

# Allan Roy Bacon

University of Florida  
Soil and Water Science Department  
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## EDUCATION

### *Degrees Awarded*

- 2014 Ph.D. Pedogenesis and Anthropedogenesis on the Southern Piedmont  
Duke University, Durham, NC
- 2009 B.S. Forestry with emphasis on Forest Soils (*summa cum laude*)  
Northern Arizona University, Flagstaff, AZ

### *Additional Training*

- 2015 Architecture and Evolution of the Deep Critical Zone  
National Science Foundation Writing Salon
- 2013 Drilling, Sampling, and Imaging the depths of the Critical Zone  
National Science Foundation Workshop
- 2012 Analysis of iron stable isotope ratios in soil and parent material  
Visiting Researcher, German Research Center for Geosciences
- 2011 Cosmogenic Nuclides  
European Science Foundation Workshop
- 2010 Analysis of meteoric beryllium-10 in soil  
Visiting Researcher, University of Vermont Geology Department
- 2010 Chemical speciation and analysis of soil mercury  
Visiting Researcher, Duke University Engineering Department

## APPOINTMENTS

- 2016- Assistant Professor of Environmental Pedology, University of Florida  
Soil and Water Science Department
- 2014-2016 Postdoctoral Research Associate, University of Florida  
School of Forest Resources and Conservation, PINEMAP
- 2010-2014 Teaching Assistant, Duke University  
Nicholas School of the Environment
- 2009-2014 Research Assistant, Duke University  
Nicholas School of the Environment
- 2012-2013 Graduate Student Research Fellow, National Science Foundation  
Critical Zone Exploration Network
- 2009-2010 W.D. Billings Fellow, Duke University  
University Program in Ecology
- 2008-2009 Undergraduate Research Fellow, Northern Arizona University  
Office for Undergraduate Research

**FUNDED  
RESEARCH  
GRANTS**

2015 | \$7,000 | “Considering soil morphology in loblolly pine needle and shoot dieback”  
USDA/NIFA-PINEMAP Undergraduate Mentorship Program  
PI: A.R. Bacon, Undergraduate Researcher: D. Worrall

2013 | \$10,900 | “Pedogenesis and Anthropogenesis on the Southern Piedmont”  
National Science Foundation-Division of Environmental Biology (DDIG)  
PI: D.deB. Richter, CO-PI: A.R. Bacon

2012 | \$7,150 | “Can stable iron isotopes track coupled C-Fe cycling in soil?”  
National Science Foundation-Critical Zone Exploration Network  
PI: A.R. Bacon, CO-PI: D.deB. Richter

2011 | \$1,750 | “Baseline pedogenic and geomorphic rates on the Southern Piedmont”  
Geological Society of America-Graduate Student Research Grant  
PI: A.R. Bacon, CO-PI: D.deB. Richter & P.R. Bierman

2008 | \$4,059 | “Mycorrhizal inoculation in soil along a stand-replacing fire chronosequence”  
Northern Arizona University-Vice President for Undergraduate Research  
Undergraduate Researcher: A.R. Bacon, Faculty Advisor: S.C. Hart

**PRESENTATIONS**

\* = invited, p=poster, o=oral

Anderson, S.P., W.E. Dietrich, D.M. Rempe, N. West, S.L. Brantley, A.R. Bacon, H.L. Buss, B. Fisher, B.A. Flinchum, W.S. Holbrook, H. Kim, P.Z. Klos, M. Leopold, S. Moon, T. Nielson, J.D. Pelletier, and N. Terry. **Seeking GUTH, the Grand Unified Theory of Hillslopes: Linking weathering, erosion, and landscapes.** American Geophysical Union fall meeting. San Francisco, CA. December, 2015. (o)

Bacon, A.R., R. Bracho, M. Akers, J. Cucinella, J.M. Davis, T.R. Fox, S. Grunwald, E.J. Jokela, M. Kane, M.A. Laviner, D. Markewitz, T.A. Martin, G.F. Peter, C.W. Ross, and J.C. Vogel. **Implications of using USDA-NCSS bulk density to estimate carbon stocks in forest soils across the southeastern United States.** American Geophysical Union fall meeting. San Francisco, CA. December, 2015. (p)

