

## **WILLIAM KOLBY SMITH**

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### **EDUCATION**

- 2009–2013** Ph.D., Department of Ecosystem and Conservation Sciences, University of Montana
- 2006–2008** M.S., Natural Resource and Ecology Laboratory, Colorado State University
- 2000–2005** B.S. (Distinction and Honors), Applied Mathematics and Biology, Western Carolina University

### **PROFESSIONAL EXPERIENCE**

- 2016–Present** Assistant Professor, School of Natural Resources and the Environment, University of Arizona, Tucson, AZ
- 2014–2016** Luc Hoffmann Postdoctoral Fellow, World Wildlife Fund, University of Minnesota, St. Paul, MN
- 2013–2014** Postdoctoral Research Associate, U.S. Geological Survey, University of Montana, Missoula, MT

### **PUBLICATONS**

#### **2016**

25. Liu, Y., Piao, S., Xu, L., Ciais, P., **Smith, W.K.** Seasonal responses of terrestrial carbon cycle to climate variation in the CMIP5 models: evaluation and projection. *Journal of Climate* (submitted).
24. Ballantyne, A.P., **Smith, W.K.**, Anderegg, W.R.L., et al. Accelerating net terrestrial carbon uptake during the warming hiatus due to reduced respiration. *Nature Climate Change* (in revision).
23. Wang, J., Dong, J., Yu, G., Wang, S., Li, G., Yi, Y., Lu, G., Li, Y., Zhang, F., Oyler, J., **Smith, W.K.**, Zhao, M., Liu, J., Running, S.W. Carbon uptake responses to climate change in China. *Journal of Geophysical Research – Biogeosciences* (in revision).
22. **Smith, W.K.**, Reed, S.C., Ballantyne A.P., Cleveland, C.C., Anderegg, W.R.L., Wieder W.R., Running, S.W. Reply to 'Satellite based estimates underestimate the effect of CO2 fertilization on NPP'. *Nature Climate Change* (in revision).

21. Ahrestani, F.S., **Smith, W.K.**, Hebblewhite, M., Running, S.W., Post, E. Density dependence and population stability at the species distribution scale. *Ecology* (*accepted*).
20. **Smith, W.K.**, Reed, S.C., Ballantyne A.P., Cleveland, C.C., Anderegg, W.R.L., Wieder W.R., Running, S.W. **2016**. Large divergence of satellite and Earth system model estimates of global terrestrial CO<sub>2</sub> fertilization. *Nature Climate Change* 6, 306–310.

**Press:** [Yahoo! News](#), [Discovery News](#), [Conservationist Magazine](#), [University of Minnesota](#)

## 2015

19. Anderegg, W.R.L., Ballantyne, A.P., **Smith, W.K.**, Majkut, J., Rabin, S., Kauppi, P., Beaulieu, C., Birdsey, R., Dunne, J., Houghton, R., Myneni, R., Pan, Y., Sarmiento, J., Serota, N., Shevliakova, E., Tans, P., Pacala, S. **2015**. Sensitivity of respiration to tropical nighttime warming drives increasing variability in the terrestrial carbon sink. *Proceedings of the National Academy of Sciences of the USA* 112, 15591–6.

**Press:** [Washington Post](#), [Princeton Journal Watch](#)

18. Wieder, W.R., Cleveland, C.C., **Smith, W.K.**, Todd-Brown, K. **2015**. Land unlikely to become large carbon source-Response. *Nature Geoscience* 8, 893–894.
17. Cleveland, C.C., Taylor, P., Chadwick, D.K., Dahlin, K., Doughty, C.E., Malhi, Y., **Smith, W.K.**, Sullivan, B.W., Wieder, W.R., Townsend, A.R. **2015**. An inter-comparison of plot-scale, satellite and earth system model estimates of tropical net primary production. *Global Biogeochemical Cycles* 29, 626–644.
16. Allred, B.W., **Smith, W.K.**, Twidwell, D., Haggerty, J.H., Running, S.W., Naugle, D.E., Fuhlenforf, S.D. **2015**. Ecosystem services lost to oil and gas in North America. *Science*, 328, 401–403.

