Gregory E. Maurer

18 October 2023

Jornada Basin LTER
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Research and professional interests

I am a broadly trained ecologist with well-developed quantitative and informatics skills. My research interests are in terrestrial biogeochemistry and ecohydrology, particularly the effects of climate, global change, and disturbance on vegetation and soil systems. As a data analyst and data manager I'm competent using a wide variety of methods and technologies to create, communicate, and publish impactful research products with an open-science philosophy. My professional goals are to understand and raise awareness of the changing earth and its ecosystems, and to inform critical resource management and conservation efforts.

Academic positions

Data Scientist and LTER Information Manager **May 2019–present**
Jornada Basin Long-term Ecological Research Program, New Mexico State University, Las Cruces, NM

Adjunct Faculty **March 2023-present** School of Life Sciences, Arizona State University, Tempe, AZ

Postdoctoral Scientist: **September 2016–May 2019**
Dept. of Environmental Science, Policy, and Management, University of California, Berkeley, CA

Postdoctoral Scientist: **August 2014–September 2016**
Department of Biology, University of New Mexico, Albuquerque, NM

Education

Ph.D., Biology, University of Utah, May 2014

B.S., cum laude, Biological Sciences, University of Alaska Fairbanks, 2001

Certifications

The Carpentries Instructor Certification, 2021

Certificate in Applied Geographic Information Science, University of Utah, 2007

Selected coursework:

Advanced Topics in Deep Learning for Image Processing, New Mexico State University/USDA ARS, 2021

Introduction to Image Processing, Classical Machine Learning, and Deep Learning, New Mexico State University/USDA ARS, 2021

Ameriflux Data and Tech Workshop, Lawrence Berkeley National Lab, 2015

Radiocarbon in Ecology and Earth System Science, University of California, Irvine, 2008

Advanced Statistical Modeling for Biologists, University of Utah, 2012

Peer-reviewed publications

(see also http://greg.pronghorns.net/publications.html)

Amundson, R., J. V. Mills, L. N. Lammers, M. Barthel, N. Gallarotti, J. Six, G. Gebauer, and **G. E. Maurer**. Simultaneous Production and Consumption of Soil N2O Creates Complex Effects on its Stable Isotope Composition. Global Biogeochemical Cycles (2023): e2022GB007536. https://doi.org/10.1029/2022GB007536

Mills, J. V., **G. E. Maurer**, L. N. Lammers, and R. Amundson. 2022. Emergent Climate Change Impacts on the Soil C and N Cycles in the Mojave Desert. *Global Biogeochemical Cycles* 36, no. 9, https://doi.org/10.1029/2021GB007254

Meng, B., J. Li, **G. E. Maurer**, S. Zhong, Y. Yao, X. Yang, S. L. Collins, and W. Sun. 2021. Nitrogen addition amplifies the nonlinear drought response of grassland productivity to extended growing-season droughts. *Ecology* https://doi.org/10.1002/ecy.3483

Hallmark, A. J., **G. E. Maurer**, R. E. Pangle, and M. E. Litvak. 2021. Watching plants' dance: Movements of live and dead branches linked to atmospheric water demand. *Ecosphere*. 12, https://doi.org/10.1002/ecs2.3705

Maurer, G.E., A.J. Hallmark, R.F. Brown, S.L. Collins, O.E. Sala. 2020. Sensitivity of primary production to precipitation across the United States. *Ecology Letters*. https://dx.doi.org/10.1111/ele.13455

Oerter, E.J., J.V. Mills, **G.E. Maurer**, L.N. Lammers, R.G. Amundson. 2018. Greenhouse gas production and transport in desert soils of the southwestern USA. *Global Biogeochemical Cycles*. https://doi.org/10.1029/2018GB006035

Rudgers, J.A., Y.A. Chung, **G.E. Maurer**, D.I. Moore, E.H. Muldavin, Collins, S.L. 2018. Climate sensitivity functions and net primary production: A framework for incorporating changes in climate mean and variability. *Ecology*. https://doi.org/10.1002/ecy.2136

Morillas, L., R.E. Pangle, **G.E. Maurer**, W.T. Pockman, N.G. McDowell, C-W Huang, D.J. Krofcheck, A.M. Fox, R.L. Sinsabaugh, T.A. Rahn, M.E. Litvak. 2017. Tree mortality decreases water availability and ecosystem resilience to drought in piñon-juniper woodlands in the southwestern U.S. *JGR Biogeosciences*. https://doi.org/10.1002/2017JG004095