Richter, D.deB., A.R. Bacon, S.L. Brantley, W.S. Holbrook. **Geophysical and chemical weathering signatures across the deep weathered-unweathered granite boundary of the Calhoun Critical Zone Observatory.** American Geophysical Union fall meeting. San Francisco, CA. December, 2015. (p)

Ross, C.W., S. Grunwald, S. Del Grosso, S. Gerber, E.J. Jokela, A.R. Bacon, J. Cucinella, K.M. Akers, M.A. Laviner, J.C. Vogel, D. Markewitz, R. Bracho, H.E. Burkhart, J.M. Davis, T.D. Fox, C.A. Gonzalez-Benecke, M. Kane, G.F. Peter, A. Maggard, and T.A. Martin. **Region-wide soil carbon assessment across “The Land of Pines”.** American Geophysical Union fall meeting. San Francisco, CA. December, 2015. (p)

Bacon, A.R and D.deB. Richter. **Subsoil’s coupled carbon-iron redox cycle and its influence on deep soil C accumulation during reforestation.** Soil Science Society of America annual meeting. Minneapolis, MN. November, 2015. (o)

Bacon, A.R, D.E. Worrall, E.J. Jokela, and T.A. Martin. **Spodosol morphology as a driver of loblolly pine needle and shoot dieback and aboveground nutrient dynamics.** Soil Science Society of America annual meeting. Minneapolis, MN. November, 2015. (p)

\*Bacon, A.R. and D.deB. Richter. **Pedogenic records in a network of highly weathered soil-bedrock profiles in the southeastern United States.** Work Salon on the Architecture and Evolution of the Deep Critical Zone. Estes Park, CO. June, 2015. (o)

Worrall, D., A.R. Bacon, E.J. Jokela, and T.A. Martin. **Does soil morphology govern spatial patterns of loblolly pine needle and shoot dieback and its response to culture and genetics?** PINEMAP Annual Meeting. Athens, GA. June, 2015. (p)

Bacon, A.R., M. Akers, J. Cuccinella, S. Grunwald, E. Jokela, A. Laviner, D. Markewitz, and J. Vogel. **The Devil's in bulk density: Considering USDA-NCSS data to estimate forest soil bulk density.** PINEMAP Annual Meeting. Athens, GA. June, 2015. (p)

Richter, D.deB. and A.R. Bacon. **Does meteoric 10Be underestimate residence time of Critical Zones in acid environments?** American Geophysical Union fall meeting. San Francisco, CA. December, 2014. (p)

\*Bacon, A.R. **Grappling with temporal and spatial soil heterogeneity in the Southern Piedmont.** University of Georgia Soil Seminar Series. Athens, GA. September, 2014. (o)

Austin, J., A.R. Bacon, S. Billings, A. Cherkinsky, D.deB. Richter and P. Schroeder. **CZ-Tope at the Calhoun CZO.** National Critical Zone Observatory All Hands Meeting. Fish Camp, CA. September, 2014. (p)

Richter, D.deB. and A.R. Bacon. **Critical Zone residence time and meteoric 10Be inventories.** A Cross-CZO Proposal. National Critical Zone Observatory All Hands Meeting. Fish Camp, CA. September, 2014. (p)

Vogel, J.C., D. Markewitz, H. Burkhart, R. Amateis, M. Laviner, E. Jokela, S. Grunwald, G. Sun, A. Noormets, M. Akers, B. Strahm, A.R. Bacon, T. Fox, C. Gonzalez, M. Kane, J. West, R. Will, D. Wilson, and L. Samuelson. **Total carbon measurement protocol of the Pine Integrated Network: Education, Mitigation, and Adaptation Project (PINEMAP).** Society of American Foresters annual meeting. Salt Lake City, UT. October, 2014. (p)

\*Bacon, A.R. **The influence of climate and lithology on elemental retention in the Critical Zone: An opportunity for rapid cross-CZO research from a mass balance investigation in the Calhoun CZO.** National Critical Zone Observatory Primary Investigator Program Meeting. Charlotte, NC. April, 2014. (o)

\*Bacon, A.R. **Pedogenesis and anthropogenesis on the Southern Piedmont.** Duke University Program in Ecology Seminar. Durham, NC. March, 2014. (o)

Bacon, A.R. and D.deB. Richter. **Coupling meteoric 10Be with pedogenic 9Be: A proposal from an ancient Southern Piedmont interfluvium.** NSF workshop: Drilling, Sampling, and Imaging the Depths of the Critical Zone. Denver, CO. October, 2013. (p)

