

# Gregory E. Maurer

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## Research interests

I study biogeochemistry and ecohydrology, particularly the effects of climate, global change, and disturbance on the structure, function, and distribution of terrestrial ecosystems. I use geospatial data, process-based models, micrometeorology, stable isotopes, and other methods with the chief aim of understanding the earth system and informing the management and conservation of its resources.

## Academic positions

*Postdoctoral Scientist: September 2016–present*

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

- *Dissertation*: Ecosystem responses to seasonal snowpack variation in the western United States
- *Committee*: David Bowling (chair), Thure Cerling, James Ehleringer, Thomas Painter, John Sperry

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

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

## Selected coursework:

*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>)

- 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. Yopez, M.L. Goulden. 2017. CO<sub>2</sub> 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. Yopez, 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>

## Publications in preparation or review

- Oerter, E.J., J.V. Mills, **G.E. Maurer**, K. Lynn, L.N. Lammers, R.G. Amundson. Greenhouse gas production and transport in desert soils of the southwestern USA. (submitted to *Global Biogeochemical Cycles*)
- Maurer, G.E., A.J. Hallmark, R.F. Brown, S.L. Collins, O.E. Sala. Sensitivity of NDVI in response to climate variability across the conterminous United States. (in prep)
- 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. 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*)

Maurer, G.E., D.J. Krofcheck, S.L. Collins, M.E. Litvak. Variation and uncertainty in long-term measures of ecosystem carbon balance in Chihuahuan desert grasslands and shrublands (in prep)

## **Presentations**

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<sub>2</sub>, H<sub>2</sub>O, and energy fluxes along the New Mexico Elevation Gradient. (Poster)

AGU Fall Meeting 2014 – Soil carbon cycle <sup>13</sup>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)

## **Reviewer for**

Climatic Change (1), Ecological Applications (1), Oecologia (1), Plant Ecology (2)

## **Research and travel grants**

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

## **Teaching and mentoring**

### **Courses taught**

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

## Teaching assistantships 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

## Undergraduates supervised:

2010: Raili Taylor

2011: Richard Malyn, Davis Unruh (high school student)

2012: Tasha Heilweil (high school student)

2013: Lori Long

## Professional and research positions

### *Postdoctoral Scientist* **September 2016–present**

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<sub>2</sub> 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/Millennium 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.

*Research Assistant: May 2001–October 2001*

Environment and Natural Resources Institute, University of Alaska, Anchorage, AK

- Installed and maintained experimental spruce seedling populations and research equipment at remote timberline field sites. Collected data on root & mycorrhizal activity, nutrient cycling, tree growth, soil processes, and climate.

*Research Assistant: May 1999–January 2001*

Institute of Arctic Biology, University of Alaska, Fairbanks, AK

- Ruess Plant Ecology laboratory. Field and lab support for a multi-year study of belowground carbon and nitrogen cycling in forest ecosystems in Alaska, N.Carolina, and Michigan. Treated study plots, collected samples, measured plant and soil physiological processes at remote field sites. Laboratory processing of samples for nutrient and stable isotope analyses.

## 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**, **ArcGIS**, **L<sup>A</sup>T<sub>E</sub>X**, Qgis

*Programming*: **Python**, **R**, **MATLAB**, Java (plus math, statistics & spatial data packages)

*Web*: **HTML & CSS**, **GitHub**, wiki & website administration

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

*Other*: **git**, **mercurial**, **literate programming** (jupyter notebooks, RMarkdown)

## **Technical, field, and laboratory skills**

Plant/soil/ecosystem CO<sub>2</sub> & H<sub>2</sub>O 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<sub>2</sub> to graphite reduction for AMS analysis of <sup>14</sup>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 Utah and neighboring states

Avalanche safety (Level 1)

## **Professional affiliations**

Member, American Geophysical Union (AGU)

Member, Ecological Society of America (ESA)