CHRISTOPHER R SCHWALM

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APPOINTMENTS

Assistant Research Professor, *School of Earth Sciences and Environmental Sustainability, Northern Arizona University*	**09/2011 – present**
Research Fellow, *Graduate School of Geography, Clark University*	**08/2008 – 08/2011**
Research Scientist, *Minnesota Department of Natural Resources*	**04/2006 – 03/2009**
Research Fellow, *Biometeorology Group, University of British Columbia*	**06/2004 – 06/2006**
Junior Scientist, *Department of Forest Resources, University of Minnesota*	**06/2003 – 05/2004**
Research Assistant, *Department of Forest Resources, University of Minnesota*	**09/1998 – 05/2003**
Research Assistant, *School of Forestry, University of Montana*	**09/1995 – 09/1997**

EDUCATION

Ph.D. Natural Resources Science and Management, 2003, University of Minnesota, St. Paul, MN 55108.
M.S. Forest Conservation, 1997, University of Montana, Missoula, MT 59812.
B.A. German & Political Science, 1992, Cleveland State University, Cleveland, OH 44115.

PUBLICATIONS

1. **Schwalm CR**, Huntzinger DN, Cook RB et al. (2014) A model–data intercomparison of simulated runoff in the contiguous United States: results from the North America Carbon Regional and Continental Interim-Synthesis. *Biogeosciences Discuss.*, 11(1), 1801-1826.
2. Poco J, Dasgupta A, Wei Y, Hargrove W, **Schwalm CR** et al. (2014) SimilarityExplorer: A Visual Inter-Comparison Tool for Multifaceted Climate Data. *Eurographics Conference on Visualization (EuroVis),* 33(3).
3. **Schwalm CR**, Huntzinger DN, Michalak AM et al. (2013) Sensitivity of inferred climate model skill to evaluation decisions: A case study using CMIP5 evapotranspiration. *Environ. Res. Lett.,* 8 024028, doi:10.1088/1748-9326/8/2/024028.
4. Huntzinger DN, **Schwalm CR**, Michalak AM et al. (2013) The North American Carbon Program Multi-scale synthesis and Terrestrial Model Intercomparison Project – Part 1: Overview and experimental design. *Geosci. Model Dev.,* 6, 2121-2133, doi:10.5194/gmd-6-2121-2013.
5. Stoy PC, Dietze M, Richardson AD, … , **Schwalm CR** et al (2013) Evaluating the agreement between measurements and models of net ecosystem exchange at different times and time scales using wavelet coherence: an example using data from the North American Carbon Program Site-Level Interim Synthesis. *Biogeosciences,* 10, 6893-6909, doi:10.5194/bg-10-6893-2013.
6. Wei Y, Liu S, Huntzinger, DN, … , **Schwalm CR** et al. (2013) The North American Carbon Program Multi-scale Synthesis and Terrestrial Model Intercomparison Project – Part 2: Environmental driver data. *Geosci. Model Dev. Discuss.*, 6, 5375-5422, doi:10.5194/gmdd-6-5375-2013.
7. Liu Z, Bambha RP, Pinto J, … , **Schwalm CR** et al. (2013) Toward verifying fossil fuel CO2 emissions with the Community Multi-scale Air Quality (CMAQ) model: motivation, model description and initial simulation, *Journal of Air and Waste Management Association*, 64 (4), 419-435, doi:10.1080/10962247.2013.816642.
8. **Schwalm CR**, Williams CA, Schaefer K, Baldocchi D, Black TA, Goldstein AH, Law BE, Oechel WC, Paw U KT, Scott RL (2012) Reduction in carbon uptake during turn of the century drought in western North America. *Nature Geosci.*, 5, 551-556, doi:10.1038/ngeo1529.
9. Luo YQ, Randerson J, Abramowitz G, … , **Schwalm CR** et al. (2012) A framework of benchmarking land models. *Biogeosciences,* 9, 3857-3874, doi:10.5194/bg-9-3857-2012.
10. Schaefer KM, **Schwalm CR**, Williams CA. et al. (2012) A model-data comparison of gross primary productivity: Results from the North American Carbon Program site synthesis. *J. Geophys. Res.*, 117, G03010, doi:10.1029/2012JG001960.

