Adam Wolf

Princeton University
Ecology and Evolutionary Biology
Princeton, NJ 08544-1003

adamwolf@princeton.edu - 510.207.8303
princeton.edu/~adamwolf

Education

2010 Ph.D., Stanford University
Biological Sciences, Ecology and Evolution Section
Dissertation: *A forward model for data assimilation of forest ecology from remote sensing*
Thesis Advisors, Joseph Berry and Christopher Field

2001 M.Sc., University of California, Davis
Agronomy
Thesis: *Landscape Patterns of SOM, Snow, and Wind Erosion in North Kazakhstan*

2001 M.Sc., University of California, Davis
International Agricultural Development

1997 B.Sc., University of California, Davis
Major: Agricultural Systems and the Environment

Professional Experience

2013+ **Associate Research Scholar, Princeton, Dept of Ecology & Evolutionary Biology**
Steve Pacala. Modeling physiology and forest population structure in respose to drought.

2012+ **Lecturer, Princeton, Dept of Civil and Environmental Engineering**
Kelly Caylor. CEE 474: Design and Construction of Environmental Sensors.

2010 - 2013 **Postdoctoral Research Associate, Princeton, Ecology & Evol Biology**
Steve Pacala. Modeling physiology and forest population structure in respose to drought.

2010 **Postdoctoral Fellow, Carnegie Institution, Dept of Global Ecology**
Chris Field. Developed wireless electronics for environmental monitoring.

2006 – 2010 **Ph.D. Student, Stanford University**
Chris Field and Joe Berry. Remote sensing, land surface modeling, data assimilation.

2005 – 2006 **Research Assistant,** Carnegie Institution, Stanford, CA
Joe Berry. Global atmospheric transport modeling.

2004 – 2005 **Staff Research Associate,** UC Davis, Davis, CA
Johan Six. Model agricultural greenhouse gas emissions in California.

2004 **Russian-English Translator,** World Wildlife Fund, Moscow, Russia
Translated research used in overviews to climate change in Russian national parks.

2003 - 2004 **State Department Title VIII FLAS Fellow.** Moscow & St Petersburg, Russia

2001 – 2003 **Staff Research Associate.** Shortandy, Kazakhstan and Davis, CA.
Setup and operated two mobile eddy covariance towers in a very remote location. Land surface modeling of ecosystem photosynthesis and energy balance.

Grants

National Science Foundation, Macrosystems $600K 2014-2016
"Extreme events and ecological acclimation: Scaling from cells to ecosystems"

Jet Propulsion Laboratory: Strategic University Research Partnership $100K 2014-2015
"Rapid forest triage by sub-canopy micro air vehicle"

Princeton Grand Challenges $200K 2013-2015
"What trees could learn from Alan Greenspan"

National Science Foundation, Rapid $100K 2012-2014
"Using open-source ecology to examine tree physiological response and mortality across species during the 2012 United States drought"

Princeton Chancellor for Research, $75K 2012
"Sensor Development and Assessment for in-situ, Realtime Drought and Crop Monitoring to Enhance Food Security in Africa"

NSF Doctoral Dissertation Improvement Grant (DDIG), $15K 2009
"Dissertation Research: The shadows cast by trees: using allometry, tree-resolving lidar, and ecostem models to inform the global view of forests"

UC Davis Jastro-Shields $5K 2000
"Development of a ^{137}Cs gamma-ray counting facility at Crocker Nuclear Lab"

Teaching

2012+ Primary Lecturer, CEE474: Design and Construction of Environmental Sensors
Civil and Environmental Engineering, Princeton. With Kelly Caylor.

