

Dr. Justin Byron Richardson

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RESEARCH INTERESTS

- Biogeochemistry of metals and metalloids in plants, soils, & regolith in the Critical Zone.
 - Applied geochemistry of metals to human, biological, and geologic processes.
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PROFESSIONAL EXPERIENCE

Jan. 2018	UNIVERSITY OF MASSACHUSETTS AMHERST <i>Assistant Professor of Geosciences</i> Department of Geosciences	Amherst, MA
2015-Present	CORNELL UNIVERSITY <i>Critical Zone Observatory National Office Postdoctoral Fellow</i> Dept. of Earth and Atm. Sci. – Dr. Louis A. Derry.	Ithaca, NY
2015-Present	DARTMOUTH COLLEGE <i>Lecturer of Environmental Studies</i>	Hanover, NH
2011 - 2014	DARTMOUTH COLLEGE <i>Graduate Student</i> Dept. of Earth Sciences – Dr. Andrew J. Friedland.	Hanover, NH
2010 - 2011	UNIVERSITY OF CALIFORNIA RIVERSIDE <i>Researcher</i> Dept. of Environmental Science – Dr. David R. Parker	Riverside, CA
2008 - 2010	UNIVERSITY OF CALIFORNIA RIVERSIDE <i>Undergraduate Researcher</i> Dept. of Botany & Plant Sciences – Dr. G. Darrel Jenerette Dept. of Entomology – Dr. William E. Walton	Riverside, CA

EDUCATION

2011 - 2015	DARTMOUTH COLLEGE Doctorate of Philosophy of Earth Sciences, June 2015 Thesis: <i>Anthropogenic Changes to Mercury and Lead Biogeochemistry in Forest Soils across the Northeastern US</i>	Hanover, NH
2007 - 2010	UNIVERSITY OF CALIFORNIA, RIVERSIDE Bachelor of Science, June 2010 Major: Environmental Science: Soil Science, minor: Botany and Plant Sciences	Riverside, California

PEER-REVIEWED PUBLICATIONS

In prep. Richardson J.B., Derry L.A., Gallium as a tracer of aluminum: Ga/Al ratios during terrestrial cycling in vegetation and soils. To be submitted.

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- In review* Richardson J.B., Bernd, B., Dobson A.M., Earthworm impacts on trace metal (Al, Fe, Mo, Cu, Zn, Pb) exchangeability and uptake by young *Acer saccharum* and *Polystichum acrostichoides*. Submitted to *Biogeochemistry*.
- In review* King E.K., Hodges C.A., Chapela Lara M., Aguirre A.A., Foster M.A., McClintock M.M., Richardson J.B., Metals and metalloids as tracers of Critical Zone processes: A review of established and emerging systems. Submitted to *International Geology Review*.
- Accepted* Dobson A.M., Richardson J.B., Bernd, B. Invasive earthworms change nutrient availability and uptake by forest understory plants. *Plant and Soil*
- In press* Richardson J.B., Görres J.H., Friedland A.J., Exotic earthworms decrease Cd, Hg, and Pb pools in upland forest soils of Vermont and New Hampshire USA. Submitted to *Bulletin of Environmental Contamination and Toxicology*
- In press* Richardson J.B., Petrenko, C.L., Friedland A.J. Mercury along three clear-cut forest soils chronosequences in the northeastern U.S. *Environmental Science and Pollution Research*
- 2017 Richardson J.B., Petrenko, C.L., Friedland A.J. Base cation and microutrient pools along three clear-cut forest soils chronosequences in the northeastern U.S. *Nutrient Cycling in Agroecosystems*.
- 2017 Richardson J.B. Manganese and Mn/Ca ratios in soil and vegetation forests across the northeastern US: insights on spatial Mn enrichment. *Science of the Total Environment*.
DOI:10.1016/j.scitotenv.2016.12.170
- 2016 Richardson J.B., Renock D.J., Görres J.H., Jackson B.P., Webb S.M., Friedland A.J. Nutrient and pollutant metals within earthworm residues are immobilized in soil during decomposition. *Soil Biology and Biochemistry* 101:217-225.
- 2016 Richardson, J.B., Görres J.H., Friedland A.J., Forest floor decomposition, metal exchangeability, and metal bioaccumulation by *Amyntas agrestis* and *Lumbricus rubellus*. *Environmental Science and Pollution Research*. 1-14 DOI: 10.1007/s11356-016-6994-5
- 2016 Richardson, J.B. Friedland A.J. 2016 Influence of coniferous and deciduous vegetation on major and trace metals in forests of northern New England, USA. *Plant and Soil* 1 – 16
DOI 10.1007/s11104-016-2805-5
- 2015 Richardson J.B., Friedland A.J. Mercury in Coniferous and Deciduous Forests in Northern New England, USA: Implications for Climate Change *Biogeosciences* 12, 6737-6749
DOI:10.5194/bg-12-6737-2015
- 2015 Richardson, J.B., Görres J.H., Friedland, A.J., Jackson B.P. Trace Metals and Metalloids in Forest Soils and Invasive Earthworms in Northern New England, USA. *Soil Biology and Biochemistry* 46:89-95
DOI: 10.1016/j.soilbio.2011.11.008
- 2015 Richardson J.B., Donaldson E.C., Friedland A.J. Response of forest soils lead, copper and zinc to decreasing emissions in the northeastern United States: a synthesis. *Science of the Total Environment* 505:851-859.
DOI:10.1016/j.scitotenv.2014.10.023