Biederman, J.A., R.L. Scott, T. Bell, D.R. Bowling, S. Dore, J. Garatuza-Payan, T.E. Kolb, P. Krishnan, D.J. Krofcheck, M.E. Litvak, **G.E. Maurer**, T.P. Meyers, W.C. Oechel, S.A. Papuga, G.E. Ponce-Campos, J.C. Rodriguez, W.K. Smith, R. Vargas, C.J. Watts, E.A. Yepez, M.L. Goulden. 2017. CO_2 exchange and evapotranspiration across dryland ecosystems of southwestern North America. *Global Change Biology*. https://doi.org/10.1111/gcb.13686

Maurer, G.E., A.M. Chan, N.A. Trahan, D.J.P. Moore, and D.R. Bowling. 2016. Carbon isotopic composition of forest soil respiration in the decade following bark beetle and stem girdling disturbances in the Rocky Mountains. *Plant, Cell, & Environment*, 39: 1513–1523. https://doi.org/10.1111/pce.12716

Biederman, J.A., R.L. Scott, M.L. Goulden, R. Vargas, M.E. Litvak, T.E. Kolb, E.A. Yepez, W. C. Oechel, P.D. Blanken, T.W. Bell, J. Garatuza-Payan, **G.E. Maurer**, S. Dore, S.P. Burns. 2016. Terrestrial carbon balance in a drier world: the effects of water availability in southwestern North America. *Global Change Biology*. https://doi.org/10.1111/gcb.13222

Maurer, G.E., and D.R. Bowling. 2014. Dust effects on snowpack melt and related ecosystem processes are secondary to those of forest canopy structure and interannual snowpack variability, *Ecohydrology*, 8: 1005–1023. https://doi.org/10.1002/eco.1558

Hall, S.J., **G.E. Maurer**, S.W. Hoch, R. Taylor, D.R. Bowling. 2014. Impacts of anthropogenic emissions and cold air pools on urban to montane gradients of snowpack ion concentrations in the Wasatch Mountains, Utah. *Atmospheric Environment*, 98: 231–241. https://doi.org/10.1016/j.atmosenv.2014.08.076

Maurer, G.E. and D.R. Bowling. 2014. Seasonal snowpack characteristics influence soil temperature and water content at multiple scales in interior western U.S. mountain ecosystems, *Water Resources Research*, 50: 5216–5234. https://doi.org/10.1002/2013WR014452

Ruess, R.W., R.L. Hendrick, A.J. Burton, K. S. Pregitzer, B. Sveinbjornsson, M.F. Allen, **G.E. Maurer**. 2003. Coupling fine root dynamics with ecosystem carbon cycling in black spruce forests of interior Alaska, *Ecological Monographs*, 74: 643-662. https://doi.org/10.1890/02-4032

Reports and white papers

Gries, C., S. Beaulieu, R.F. Brown, S. Elmendorf, H. Garritt, G. Gastil-Buhl, H. Hsieh, L. Kui, M. Martin, G. Maurer, A.T. Nguyen, J.H. Porter, A. Sapp, M. Servilla, and T.L. Whiteaker. 2021. Data Package Design for Special Cases ver 1. *Environmental Data Initiative*. https://doi.org/10.6073/pasta/9d4c8035 78c3fbcb45fc23f13124d052

Juried conference abstracts

Gries, C., S, Beaulieu, R. Brown, G. Gastil-Buhl, S. Elmendorf, H. Hsieh, L. Kui, G. Maurer, and J. Porter. 2020. Change in Pictures: Creating best practices in archiving ecological imagery for reuse. *Biodiversity Information Science and Standards 4*

Gries, C., R. Brown, M. Gastil-Buhl, S. Elmendorf, H. Garritt, M. Martin, G. Maurer, A. Nguyen, J. Porter, and T. Whiteaker. 2020. Going beyond the spreadsheet-developing Best Practices in 'long-tail' environmental data curation and publishing. *Earth and Space Science Open Archive (ESSOAr)*

Publications in preparation or review

Maurer, G.E., J.V. Mills, E.J. Oerter, R.G. Amundson, L.N. Lammers. Measured and modeled soil carbon cycling in the Mojave desert: toward projected regional greenhouse gas budgets. (in prep)

Maurer, G.E., J.V. Mills, R.G. Amundson, L.N. Lammers. Contrasting climate responses of ecosystem carbon uptake and efflux along seasonal and topographic gradients in the Mojave Desert (in prep)