2009 Bio164: Biosphere Atmosphere Interactions, Stanford
Lecturer, lab and modeling instructor, with Chris Field and Joe Berry

2008 Bio117: Global Change, Stanford
Lecturer and teaching assistant, with Peter Vitousek and Kevin Arrigo

2007 Bio164: Biosphere Atmosphere Interactions, Stanford
Lecturer, lab and modeling instructor, with Chris Field and Joe Berry

2007 Bio43: Introductory Plant Biology (Teaching assistant)

Awards

Princeton Environmental Institute Postdoctoral Fellowship 2010-2013
Carnegie Institution - Dept of Global Ecology Postdoctoral Fellowship 2010
Aldo Leopold Leadership Program Graduate Participant 2009
Stanford Center for Russian Eurasian and Eastern European Studies Travel Grant 2007
NASA Earth Systems Science Fellowship 2005-2008
US State Dept Title VIII FLAS Fellowship 2003-2004
USAID GL-CRSP Full scholarship and research assistantship 1999-2001

Student Mentoring

2013+ Princeton Grand Challenges PI. Trained and supervised 6 students in lab, field, and modeling work addressing drought impacts on forest ecosystems. (Caden Ohlwiler, Bethany Sneathen, Sindiso Nyathi, Elliot Chang, Sean Treacy)

2013 Princeton Laboratory Learning program. Trained and supervised high school rising senior conducting plant physiological research in the field and lab. (Jackie Jones)
Press: http://www.princeton.edu/main/news/archive/S37/70/18I36/index.xml

2013 Collective Motion 3.0 workshop for Princeton Engineers Without Borders. Use of Arduino and GSM. *http://ewb.princeton.edu/site/cm*. With Benedetta Piantella.

2012+ Electronics Prototyping and 3D printing. (Ben Siegfried, Jaiye Falusi, Molly O'Connor, Caden Ohlwiler, Sara Guenther, Ghassen Jerfel)

2012 Thesis advisor, Steven Tuozzolo, "Development of an inexpensive and durable disdrometer for use in drought prediction networks".

2010 RISE Mentor (Stanford summer research experience for minority high school students) Taught student GIS to study impacts of climate change on plants. (Myra Espinosa)

Field, Laboratory, and Technical Skills

- Design and implementation of scientific studies in the biogeosciences
- Computer science and coding, using Python, JavaScript, C++, Matlab, Fortran, linux, Arduino/AVR, PHP, HTML, CSS, mySQL, mongoDB, git, Heroku
- Statistics including Markov chain Monte Carlo, Kalman Filter, Maximum likelihood methods, standard and multivariate statistics, experimental design
- Mathematical models, numerical models, simulation models, Earth system models
- Data mining of ecological data, including flux data, forest inventory, floristic collections
- Electronics, circuit board design, environmental sensors, data acquisition
- Remote sensing, GIS, gridded data of all kinds
- Physiological ecology techniques in the field and lab
- Isotopic and nutrient analysis of plants, waters and soils

Popular science writing

Wolf, A. (2008) The Big Thaw (cover story). Stanford Magazine. Sept/Oct.
http://www.stanfordalumni.org/news/magazine/2008/sepoct/features/siberia.html

Language Training

2004 International University, Moscow, Russia

2003 Hertzen Pedagogical University, St Petersburg Russia
as US State Department Title VIII Fellow for Language and Area Studies

2002 Middlebury College, Summer Russian Language School

Press

Makerbot Stories: Taking the Pulse of Climate Change
http://www.makerbot.com/blog/2013/12/05/stories-taking-pulse-climate-change/

Center for Data Innovation: 5 Q's With Ecological Sensing Expert Adam Wolf
http://www.datainnovation.org/2013/10/5-qs-with-ecological-sensing-expert-adam-wolf/

BBC News, Mark Kinver. "Big animal extinction 'severed nutrient arteries'. August 12, 2013.

http://www.bbc.co.uk/news/science-environment-23634801

NBC Nightly News with Brian Williams. "As Siberian permafrost melts, methane seems out." Airdate December 30, 2011. http://video.msnbc.msn.com/nightly-news/45829669