**Press:** [Science](#), [High Country News](#), [Discovery](#), [Think Progress](#), [Conservation Magazine](#), [Calgary Herald](#), [Scientific American](#), [Ecologist](#), [Climate Central](#).

15. Wieder, W.R., Cleveland, C.C., **Smith, W.K.**, Todd-Brown, K. **2015**. Nutrient availability strongly constrains future terrestrial productivity and carbon storage. *Nature Geoscience* 8, 441–444.

**Press:** [Science](#), [Carbon Brief](#), [Nature World News](#).

14. Cavaleri, M.A., Reed, S.C., **Smith, W.K.**, Wood, T.E. **2015**. Urgent need for warming experiments in tropical forests. *Global Change Biology*, DOI: 10.1111/gcb.12860.

## 2014

13. Small, E.E., Larson K.M, **Smith, W.K.** **2014**. Normalized Microwave Reflectance Index: Validation of Water Content Estimates from Montana Grasslands. *IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing* DOI:

10.1109/JSTARS.2014.2320597.

12. Sullivan, B.W., **Smith, W.K.**, Nasto, M.K., Reed, S.C., Townsend, A.R., Chazdon, R., Cleveland, C.C. **2014**. Spatially robust estimates of biological nitrogen (N) fixation imply substantial human alteration of the tropical N cycle. *Proceedings of the National Academy of Sciences of the USA* 111, 8101-8106.
11. Hurley, M.A., Hebblewhite, M., Gaillard, J., Dray, S., Taylor, K.A., **Smith, W.K.**, Zager, P., Bonenfant, C. **2014**. Functional analysis of NDVI curves reveals overwinter mule deer survival is driven by both spring and fall phenology. *Philosophical Transactions of the Royal Society B* 369, 20130196.
10. Wang, J., Dong, J., Liu, J., Huang, M., Li, G., Running, S.W., **Smith, W.K.**, Harris, W., Fujinuma, Y., Kondo, H., Lui, Y., Hirano, T., Gamo, M., Xiao, X. **2014**. Comparison of Gross Primary Productivity Estimates derived from GIMMS NDVI3g, GIMMS, and MODIS in Southeast Asia. *Remote Sensing* 6, 2108-2133.
9. **Smith, W.K.**, Cleveland, C.C., Reed, S.C., Running, S.W. **2014**. Agricultural conversion without external water and nutrient inputs reduces terrestrial vegetation productivity. *Geophysical Research Letters* 41, 449-455.

Press: [Nature Geoscience](#).

### 2013

8. Haberl, H., Erb, K.H., Krausmann, F., Running, S.W., Searchinger, T.D., **Smith, W.K.** **2013**. Bioenergy: how much can we expect for 2050? *Environmental Research Letters* 8, 031004.
7. Cleveland, C.C., Houlton, B.Z., **Smith, W.K.**, Marklein, A.R., Reed, S.C., Parton, W.J., Del Grosso, S.J., Running, S.W. **2013**. Patterns of new versus recycled primary production in the terrestrial biosphere. *Proceedings of the National Academy of Sciences of the USA* 110, 12733-12737.

### 2012

6. Running, S.W., **Smith, W.K.** **2012**. Pushing the Planetary Boundaries-Response. *Science* 338, 1420-1420.
5. **Smith, W.K.**, Zhao, M., Running, S.W. **2012**. Global bioenergy capacity as constrained by observed biospheric productivity rates. *BioScience* 62, 911-922.

Press Coverage: [BioScience](#), [Science](#).

4. **Smith, W.K.**, Cleveland, C.C., Reed, S.C., Miller, N.L., Running, S.W. **2012**. Bioenergy potential of the United States constrained by satellite observations of existing productivity. *Environmental Science & Technology* 46, 3536-3544.