11. Williams CA, Reichstein M, Buchmann N, … , **Schwalm CR** et al. (2012) Climate and vegetation controls on the surface water balance: Synthesis of evapotranspiration measured across a global network of flux towers. *Water Resour. Res.*, 48, W06523, doi:10.1029/2011WR011586.
12. **Schwalm CR**, Williams CA, Schaefer KM (2011) Carbon consequences of global hydrologic change, 1948–2009. *J. Geophys. Res.*, 116, G03042, doi:10.1029/2011JG001674.
13. **Schwalm CR**, Williams CA, Schaefer K et al. (2011) Does terrestrial drought explain global CO_2 flux anomalies induced by El Niño? *Biogeosciences.*, 8, 1-14, doi:10.5194/bg-8-1-2011.
14. **Schwalm CR**, Williams CA, Schaefer K et al. (2010) A model-data intercomparison of CO_2 exchange across North America: Results from the North American Carbon Program site synthesis. *J. Geophys. Res.*, 115, G00H05, doi:10.1029/2009JG001229.
15. **Schwalm CR** (2009) Forest harvest levels in Minnesota - Effects of selected forest management practices on sustained timber yields. Staff Paper Series No. 204, Department of Forest Resources, College of Food, Agricultural, and Natural Resource Sciences, University of Minnesota, 49pp.
16. **Schwalm CR**, Williams CA, Schaefer K et al. (2009) Assimilation exceeds respiration sensitivity to drought: A FLUXNET synthesis. *Global Change Biology*, 16, 657-670.
17. Hilker T, Coops NC, **Schwalm CR** et al. (2008) Effects of mutual shading of tree crowns on prediction of photosynthetic light use efficiency in a Coastal Douglas Fir Forest. *Tree Physiology*, 28, 825-834.
18. **Schwalm CR**, Black TA, Morgenstern K, Humphreys ER (2007) A method for deriving net primary productivity and component respiratory fluxes from tower-based EC data: a case study using a 17-year data record from a Douglas-fir chronosequence. *Global Change Biology*, 13, 370-385.
19. **Schwalm CR,** Black TA, Amiro BD et al. (2006) Photosynthetic light use efficiency of three biomes across an east-west continental-scale transect in Canada. *Agricultural and Forest Meteorology*, 140, 269-286.
20. **Schwalm CR**, Ek AR (2004) A process-based model of forests ecosystems driven by meteorology. *Ecological Modelling*, 179, 317-348.
21. **Schwalm CR**, Ek AR (2003) Developing the next generation of forest ecosystem models In: McRoberts RE, Reams GA, Van Deusen PC, Moser JW (eds), Proceedings of the Third Annual Forest Inventory and Analysis Symposium; Gen. Tech. Rep. NC-230. St. Paul, MN: USDA, Forest Service, North Central Research Station: 130-136.
22. **Schwalm CR**, Milner KS (2002) Stand responses following partial cutting. *Western Journal of Applied Forestry*, 17, 31-36.
23. **Schwalm CR**, Ek AR (2001) Climate change and site: relevant mechanisms and modeling techniques. *Forest Ecology and Management*, 150, 241-258.

CURRENT FUNDING

1. **NASA Terrestrial Ecology, August 2012 – July 2015, $437,165:** *Using observations to assess the sensitivity of land-atmosphere carbon exchange to climate variability*. Christopher Schwalm (PI).
2. **NASA Carbon Monitoring System, Sept. 2012 – Oct. 2014, $497,179:** *Reducing flux uncertainty in the CMS through a multi-model system*. Deborah Huntzinger (PI, NAU), Christopher Schwalm (Co-PI).
3. **NASA Terrestrial Ecology, August 2010 – May 2014, $1,439,840:** *The North American Carbon Program (NACP) Multi-Scale Synthesis and Terrestrial Model Intercomparison Project (MsTMIP)*. Deborah N. Huntzinger (PI, NAU), Christopher Schwalm (Core Team).
4. **NSF Macrosystems, June 2014 – May 2016, $419,207:** *Collaborative Research: Extreme events and ecological acclimation: Scaling from cells to ecosystems*. Stephen Pacala (PI, Princeton), Christopher Schwalm (Co-PI).
5. **NASA Carbon Cycle Science, May 2014 – April 2017, $1,599,833:** *Multi-scale Synthesis and Terrestrial Model Intercomparison Project (MsTMIP) Phase II*. Deborah Huntzinger (PI, NAU); Christopher Schwalm (Co-PI).

RECENT ABSTRACTS

1. **Schwalm CR**, Huntzinger DN, Fisher JB et al. (2013) A case study of reliability ensemble averaging for terrestrial biosphere simulators. AGU Fall Meeting, San Francisco, CA, December 2013.