Bacon, A.R. **How is carbon stored in soil redoximorphic features after one century of reforestation on the Southern Piedmont?** Duke University GradX Talks. Durham, NC. April, 2013. (o)

\*Bacon, A.R. and D.deB. Richter. **The impacts of one century of reforestation on the coupled carbon (C) and iron (Fe) cycle in redoximorphic features of a Southern Piedmont soil.** Annual Duke Forest Research Tour. Durham, NC. December, 2012. (o)

\*Richter, D.deB. and A.R. Bacon. **Rhizogenic C-Fe redox cycling in non-wetland terrestrial ecosystems.** Ecological Society of America annual meeting. Portland, OR. August, 2012. (o)

Bacon, A.R., D.deB. Richter, P.R. Bierman, and D.H. Rood. **Meteoric  $^{10}\text{Be}$  in acidic soils: A new approach from a North American Ultisol.** European Science Foundation Workshop: Cosmogenic Nuclides. Obergurgl, Austria. August, 2011. (o)

Bacon, A.R., D.deB. Richter, and P.R. Bierman. **Soil change through the millennia: Pedogenic time and chemistry of an Ancient North American Ultisol.** Global Soil Change Workshop. Cross Keys, SC. June, 2011. (o)

Bacon, A.R. and D.deB. Richter. **Logging residue on an old field Ultisol.** Global Soil Change Workshop. Cross Keys, SC. June, 2011. (p)

Bacon, A.R., D.deB. Richter, P.R. Bierman, and D.H. Rood. **Stone to Soil: Duration of Ultisol formation on the Southern Piedmont.** Geological Society of America annual meeting. Denver, CO. October, 2010. (o)

Bacon, A.R. **Consequences of logging slash removal: Effect of nutrient bioavailability during the next 50 years of forest ecosystem development.** Global Soil Change Workshop. Durham, NC. May, 2009. (p)

Jackson, S.R., A.R. Bacon, V.J. Kurth, S.C. Hart, and N.C. Johnson. **Mycorrhizal inoculation potentials along stand-replacing fire chronosequence in southwestern ponderosa pine forests.** Ecological Society of America annual meeting. Albuquerque, NM. August, 2009. (p)

Bacon, A.R. and S.R. Jackson. **Mycorrhizal inoculation potentials along stand-replacing fire chronosequence in southwestern ponderosa pine forests.** Northern Arizona University Undergraduate Research Symposium, Flagstaff, AZ. April, 2009. (p)

## BOOKS

Richter, d.DeB., A.R. Bacon, S.A. Billings, D. Markewitz, and M.L. Mobley. **Understanding Soil Change.** 2nd edition. Cambridge University Press, UK. (in preparation for 2017 publication)

## PUBLICATIONS

*Prepared manuscripts (available upon request)*

Parolari, A.J., M.L. Mobley, A.R. Bacon, G.G. Katul, D.deB. Richter, and A. Porporato. **Boom and bust carbon-nitrogen dynamics during reforestation.** (manuscript in second review at Journal of Geophysical Research-Biogeosciences)

Bacon, A.R., F. von Blankenburg, L.E. Nave, M. Oelze, K.A. Heckman, T.J. Veverica, T. Natake, K. Shipley, and D.deB. Richter. **Subsoil's coupled carbon-iron cycle spatially governs carbon accumulation during reforestation.** (manuscript in co-author review, to be submitted to Nature Geoscience, February 2016)

*Manuscripts in preparation*

Bacon, A.R., S. Grunwald, J.C. Vogel, R. Bracho, M. Akers, J. Cucinella, M.A. Lavinier, C.W. Ross, E.J. Jokela, D. Markewitz, J.M. Davis, T.R. Fox, M. Kane, G.F. Peter, and T.A. Martin. **Soil bulk density matters for regional carbon analyses, and so does where you get it: A case study across the PINEMAP Tier II network.** (in preparation for submission to *Global Change Biology*)

Bacon, A.R., E.J. Jokela, T.A. Martin, S.A. Gezan, T. Quesada, and D. Worrall. **Spatial correlation between Spodosol morphology and visual symptoms of aboveground nutrient deficiencies in young loblolly pine plantations.** (in preparation for submission to *Soil Science Society of America Journal*)