Press Coverage: [Frontiers in Ecology and the Environment](#), [American Chemical Society \(podcast\)](#), [Conservation Magazine](#), [Ethanol Producer Magazine](#), [Renewable Energy Magazine](#), [The Futurist Magazine](#).

3. Rout, M.E., Chrzanowski, T.H., **Smith, W.K.**, Gough L. **2012**. Ecological impacts of the invasive grass *Sorghum halepense* on native tallgrass prairie. *Biological Invasions* 15, 327-339.

## 2009-2011

2. **Smith, W.K.**, Gao, W., Steltzer, H., Wallenstein, M.D., Tree, R. **2010**. Moisture availability influences the effect of ultraviolet-B radiation on leaf litter decomposition. *Global Change Biology* 16, 484-495.
1. **Smith, W.K.**, Gao, W., Steltzer, H. **2009**. Current and future impacts of ultraviolet radiation on the terrestrial carbon balance. *Frontiers of Earth Science* 3, 34-41.

## FELLOWSHIPS, SCHOLARSHIPS, AWARDS, AND GRANTS

<b>2015</b>	<b>Grant</b>	Assessing the Business Case for Supporting Commodity Standards. Carlson School of Management Sustainability Research Grant, University of Minnesota (\$35,000)
<b>2014</b>	<b>Fellowship</b>	Luc Hoffmann Postdoctoral Fellowship, Luc Hoffmann Institute, World Wildlife Fund (\$250,000).
<b>2012</b>	<b>Award</b>	Bertha Morton Scholarship (95 <sup>th</sup> percentile in graduate performance, research, and academics). University of Montana (\$3,000).
<b>2012</b>	<b>Award</b>	Outstanding Student Paper Award (Oral Presentation). Hydrology Section, American Geophysical Union Fall Meeting, San Francisco, CA.
<b>2012</b>	<b>Award</b>	Outstanding Graduate Student Performance Award (Oral Presentation). 11 <sup>th</sup> Annual University of Montana Student and Faculty Research Conference, University of Montana.
<b>2010</b>	<b>Award</b>	Outstanding Graduate Student Performance Award (Poster Presentation), 9 <sup>th</sup> Annual University of Montana Student and Faculty Research Conference, University of Montana.
<b>2007</b>	<b>Grant</b>	Francis-Clark Thesis Improvement Grant, Colorado State University (\$5,000).
<b>2000</b>	<b>Scholarship</b>	Founder's Full-Tuition Scholarship, Western Carolina University (\$25,000).

## RESEARCH EXPERIENCE

<b>2016</b>	<b>DroughtNet</b>	Workshop: Utilizing ongoing experiments to understand terrestrial ecosystem sensitivity to precipitation change and drought. Seville National Wildlife Refuge, Socorro, NM.
<b>2016</b>	<b>INTERFACE</b>	Workshop: Frontiers in terrestrial climate feedbacks: Integrating models and experiments to explore climate feedbacks in a managed and warming world. St. Bert's Beach, FL.