Maurer, G.E. and D.R. Bowling. Forest soil carbon stocks and isotopic composition along mountain climate gradients of the interior western United States. (in prep for *Ecosystems*)

Public datasets

Hernandez Rosales, B. and G.E. Maurer. 2022. Long-term climate indices (SPEI and scPDSI) derived from monthly meteorology data collected at USHCN stations in the northern Chihuahuan Desert of the United States, 1911-2021 ver 2. *Environmental Data Initiative*. https://doi.org/10.6073/pasta/087795f6fac0f174 397536ab27d50db6

Hernandez Rosales, B. and G.E. Maurer. 2022. Derived SPEI and vapor pressure deficit for 15 NPP study sites on the Jornada Basin, 2013-ongoing ver 1. *Environmental Data Initiative*. https://doi.org/10.6073/ pasta/094b708fcc8bddca273010ddcde3dce1

Maurer, G. E., A. Hallmark, R. F. Brown, O.E. Sala, and S. L. Collins. 2019. Derived data and code for: Sensitivity of primary production to precipitation across the United States (Ecology Letters). *figshare*. https://doi.org/10.6084/m9.figshare.c.4780313.v1

Maurer, G., L. N. Lammers, and R. Amundson. 2019. MojaveCarbon Climosequence. *HydroShare*. http: //www.hydroshare.org/resource/d01662d827f34170a5fd3589e468d06b

Rudgers J., Y. Chung, G. Maurer, D. Moore, E. Muldavin, M. Litvak, S. Collins. 2017. Net primary production (NPP) and climate data from Sevilleta LTER core and control sites in desert grassland and shrubland ecosystems, 1999 - 2017. *Environmental Data Initiative*. https://doi.org/10.6073/pasta/451fe8e98c663c728be3f85d3149e109

Grants and fellowships

NSF (DEB 2326482). "LTREB: Long-term ecosystem responses to directional changes in precipitation amount and variability in an arid grassland," $670,000.00. Co-PI. September 2023-August 2028.

UU Graduate School and Dept. of Biology travel funding (AGU Fall meeting), 2012

ASUU and Dept. of Biology travel funding (AGU Fall Meeting), 2011

UU Global Change and Sustainability Center Research Grant, 2011

NSF Research Experience for Undergraduates (publication above), 1999

Conference activity

Presentations and posters

ESA Annual Meeting 2020 – Systematic variations in the contribution of rainfall-driven soil respiration pulses to soil carbon cycling in North American deserts (Poster)

AGU Fall Meeting 2018 – The contribution of ephemeral, moisture-driven soil respiration pulses to soil carbon cycling in the Mojave Desert (Poster)

AGU Fall Meeting 2017 – Sensitivity and asymmetry of NPP in response to climate variability across the conterminous United States (Talk)

AGU Fall Meeting 2017 – Modeled and measured carbon cycling in Mojave Desert soils: toward present and projected greenhouse gas budgets for arid regions (Poster)

AGU Fall Meeting 2015 – Seasonal precipitation and deep soil moisture recharge as competing drivers of carbon and water fluxes across a gradient of semi-arid ecosystems. (Poster)

AmeriFlux Principal Investigators Meeting 2015 – Seasonal and interannual variability in available water and coupled CO_2, H_2O, and energy fluxes along the New Mexico Elevation Gradient. (Poster)

AGU Fall Meeting 2014 – Soil carbon cycle ^{13}C responses in the decade following bark beetle and stem girdling forest disturbance. (Poster)

AGU Fall Meeting 2013 – Dust and canopy effects on snowpack melt and ecosystem processes in a Utah subalpine forest. (Poster)

Fusion seminar (UU Biology Dept. Fall 2012) – The Weather Underground: The influence of seasonal snowcover on soil temperature and water content in the western U.S. (Talk)

AGU Fall Meeting 2012 – Sensitivity of soil temperature and soil moisture to seasonal snowpack variability in western U.S. mountain ecosystems. (Talk)

AGU Fall Meeting 2011 – Sources of variability in winter soil temperature moderation by mountain snowpacks. (Poster)

AGU Fall Meeting 2010 – Influence of dust deposition on snowpack melt rate and ecohydrological processes in a subalpine forest. (Talk)

Sessions organized

Linking traits, genomes, specimens, and images to LTER data. LTER Network All-Scientists Meeting 2022. Co-organized with Corinna Gries. https://sched.co/1357I

Emerging best-practices for publishing non-tabular, complex, and special-case ecological datasets. ESIP Summer Meeting 2021. Co-organized with Renée Brown and Corinna Gries. https://sched.co/jMPC

Teaching and mentoring

Instructor of record

Microbiology Lab, Biology 2310L, School of Math Science and Engineering, Central New Mexico Community College. Fall 2020 (online/asynchronous).