Worrall, D., A.R. Bacon, S. Grunwald, E.J. Jokela, and T.A. Martin. **Incorporating spatial and depth dependence into estimates of soil organic matter content in an Ultic Alaquod.** (in preparation for submission to *Geoderma*)

Bacon, A.R., W.S. Holbrook, S.L. Brantley, B. Carr, V. Marcon, and D.deB. Richter. **Geophysical and geochemical weathering indices correspond in an ancient and deep granite weathering profile.** (in preparation for submission to *Geology*)

Anderson, S.P., W.E. Dietrich, D.M. Rempe, N. West, S.L. Brantley, A.R. Bacon, H.L. Buss, B. Fisher, B.A. Flinchum, W.S. Holbrook, H. Kim, P.Z. Klos, M. Leopold, S. Moon, T. Nielson, J.D. Pelletier, and N. Terry. **A tale of two topographies: The nature of the deep critical zone.** (in preparation for submission to *Annual Reviews of Earth and Planetary Sciences*)

*Published*

Richter, D.deB., A.R. Bacon, Z. Brecheisen, and M.L. Mobley. 2015. **Soil in the Anthropocene.** *IOP Conference Series: Earth and Environmental Science*, 25: 012010. (doi:10.1088/1755-1315/25/1/012010)

Mobley, M.L., K. Lajtha, M.G. Kramer, A.R. Bacon, P.H. Heine, and D.deB. Richter. 2015. **Surficial gains and subsoil losses of soil C and N during secondary forest development.** *Global Change Biology*, 21:986-996. (doi: 10.1111/gcb.12715)

Adewopo, J.B., R. Bhomia, M. Almaraz, A.R. Bacon, E. Eggleston, J. Judy, R. Lewis, M. Lusk, B. Miller, C. Moorberg, E. Hodges Snyder, M. Tiedman, and C. VanZomeren. 2014. **Top-ranked priority research questions for soil science in the 21st century.** *Soil Science Society of America Journal*, 78: 337-247. (doi:10.2136/sssaj2013.07.0291)

Richter, D.deB., A.R. Bacon, S.A. Billings, D. Binkley, M. Buford, M.A. Callahan Jr., A.E. Curry, R.L. Fimmen, A.S. Grandy, P.R. Heine, M. Hofmockel, J.A. Jackson, E. Lemaster, J. Li, D. Markewitz, M.L. Mobley, M.W. Morrison, M.S. Strickland, T. Waldrop, C.G. Wells. 2014. **Six Decades of Soil and Ecosystem Research at USDA FS Calhoun Experimental Forest**, in Stout, S., Hayes, D., and Crawford, R., *Research for the Long Term*. Springer Verlag. (ISBN 978-1-4614-1817-7)

Bacon, A.R., D.deB. Richter, P.R. Bierman, and D.H. Rood. 2012. **Coupling meteoric <sup>10</sup>Be with pedogenic losses of <sup>9</sup>Be to improve estimates of soil residence time on an ancient North American interfluvium.** *Geology*, 40: 843-846. (doi: 10.1130/G33449.1)

Robins, N., N. Hagan, S. Halabi, H. Hsu-Kim, R.D.E. Gonzales, M. Morris, G. Woodall, D.deB. Richter, P.R. Heine, T. Zhang, A.R. Bacon, and J.J. Vandenberg. 2012. **Estimations of historical atmospheric mercury concentrations from mercury refining and present day soil concentrations of total mercury in Huancavelica, Peru.** Science of the Total Environment, 426: 146-154. (doi:10.1016/j.scitotenv.2012.03.082)

Richter, D.deB., S.S. Andrews, A.R. Bacon, S. Billings, C.A. Cambardella, N. Cavallaro, J.E. DeMeester, A.J Franzluebbbers, A.S. Grandy, S. Grunwald, J. Gruver, A.S Hartshorn, H. Jenzen, M.G. Kramer, J.K. Ladha, K. Lajtha, G.C. Liles, D. Markewitz, P.J. Megonigal, A.R. Mermut, M.L. Mobley, C. Rasmussen, C.J. Richardson, D.A. Robinson, P. Smith, C. Stiles, R.L. Tate, A. Thompson, A.J. Tugel, H. van Es, L. West, S. Wills, D. Yaalon, and T.M. Zobeck. 2011. **Human-Soil Relations are Changing Rapidly: Proposals from SSSA's new cross-divisional working group on soil change.** Soil Science Letters, 75: 2079-2084. (doi: 10.2136/sssaj2011.0124)