2. Woods KD, **Schwalm CR**, Huntzinger DN et al. (2013) Seasonality and Sensitivity of Land-Atmosphere Carbon Exchange. AGU Fall Meeting, San Francisco, CA, December 2013.
3. **Schwalm CR**, Williams CA, Schaefer K et al. (2013) Carbon and Water Impacts of the Turn of the Century Drought in Western North America 2000-2004. 4th NACP All-Investigators Meeting, Albuquerque, NM, February 2013.
4. Huntzinger DN, **Schwalm CR**, Michalak A et al. (2013) Multi-Scale Synthesis and Terrestrial Model Intercomparison Project – A Systematic Approach for Assessing Model Estimates of the Cumulative Land Carbon Sink. 4th NACP All-Investigators Meeting, Albuquerque, NM, February 2013.
5. Tian T, Post W, Lu C, **Schwalm CR** et al. (2013) Global Soil Organic Carbon Stocks and Soil Respiration: Estimates derived from Multi-model intercomparison and observations. 4th NACP All-Investigators Meeting, Albuquerque, NM, February 2013.
6. **Schwalm CR**, Huntzinger DN, Michalak A et al. (2012) On the effects of evaluation decisions in model-data intercomparisons: An example using CMIP5 evapotranspiration. AGU Fall Meeting, San Francisco, CA, December 2012.
7. Huntzinger DN, **Schwalm CR**, Michalak A et al. (2012) Multi-Scale Synthesis and Terrestrial Model Intercomparison Project – A Systematic Approach for Evaluating Land-Atmosphere Flux Estimates. AGU Fall Meeting, San Francisco, CA, December 2012.
8. Williams CA [*invited*], Ghimire B, **Schwalm CR** et al. (2012) Carbon consequences of droughts, fires, bark beetles, and harvests affecting forests of the United States: comparative analysis and synthesis. AGU Fall Meeting, San Francisco, CA, December 2012.
9. Schaefer K, Williams CA, **Schwalm CR**, Li Z (2012) Estimating Uncertainty in Global Climate Projections using Gaussian Error Propagation. AGU Fall Meeting, San Francisco, CA, December 2012.
10. **Schwalm CR** [*invited*], Williams CA, Schaefer K et al. (2012) Carbon consequences of the turn-of-the-century drought in North America. AGU Fall Meeting, San Francisco, CA, December 2012.

Total: presented 45 abstracts

MEDIA MENTIONS

1. NAU scientists contribute to international report on climate change September 27, 2013 at *NAUnews* http://news.nau.edu/nau-scientists-contribute-international-report-climate-change/
2. "Insight: how good are climate models?" July 31, 2013 at *environmentalresearchweb*: http://environmentalresearchweb.org/cws/article/news/54223
3. "Warming brings home the value of a meal" December 29, 2012 at *Simple Climate*: http://simpleclimate.wordpress.com/2012/12/29/warming-brings-home-the-value-of-a-meal/
4. "West of 100: Droughts past, present and future" August 28, 2012 podcast at *High Country News*: http://www.hcn.org/articles/west-of-100-droughts-past-present-and-future
5. "Hundred-Year Forecast: Drought" August 11, 2012 invited editorial at *The New York Times, Sunday Review, The Opinion Pages*: http://www.nytimes.com/2012/08/12/opinion/sunday/extreme-weather-and-drought-are-here-to-stay.html
6. "Continued emission growth promises US megadroughts" August 4, 2012 at *Simple Climate*: http://simpleclimate.wordpress.com/2012/08/04/continued-emission-growth-promises-us-megadroughts/

PROFESSIONAL SERVICE

External service – DataONE EVA Working Group Member (present); NASA Carbon Monitoring System Science Team Member (present), NASA NEX User's Working Group Member (present), 2013 NASA Earth and Space Science Fellowship Carbon Cycle and Ecosystems Review Panelist
Publication reviewer – Agr. Forest. Meteorol., Biogeosciences, Ecological Modelling, Ecological Monographs, Environmental Research Letters, Global Change Biology, J. of Geophysical Research, Nature Communications, PLOS ONE, Progress in Physical Geography, Remote Sensing, and Silva Fennica
Administrative service – NAU SESES Annual Review Committee Member (2012-2013 AY) & NAU Scientific Computing Cluster User Group Member (present)

FIELD EXPERIENCE

Spring/Summer 2005 & 2006 leaf area index transects (point count and LAI-2000 method) in 3 Douglas-fir dominated stands on Vancouver Island, British Columbia, Canada
Summer 2002 Supervisor (7 seasonal employees) and crew leader of continuous forest inventory remeasurement effort on 400 plots in outstate Minnesota
Summer 1996 Chief of 2-person field crew of continuous forest inventory remeasurement effort on 44 plots in western Montana
Summer 1993 – 1995 Volunteer member (team leader in 1995) of 5 person group that performed forestry technical work at remote sites in the Swiss, Austrian and German Alps

TEACHING EXPERIENCE

School of Earth Sciences and Environmental Sustainability, Northern Arizona University

1. Fall 2012, Spring 2013, Fall 2013, Spring 2014: Environmental Sciences 115 (cross-listed with Geology 115) "*Climate change*"; an introductory course on climate change with the goal of climate change literacy for majors and non-majors.
2. Fall 2012, Fall 2013: Environmental Sciences 360 "*Physical processes of the atmosphere and hydrosphere*"; upper-level course on the physical processes of Earth's climate systems, team-taught.

Department of Forest Resources, University of Minnesota

3. Spring 2002: Instructor of field course in *survey design and timber cruising* at the Cloquet Forestry Center
4. Winter 1999, Winter 2000, Winter 2001, Winter 2002: teaching assistant (1999 & 2000), co-instructor (2001) and instructor (2002) for mixed undergraduate and graduate-level course in *survey design and sampling for environmental analysis*
5. Fall 2001: Teaching assistant for undergraduate-level course in *forest assessment and modeling techniques*

Abteilung für Forstliche Biometrie, Albert-Ludwigs-Universität Freiburg, Germany

6. Summer 1998: taught colloquium in *descriptive statistics and applied regression* [taught in German]

REFERENCES

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