Anonymous. (July 8, 2010). A mammoth effect: Hunting large herbivores may have (slightly) contributed to global warming. The Economist (www.economist.com/node/16537600)

Pala, C. (Oct 28, 2009) Abandoned Soviet farmlands could help offset global warming. Environ. Sci. Technol., Article ASAP (pubs.acs.org/doi/full/10.1021/es903218x)

Invited Talks

Princeton, Ecology & Evolutionary Biology, October 2013
UCLA, Ecology & Evolutionary Biology, February 2013
Bard College, Biology Department, November 2012
Stanford, Lane Center for the American West, 2011
Stanford, Jasper Ridge Biological Preserve, 2008
Stanford, Center for Russian and Eastern European Studies, 2008

Synergistic Activities

Reviewer: Agricultural and Forest Meteorology; Arctic Antarctic and Alpine Research; Biogeosciences; Climatic Change; Ecology; Geophysical Research Letters; Global Change Biology; Global Ecology and Biogeography; Hydrological Processes; Journal of Geophysical Research; Oecologia; PNAS; Remote Sensing of Environment.

Member: American Geophysical Union, Ecological Society of America, American Association for the Advancement of Science, American Meteorological Society

DOE Terrestrial Ecosystem Sciences review panel (2012)

NASA Terrestrial Ecology review panel (2012)

NASA Terrestrial Ecology Program Modeling Working Group (2010 – ongoing)

Session chair (with Kelly Caylor and Justin Sheffield) Postmortem: Drought 2012 (AGU 2013)

Session chair (with Bill Anderegg) B61: Plant Demography and the Carbon Cycle (AGU 2011)

Session chair (with Maoyi Huang) H64: Ecosystem Resilience to Changing Climate Patterns: The Role of Hydrology (AGU 2008)

Session chair (with Maoyi Huang) B10: Ecohydrology and Climate Change (AGU 2007)

Wolf, A. and E.A. Laca (2003) Carbon Credits in Kazakhstan. Global Livestock CRSP brochure for distribution to policy makers in Kazakhstan (In Russian).

Specialized Education and Short Courses

2010 NSF/OTS Workshop, La Selva Biological Station, Costa Rica
"Expanding the frontier in tropical ecology through embedded sensors"
2009 Global Sustainability Workshop, Santa Fe Institute
2008 Laboratoire des Sciences du Climat et de l'Environment, Paris.
Visiting Scientist

2007 Far East Science Station, Cherskii, Russia.
Visiting Scientist
2006 Norwegian Institute for Atmospheric Research, Kjeller, Norway.
Lagrangian atmospheric transport modeling.
2006 NCAR/MSRI graduate seminar Data Assimilation for the Carbon Cycle

Peer reviewed publications

Guan, K., Pan, M., Wolf, A., Li, H., Caylor, K.K., Medvigy, D., Sheffield, J., Wood, E.F., Aloysius, N. (2013) Contrasting photosynthesis cycles reveal geographical differences in global tropical evergreen forests. In Review.

Wolf, A., Lichstein, J.W., Pacala, S.A., Berry, J.A. (2013) Geometric Optics of Closed Forest Canopies. Remote Sensing of Environment, In Revision.

Wolf, A., Anderegg, W.R.L., Zimmermann, N.B., Busby, P., Christensen, J. (2013) California's endemic flora is disproportionately affected by 20th century warming. In Revision.

20. Doughty, C.E., Wolf, A., Malhi, Y. (2103) The impact of large animal extinctions on nutrient fluxes in early river valley civilizations.Ecosphere 4(12):148. http://dx.doi.org/10.1890/ES13-00221.1

19. Doughty, C.E., Wolf, A., Malhi, Y. (2103) The legacy of the Pleistocene megafauna extinctions on nutrient availability in Amazonia. Nature Geosciences doi: 10.1038/ngeo1895
News Coverage: http://www.bbc.co.uk/news/science-environment-23634801
News & Views: http://www.nature.com/ngeo/journal/v6/n9/full/ngeo1932.html

18. Wolf, A., Doughty, C.E., Malhi, Y. (2013) Lateral diffusion of nutrients by mammalian herbivores in terrestrial ecosystems. Plos ONE 8(8): e71352. doi:10.1371/journal.pone.0071352.

