Proceedings of the Royal Society B*, *Quaternary Research*, and *Sedimentology*.

Reviewer for funding agencies including the *National Science Foundation (programs Sedimentary Geology and Paleobiology, P2C2, Archaeology, EAR Major Research Instrumentation, Antarctic Glaciology)*, *the Department of Energy*, *the Leakey Foundation*, *Petroleum Research Fund*, and *the National Geographic Society*.

Judge for Outstanding Student Paper Award, American Geophysical Union Fall Meeting, 2014, 2019, 2020.

Center for the Advanced Study of Hominid Paleobiology at George Washington University, resource faculty, 2012–2018.

NSF-funded Inter-university Training for Continental-scale Ecology (ITCE) initiative based at the University of Utah, affiliated faculty, 2012–present.

African Rift Valley Research Consortium, member 2015–present.

Olorgesailie Drilling Project Scientific Advisory Team, member, 2015–present.

Geological Society of America Young Scientist Award Committee, member, 2016–2019.