Biology Lab for Health Science Majors, Biology 1140L, School of Math, Science and Engineering, Central New Mexico Community College. Spring 2020

Microbiology Lab, Biology 2310L, School of Math Science and Engineering, Central New Mexico Community College. Spring 2020 (partial term).

Microbiology Lab, Biology 2192, School of Math Science and Engineering, Central New Mexico Community College. Spring 2019.

Biology Lab for Health Science Majors, Biology 1492, School of Math, Science, and Engineering, Central New Mexico Community College. Fall 2018 (2 sections).

Plant Identification, Red Butte Garden and Arboretum, University of Utah. 2007 & 2008.

Teaching assistant positions at University of Utah, Dept. of Biology:

Evolution and Diversity of Life, Biology 2010, Drs. Lynn Bohs & Franz Goller. Spring 2012

Biophysical Ecology, Biology 5495, Dr. David Bowling. Fall 2011

Ecosystem Ecology, Biology 5490, Dr. David Bowling. Fall 2010

Evolution and Diversity of Life, Biology 2010, Drs. Lynn Bohs & David Carrier. Spring 2010

Comparative Vertebrate Morphology, Biology 3310, Dr. Colleen Farmer. Fall 2009

Evolution and Diversity of Life, Biology 2010, Drs. John Sperry and David Carrier. Spring 2009

Ecosystem Ecology, Biology 5490, Dr. David Bowling. Fall 2008

Plant Ecology, Biology 5460, Dr. James Ehleringer. Fall 2007

Software & Data Carpentry workshops

Working with Ecological Data in R at USDA-ARS Jornada Experimental Range Headquarters (in-person). Organizer and instructor. June 2023

Working with Geospatial Data in R at Jornada Basin LTER and NMSU (online). Organizer and instructor. November 2023

STEM Advancement Program Python workshop at New Mexico EPSCoR (online). Instructor. June 2022

Data carpentry for environmental scientists at Jornada Basin LTER and NMSU (online). Organizer and instructor. March 2022

Data Carpentry for Ecology at UNM Sevilleta Field Station. Instructor. June 2021 and 2022

Students mentored:

2023: Niko Valdez (Jornada LTER REU program)

2022: Kyle Gallant (Sevilleta REU), Brianda Hernandez-Rosales (EDI Data fellow)

2013: Lori Long (Undergraduate student, Univ. of Utah)

2012: Tasha Heilweil (High school student, Univ. of Utah)

2011: Richard Malyn, Davis Unruh (high school student, Univ. of Utah)

2010: Raili Taylor (undergraduate at Univ. of Utah)

Service to profession

Co-chair, LTER Network Information Management Executive Committee **2021-2023** (member 2020-2023)

Associate editor for *Ecological Informatics* **2021-present**

Reviewer for: *BioScience* (1), *Global Change Biology* (2), *Climatic Change* (1), *Ecological Applications* (1), *Oecologia* (1), *Plant Ecology* (2), *Trends in Ecology and Evolution* (1)

NSF Panelist

Full academic and research experience

Data Scientist and LTER Information Manager **May 2019–present**
Jornada Basin Long-term Ecological Research Program, New Mexico State University, Las Cruces, NM

- Manage and publish research data collected by the Jornada Basin LTER program, in collaboration with scientists and data managers in the LTER network. Develop and manage a data science program that will generate new ecological research products, enhance existing investigations, and create analytical applications for scientific outreach.

Part-time Instructor of Biology **August 2018-present**
School of Math, Science, and Engineering, Central New Mexico Community College, Albuquerque, NM

- Teach Biology lab classes to first and second year students at a large, open-enrollment community college.

Postdoctoral Scientist **September 2016–May 2019**
Dept. of Environmental Science, Policy, and Management, Univ. of California Berkeley, Berkeley, CA

- Soil biogeochemistry research combining field measurements and ecosystem process modeling to create regional budgets of CO_2 and other soil trace gas fluxes under climate and land-cover change scenarios in the Mojave desert. Field instrumentation, modeling experiments (using DayCent), data QA and analysis, manuscript preparation.

Independent Contractor: **March 2016–June 2016**
U.S.F.S Rocky Mountain Research Station, Albuquerque, NM

- Literature review contributor in the Southwestern Fire-Climate Partnership.