17. Berry, J.A., Wolf, A., Campbell, J.E., Baker, B., Blake, N., Blake, D., Denning, A.S., Kawa, S.R., Montzka, S.A., Seibt, U., Stimler, K., Yakir, D., Zhu, Z. (2013) A Coupled Model of the Global Cycles of Carbonyl Sulfide and CO2: A Possible New Window on the Carbon Cycle. JGR-Biogeosciences 118: 1–11, doi:10.1002/jgrg.20068.

16. Guan, K., Wolf, A., Wood, E. F., Medvigy, D., Caylor, K. K. and Pan, M. (2012). Seasonal coupling of canopy structure and function in African tropical forests and their environmental controls. Ecosphere 4 art(35). http://dx.doi.org/10.1890/ES12-00232.1

15. Wolf, Anderegg, Ryan, Christensen, Robust Detection of Species Range Shifts Under Biased Sampling of Herbarium Specimens (2011). Ecosphere, 2:115 doi:10.1890/ES11-00162.1.

14. Wolf, Anderegg. (2011) Comment on Crimmins et al. "Changes in Climatic Water Balance Drive Downhill Shifts in Plant Species' Optimum Elevations". Science, 344:177 doi: 10.1126/science.1204607

13. Wolf, A., Ciais P., Bellassen, V., Field, C.B., Berry, J.A. (2011) Forest biomass allometry in global land surface models. Global Biogeochemical Cycles, v. 25, gb3015, doi:

10.1029/2010gb003917

12. Parazoo, N., Denning, S., Berry, J.A. Wolf, A., Randall, D., Kawa, S.R., Pauluis, O., Doney, S.C.C. (2011) Moist synoptic transport of CO_2 along the mid-latitude storm track. Geophysical Research Letters 38:L09804. DOI:10.1029/2011GL047238

11. Doughty, C., Wolf, A. (2010) Detecting tree-like multicellular life on extrasolar planets. J Astrobiology, 10 (9): 869-879. DOI: 10.1089/ast.2010.0495

    News Coverage:
http://www.universetoday.com/81605/forests-might-be-detectable-on-extrasolar-planets/
http://www.world-science.net/exclusives/101204_trees.htm

10. Dybzinski, R., Farrior, C., Wolf A., Reich P.B., Pacala S.W. (2010). ESS carbon allocation to foliage, wood, and fine roots in trees competing for light and nitrogen: an analytically-tractable, individual-based model and quantitative comparisons to data. The American Naturalist. 117: 153-156.

    Selected by Faculty of 1000: http://f1000.com/8197956

9. Wolf, A., Field, C.B., Berry, J.A. (2010) Allometric growth and allocation in forests: a perspective from Fluxnet. Ecological Applications. doi:10.1890/10-1201.1

8. Moffett, K. B. Wolf, A., Gorelick, S. M. (2009) Salt marsh - atmosphere exchange of energy, water vapor, and carbon dioxide: biophysical controls and effects tidal flooding. Water Resources Research. 46: W10525, doi:10.1029/2009WR009041

7. Doughty, C., Wolf, A, Field, C.B. (2010) Biophysical feedbacks between the mega-fauna extinction and climate: The first human induced global warming. Geophysical Research Letters 37: L15703, doi:10.1029/2010GL04398537.