<b>2015</b>	<b>ISEAL Alliance</b>	Workshop: Improving understanding of the potential global impacts of agricultural sustainability standards. London, UK.
<b>2015</b>	<b>World Wildlife Fund / The Coca-Cola Company</b>	Workshop: Valuing nature team meeting on meeting 2020 sustainability targets. Coca-Cola Corporate Offices, Atlanta, GA.
<b>2015</b>	<b>NCEAS / SNAP</b>	Workshop: Making ecosystem services count in the Sustainable Development Goals. National Center for Ecological Analysis and Synthesis, Santa Barbara, CA.
<b>2015</b>	<b>The Barefoot Thinking Company</b>	Intensive course on the development of leadership, communication, and innovation skills. National Conservation Training Center, Shepherdstown, WV.
<b>2014</b>	<b>Luc Hoffmann Institute</b>	Workshop: assessing sustainable commodity standards. Institute on the Environment, University of Minnesota, MN.
<b>2014</b>	<b>NCEAS</b>	Working group: Revisiting nutrient limitation in tropical forests II. National Center for Ecological Analysis and Synthesis, Santa Barbara, CA.
<b>2014</b>	<b>USGS Powell Center</b>	Working group: Integrating modeling and empirical approaches to improve predictions of tropical forest responses to global warming. Fort Collins, CO.
<b>2013</b>	<b>NCEAS</b>	Working group: Revisiting nutrient limitation in tropical forests I. National Center for Ecological Analysis and Synthesis, Santa Barbara, CA.
<b>2013</b>	<b>NASA</b>	Workshop: Biodiversity and Ecological Forecasting Team Meeting. Washington, DC.
<b>2012</b>	<b>ESA</b>	Panel member: SS20 Global Environmental Challenges. ESA annual meeting, Portland, OR.
<b>2009</b>	<b>Energy Biosciences Institute</b>	Research retreat: Evaluation of US Bioenergy policy. University of Illinois, IL.
<b>2009</b>	<b>Numerical Terradynamic Simulation Group</b>	4 <sup>th</sup> global vegetation workshop: current progress and advances in satellite remote sensing of terrestrial ecosystems. University of Montana, MT.
<b>2008</b>	<b>University of Colorado</b>	The 1 <sup>st</sup> annual flux course for early career scientists studying land-atmosphere interactions. University of Colorado Mountain Research Station, Boulder, CO.
<b>2002-2005</b>	<b>Wake Forest University</b>	Undergraduate research assistant, Biology.
<b>2002-</b>	<b>Western Carolina</b>	Undergraduate research assistant, Mathematics.

**2005**            **University**

## **TEACHING EXPERIENCE**

- 2014**    Guest lecturer, Systems Ecology (NRM532), University of Montana.
- 2013**    Guest lecturer, Forest Ecosystem Analysis (FOR532), University of Montana.
- 2011-2013**    Lead lecturer, Introduction to Climate Change Studies (CCS203), University of Montana.
- 2010-2011**    Teaching Assistant, Introduction to Climate Change Studies (CCS203), University of Montana.
- 2008**    Supervised college teaching, Colorado State University.
- 2001-2005**    Undergraduate mathematics tutor, Western Carolina University.

## **PRESENTATIONS (\* Invited)**

- 2016\***    **Smith, W.K.** Satellite observed trends in terrestrial vegetation dynamics. Carlton College, Northfield, Minnesota.
- 2016\***    **Smith, W.K.** Using remote sensing to assess vegetation dynamics and climate feedbacks in a warming and increasingly managed world. University of Arizona, Tucson, Arizona.
- 2016\***    **Smith, W.K.** Using remote sensing to assess vegetation dynamics and climate feedbacks in a warming and increasingly managed world. University of Nevada-Reno, Reno, Nevada.
- 2016\***    **Smith, W.K.** Integrating remote sensing, experiments, and models, to explore climate feedbacks. INTERFACE workshop. Frontiers in terrestrial climate feedbacks: Integrating models and experiments to explore climate feedbacks in a managed and warming world. St. Bert's Beach, Florida.
- 2015**    **Smith, W.K.**, Pennington D., Gerber, J., West, P., Polasky, S. Can sustainability standards promote win-win opportunities? An exploration of the potential outcomes of large-scale compliance with Bonsucro sustainability standards. Organized oral session. Ecological Society of America annual meeting, Baltimore, MD.
- 2015**    **Smith, W.K.**, Pennington D., Gerber, J., West, P., Polasky, S. Large-scale compliance with sugarcane sustainability standards leads to mixed conservation outcomes. International Congress of Conservation Biology, Monpellier, France.
- 2014\***    **Smith, W.K.** Global terrestrial vegetation growth and the limits to sustainable bioenergy production. Global Challenges: Achieving Sustainability. Sustainability Science Congress, International Alliance of Research Universities, Copenhagen, Denmark.
- 2014\***    **Smith, W.K.** Global scale constraints to the human appropriation of net primary production. Department of Global Ecology. Carnegie Institute for Science, Stanford, CA.
- 2013**    **Smith, W.K.**, Cleveland, C.C., Reed, S.C., Running, S.W. Agricultural