Hagan, N., N. Robins, H. Hsu-Kim, S. Halabi, M. Morris, G. Woodall, T. Zhang, A.R. Bacon, D.deB. Richter, and J.J. Vandenberg. 2010. **Estimating historical atmospheric mercury concentrations from silver mining and their legacies in present-day surface soil in Potosí, Bolivia.** Atmospheric Environment, 45: 7619-7626. (doi: 10.1016/j.atmosenv.2010.10.009)

#### TECHNICAL REPORTS

Bacon, A.R., D. Worrall, S.A. Gezan, E.J. Jokela, T.A. Martin, and T. Quesada, 2015. **Loblolly pine needle at shoot dieback at SSIGNS: Considering subsoil morphology, nutrition, and forest genetics from emergence through recovery.** Forest Biology Research Cooperative 19<sup>th</sup> Annual Report.

Vogel, J.C., M. Akers, R. Amateis, D., A.R. Bacon, J. Cuccinella, C. Gonzalez-Benecke, M. Laviner, M. Kane, T. Fox, E. Jokela, H. Burkhart, S. Grunwald, A.J. Marquis, B. Strahm, G. Sun. 2015. **The Tier II Network: Estimating the Response of Loblolly Pine Carbon Dynamics to Management.** PINEMAP Year 4 Annual Report. (www.pinemap.org/reports)

#### MENTORING

- 2015 Duncan Worrall (Undergraduate), George Mason University  
*Secured funding for and served as advisor during a 7 month research fellowship*
- 2014 Ross Wygmans (Undergraduate), University of Florida  
*Provided primary guidance during a 6 month research assistantship*
- 2012 Krista Shipley (Masters of Environmental Management Candidate), Duke University  
*Provided primary guidance during a 9 month research assistantship*
- 2012 Taichi Natake (Masters of Environmental Management Candidate), Duke University  
*Provided primary guidance during a 9 month research assistantship*
- 2011 Ashley Jernigan (High School Student), NC School of Science & Mathematics  
*Served as co-advisor over the course of a 9 month Research Experience curricula*

#### TEACHING

- 2010-2014 Soil Resources and Management, Duke University  
Guest Instructor - Soil Acidity; Soil Salinity  
Guest Instructor - Impacts of Forest Management on Soil Properties  
Co-Instructor - Cross Carolinas Soils Field Trip (3-day, >800 mile field trip)
- 2011-2013 Forest Measurements, Duke University  
Field Instructor - Fundamentals of measuring trees and distances  
Section Creator - Measuring the Urban Forest (3-class field/modeling section)

**AWARDS**

2012 Outstanding Student Manuscript (Honorable Mention), Duke University, NSOE  
 2011 Student Conference Travel Award, European Science Foundation  
 2011 Conference Travel Award, Duke University Nicholas School of the Environment  
 2010 Conference Travel Award, Duke University, Nicholas School of the Environment  
 2008 Martin B. Applequist Award, Northern Arizona University, School of Forestry  
 2008 L. & D. Brenn Scholarship, Northern Arizona University, School of Forestry  
 2007 Forestry Faculty Scholarship, Northern Arizona University, School of Forestry  
 2007 Xi Sigma Pi Membership, Forestry Honors Society

**AFFILIATIONS**

Soil Science Society of America  
 Geological Society of America  
 American Geophysical Union  
 Society of American Foresters  
 Calhoun Critical Zone Observatory  
 Critical Zone Exploration Network  
 PINEMAP

**SERVICE**

2011-	Reviewer ( <i>ad hoc</i> )	Biogeochemistry, Forests, Forest Ecology and Management, Geoderma, Global Ecology and Biogeography, Journal of Geophysical Research-Earth Surface, Pedosphere, Scientific Reports
2010-2012	Coordinator	Graduate Student Afternoon Seminar Duke University, NSOE
2009-2011	Treasurer	Ph.D. Student Government Duke University, NSOE
2009-2001	Coordinator	Ecology Seminar Series Duke University Program in Ecology
2007	Student Rep	Grade Appeal Committee Northern Arizona University