    News coverage: http://www.economist.com/node/16537600
    Selected as "exceptional" by Faculty of 1000: http://f1000.com/9899956

6. De Gryze, S., Wolf, A., Kaffka, S.R., Mitchell, J., Rolston, D.E., Temple, S.R., Lee, J., Six, J. (2010) Simulating greenhouse gas budgets of four California cropping systems under conventional and alternative management. Ecol App, 20(7): 1805-1819, doi:10.1890/09-0772

5. Wolf, A. Asner, G.P., Berry, J.A. (2010) Allometric constraints on sources of variability in multi-angle reflectance measurements. Remote Sens Env., 114:1205-1219.

4. Vuichard, N., Ciais, P., Wolf, A. (2009) Abandoned Soviet farmlands: a new opportunity for biofuel production? Environ Sci Technol, 43 (22): 8678–8683

    News coverage: http://pubs.acs.org/doi/abs/10.1021/es903218x

3. Wolf, A, and Saliendra, N.Z., Akshalov, K.A., Johnson, D.A., Laca, E.A. (2008) Effects of different eddy covariance correction schemes on energy balance closure and comparisons with the Modified Bowen Ratio system. Ag For Met. 148: 942–952

2. Wolf, A, and E.A. Laca (2007) Cospectral analysis of high frequency signal loss in eddy covariance measurements. Atm Chem Phys Disc, ACPD-2007-0323

1. Wolf, A., Akshalov, K.A., Saliendra N.Z, Johnson D., Laca E.A. (2006). Inverse Estimation of LAI, Vc_{max}, and the Ball-Berry Parameter from carbon and water flux measurements. J. Geophys Res. vol 111, D08S08

Conference Abstracts

Wolf, A., Weng, E., Shevliakova, E., Malyshev, S., Pacala, S. (2013). Implementation of diverse tree hydraulics in a land surface model. AGU Fall Meeting, San Francisco.

Gerlein, C., Wolf, A., Caylor, K.K. (2013) Stable isotopes in plant physiology: using water isotopes to study water fluxes in a temperate forest. AGU Fall meeting, San Francisco.

Wolf, A., Caylor, K.K. (2013) Drought prediction and ecological monitoring with the Internet of Things. O'Reilly Strata Conference: Making Data Work. New York.

Siegfried, B. Wolf, A., Caylor, K.K., Sheffield, J., Wood, E.F., Gosset, M., Cazanave, F. (2013). Development and field deployment of real-time precipitation sensors using cell-phone communications. 11th International Precipitation Conference, Wageningen University, Netherlands.

Wolf, A., Siegfried, B., O'Connor, M., Caylor, K.K. (2013). PULSE: The Princeton Low-cost Sensor Effort. Wireless Intelligent Sensor Networks (Wisenet), Duke University.

Herrera Estrada, J.E., Wolf, A., Chaney, N., Sheffield, J. (2013). Network design for the deployment of wireless low-cost sensors for drought monitoring. Wireless Intelligent Sensor Networks (Wisenet), Duke University.

Guan, K., Estes, L., Wolf, A., Caylor, K.K., Pan, M., Oudemans, P., Lathrop, R. (2013) High-resolution ecosystem monitoring in both time and space by Unmanned Aerial Vehicle (UAV) based sensing system. Am Soc Photogrammetry and Remote Sensing Annual Meeting, Baltimore.

Wolf, A, Falusi, J., Caylor, K.K., Sheffield, J., Wood, E.F. (2012) A GSM-based surface meteorology network in service of improved African hydrological data assimilation and drought forecasting. AGU Fall Meeting, San Francisco (Oral Session).

Wolf, A., Anderegg, W.R.L., Busby, P.E., Zimmerman, N., Christensen, J. (2012) Widespread plant movement in response to 20th century warming disproportionately affects endemic species. Ecological Society of America Annual Meeting, Portland.

Wolf, A. (2011). Alice in the Golden State: Chasing the elusive *Regina rubra*. Lane Center for the American West workshop on environmental visualization. Stanford CA.