- conversion without external water and nutrient inputs reduces biospheric vegetation productivity. GC43. Future land use change and climate III (poster). American Geophysical Union annual meeting, San Francisco, CA.
- 2013** **Smith, W.K.**, Cleveland, C.C., Reed, S.C., Miller, N.L., Running, S.W. Estimating the bioenergy potential of the United States using satellite observations of vegetation productivity (poster). North American Carbon Program All-Investigators annual meeting, Albuquerque, NM.
- 2012\*** **Smith, W.K.**, Zhao, M., Running, S.W. Satellite observations of vegetation productivity provide new insight into United States bioenergy targets. H51O. Trade-Offs Among Water, Land, and Energy for Sustainable Biofuel Production I. American Geophysical Union annual meeting, San Francisco, CA.
- 2012** **Smith, W.K.**, Cleveland, C.C., Reed, S.C., Miller, N.L., Running, S.W. Bioenergy potential of the United States constrained by satellite observations of existing productivity. Contributed oral session. Ecological Society of America annual meeting, Portland, OR.
- 2012** **Smith, W.K.**, Zhao, M., Running, S.W. Bioenergy potential of the United States constrained by satellite observations of existing productivity. 11th Annual Graduate Student & Faculty Research Conference, University of Montana, MT. (*Outstanding Graduate Student Performance Award*).
- 2011** **Smith, W.K.**, Zhao, M., Running, S.W. Global bioenergy capacity as constrained by observed biospheric productivity rates. H11M. Water and Energy Footprints in the Anthropocene I. American Geophysical Union annual meeting, San Francisco, CA. (*Outstanding Student Paper Award*)
- 2011** **Smith, W.K.**, Zhao, M., Running, S.W. Global bioenergy capacity as constrained by observed biospheric productivity rates. 10th Annual Graduate Student & Faculty Research Conference, University of Montana, MT.
- 2010** **Smith, W.K.**, Zhao, M., Running, S.W. A MODIS-based assessment of global bioenergy potential (poster). 9th Annual Graduate Student & Faculty Research Conference, University of Montana, MT (*Outstanding Graduate Student Performance Award*).
- 2009\*** **Smith, W.K.**, Gao, W., Steltzer, H., Wallenstein, M.D., Tree, R. Moisture availability influences the effect of ultraviolet-B radiation on leaf litter decomposition. Organized oral session. Ecological Society of America annual meeting, Albuquerque, NM.
- 2008** **Smith, W.K.**, Gao, W., Steltzer, H., Wallenstein, M.D., Tree, R. Effects of ultraviolet-B radiation and precipitation frequency on aspen litter decomposition (poster). Mountain Climate Research Conference annual meeting, Silverton, CO.

## SCIENCE COMMUNICATION

[Luc Hoffmann Institute Blog](#) (Founding Contributor):

- [Oil and gas extraction drives ecosystem loss in North America](#)
- [Does More Atmospheric Carbon Mean Bigger Plants?](#)

[Institute on the Environment Blog](#):

- [Oil and gas extraction drives ecosystem loss](#)
- [Plants' ability to absorb CO2 limited](#)

[Early Career Ecologists Blog](#) (Founding Contributor):

- [Biofuel, food production, & climate change: Where does current energy policy position the United States?](#)
- [Forty years after "The Limits to Growth": A focus on global food production](#)

## **JOURNAL REFEREE**

*BioResources (1); Ecological Applications (2); Ecological Modeling (1); Global Change Biology (2); Geophysical Research Letters (1); Plant, Cell & Environment (1); Remote Sensing (2); Landscape Ecology (1); Land (2); Ecological Indicators (1); Frontiers in Ecology and the Environment (1); Scientific Reports (1); Regional Environmental Change (1); Nature Ecology & Evolution (1)*

## **PROFESSIONAL MEMBERSHIPS**

American Geophysical Union, Ecological Society of America, Society for Conservation Biology, American Association for the Advancement of Science