Postdoctoral Scientist: **August 2014–September 2016**
Department of Biology, University of New Mexico, Albuquerque, NM

- Carbon cycle and ecohydrology research in Southwestern U.S. ecosystems using data from the New Mexico Elevation Gradient cluster of 8 AmeriFlux eddy covariance towers. Data analysis, presentations, and manuscript preparation. Data manager and QA/QC lead for this AmeriFlux cluster.

Research Assistant: **July 2012–June 2014**
Department of Biology, University of Utah, Salt Lake City, UT

- Carbon concentration and stable isotope analysis of soil and soil respiration samples, data analysis, and writing for a DOE funded project on belowground carbon cycling in beetle-impacted sub-alpine forest ecosystems.

Research Assistant: **December 2010–June 2011**
Department of Biology, University of Utah, Salt Lake City, UT

- Method development, field collection, and laboratory analysis (major ions in snow) for a study of winter atmospheric deposition in the Salt Lake City area. Study occurred in collaboration with the Persistent Cold Air Pool study by the UU Dept. of Atmospheric Sciences (Winter 2010–11).

Field Botanist: **Summers 2007 & 2008**
Cottonwood Canyons Foundation, Salt Lake City, UT

- Conducted surveys for threatened, endangered, and sensitive plant species in the central Wasatch Mountains. Coordinated efforts with and provided data to the Uinta-Wasatch-Cache National Forest and Utah Native Plant Society. (Summers only)

Field Botanist: **Summers 2006 & 2007**
Red Butte Garden and Arboretum, Salt Lake City, UT

- Lead collector for Red Butte Garden's team in the Seeds of Success project (BLM/Millenium Seed Bank). Researched native plant species, located populations, then made large seed collections utilizing volunteer assistance. Coordinated efforts with regional botanists and land managers.

GIS Analyst: **October 2006–May 2007**
DIGIT Lab, Department of Geography, University of Utah, Salt Lake City, UT

- Conducted spatial data analysis, GIS application development, and provided technical support for University of Utah Geography Dept. projects and other public or private sector clients. Maintained the University of Utah Spatial Database.

Port Sampler: **June 2004–September 2004**
Marine Resources Program, Oregon Department of Fish and Wildlife, Salem, OR

- Ocean Recreational Boat Survey. Conducted boat counts and interviews with returning fishermen to determine fishing effort, target locations and species, catch and release rates. Inspected catches, collecting hatchery tags and biological data/samples from species of interest. Made weekly reports to Newport office.

Internships

The Nature Conservancy, Conservation GIS intern, Salt Lake City, UT, 2006

Alaska Bird Observatory, Nesting field study intern, Fairbanks, AK, 2001

Volunteer

Wasatch Community Gardens, Salt Lake City, UT, 2010–2014

Lowell-Bennion Community Service Center (Univ. of Utah), 2006–2007

Red Butte Garden and Arboretum, Salt Lake City, UT, 2005–2007

Swaner Nature Preserve, Kimball Junction, UT, 2005

Columbia River Estuary Study Taskforce, Astoria, OR, 2004

Computing skills

(**Bold** indicates proficiency)

Applications: **MS Office**, **QGIS**, **ArcGIS**, LaTeX, PostgreSQL,

Programming: **Python**, **R**, **MATLAB**, JavaScript

Web: **HTML & CSS**, WordPress, website administration

Operating systems: **Unix/Linux**, **Windows**, **Mac OSX**

Other: **git/GitHub**, **literate programming** (jupyter notebooks, RMarkdown), basic sysadmin skills, basic server/cloud provisioning with ansible

Technical, field, and laboratory skills

Plant/soil/ecosystem CO_2 & H_20 exchange measurements (Li-Cor 6200, 6400, 7000, 7200, 7500)

Eddy covariance instrumentation and data QA/QC

Soil hydrological and ecosystem process modeling with HYDRUS and DayCent

Analysis of gridded climate and carbon cycle modeling products (PRISM, MsTMIP)

Stable isotope and nutrient analysis of plants, soils, waters, and gases

CO_2 to graphite reduction for AMS analysis of ^{14}C

Major ion analysis of water/snow samples

Datalogger and environmental sensor network design/maintenance (Esp. with Campbell dataloggers)

Weather station setup, maintenance, and quality assurance

Wireless radio and internet networks (Sierra Wireless modems, MaxStream and Digi Xbee radios)

Plant identification in western North America

Avalanche safety (Level 1)

Professional affiliations

Member, American Geophysical Union (AGU)

Member, Ecological Society of America (ESA)