Wolf, A. (2011) A small device for monitoring thermal sensitivity of individual tree crowns. AGU Fall Meeting, San Francisco

Berry, J.A., Wolf A. (2010) Implementation of Forest Allometry in models of carbon cycle processes and reflectance properties of forest canopies: First steps toward a system for data assimilation of the carbon cycle at regional and continental scales. AGU Fall Meeting, San Francisco (Invited, Oral Session).

Wolf, A., Berry, J.A., Asner, G.P. (2010) Data Assimilation of Forest Ecology from Modis Parallax. NASA Terrestrial Ecology team meeting. San Diego, CA.

Wolf, A., Berry, J.A. (2009) Allometry in global models: an important reality check on the growth and biomass of forests. AGU Fall Meeting, San Francisco (Oral session).

Wolf, A., Berry, J.A., Asner, G.P. (2008) Allometric constraints to inversion of canopy structure from remote sensing. AGU Fall Meeting, San Francisco (Oral Session).

Berry, J.A. et al. (2008) Constraining the Terrestrial Carbon Cycle With Atmospheric Measurements of Carbonyl Sulfide. AGU Fall Meeting, San Francisco.

Berry et al. (2008) Analyzing Gross Primary Production and Respiration of Terrestrial Ecosystems Using a Global Carbon Cycle Model That Includes Carbonyl Sulfide. NASA Carbon Cycle and Ecosystems meeting, Adelphi MD.

Wolf, A., Berry, J.A., Asner, G.P. (2008) Sequential data assimilation of canopy attributes from multispectral bidirectional reflectance. NASA Carbon Cycle and Ecosystems meeting, Adelphi MD.

Wolf, A., Berry, J.A., Asner, G.P. (2008) Sequential data assimilation of canopy attributes from multispectral bidirectional reflectance. EGU Spring Meeting, Vienna.

Wolf, A., I. Baker, J.A. Berry et al. (2008) Testing of a global carbon cycle model that includes Carbonyl Sulfide (COS). European Geophysical Union General Meeting, Vienna, Austria.

Wolf, A., Hirsch A., Helliker, B., Stohl, A., Berry, J. (2007) Making use of surface layer and ABL concentration measurements for regional flux analysis. NACP meeting, Boulder CO.

Wolf, A. (2007) Major hypotheses for Eurasian hydrologic change. IARC expert workshop on Eurasian hydrologic change. Fairbanks, AK.

Wolf, A. (2006). A contrary view of energy balance non-closure in eddy covariance: loss of heat flux in the high frequency cospectrum. American Geophysical Union Fall Meeting, San Francisco CA.

Wolf, A., B. Helliker, J.A. Berry (2005). Estimating Mean Boundary Layer Turnover from Radon Concentration to Retrieve Surface Fluxes of CO_2. International Carbon Dioxide Conference, Boulder CO.

Wolf, A., J.W. Six, D. Rolston, J. Mitchell, J. Hopmans, R. Howitt (2005) Adapting Century and DNDC for California. Kearney Foundation of Soil Science Annual Meeting, Davis CA.

Wolf, A., J.W. Six, D. Rolston (2005). Spanning the Experimental Divide: Using Data at Multiple Spatial Scales to Better Constrain Gas Exchange Models. Third USDA Symposium on Greenhouse Gases & Carbon Sequestration in Agriculture and Forestry, Baltimore MD.

Berry, J.A. and A. Wolf (2004) Stomatal Conductance in Boreal Forest Species: Do Species Differ and Does it Matter? American Geophysical Union Fall Meeting, San Francisco CA.

Wolf, A. (2004) Inverse Estimation of LAI, Vc_{max}, and the Ball-Berry Parameter from carbon and water flux measurements. American Geophysical Union Fall Meeting, San Francisco CA.

Wolf, A. (2001) Равнина ли Целина? (*Is Kazakhstan flat?*) Wind erosion after the Virgin Lands Campaign. Global Livestock Collaborative Research Support Program Annual Meeting, Sierra de Manatlan, Jalisco Mexico