- 2014 Richardson, J.B., Friedland, A.J., Kaste J.M., Jackson B.P. Forest floor lead changes from 1980 to 2011 and subsequent accumulation in the mineral soil across the northeastern United States. *Journal of Environmental Quality* 43:926-935
DOI:10.2134/jeq2013.10.0435
- 2013 Richardson, J.B., Friedland, A.J., Engerbretson T.R., Kaste J.M., Jackson B.P. Spatial and vertical distribution of mercury in upland forest soils across the northeastern United States. *Environmental Pollution* 182:127-134
DOI: 10.1016/j.envpol.2013.07.01
- 2012 Richardson J.B., Chatterjee A., Jenerette G.D. Optimum temperatures for soil respiration along a semi-arid elevation gradient in southern California. *Soil Biology and Biochemistry* 46:89-95
DOI: 10.1016/j.soilbio.2011.11.008

NON-REFERRED PUBLICATIONS

- 2017 Richardson J.B. "Critical Zone" definition. *Encyclopedia of Geochemistry*. Part of the series *Encyclopedia of Earth Sciences Series* pp 1-5
DOI: 10.1007/978-3-319-39193-9_355-1
- 2017 Richardson J.B., Smith L.M. Investigating Your Critical Zone – Applying the Scientific Method to Critical zone Science for Students.
- 2016 – 2017 Richardson J.B., and many others contributors. *Adventures in the Critical Blog* – the blog of the Critical Zone Observatory National Office.
<http://CriticalZone.org/national/blogs/>
- 2013 Richardson J.B. Studying Soil Science at an Ivy League School. *Soil Horizons*. DOI: 10.2136/sh2013-54-5-rc

RESEARCH SUPPORT/ GRANTS RECEIVED

- 2016 National Science Foundation "Collaborative Research: GEODES: GEOscience Diversity Experiential Simulations". Chen J., Teppen B., Houlton H., Brinkworth C., Motto A., Jackson J., Richardson J. Total project: \$399968 NSF Grant #1645258
- 2015 User Grant. Stanford Synchrotron Radiation Light Source Beam Line 14-3 and 2-3 – "Potential Effects of Earthworm Winter Mortality on Lead and Mercury Retention in Soil". Renock DJ, Richardson JB, Jackson BP, Friedland AJ, Webb SM.
- 2014 Graduate Alumni Research Award – Dartmouth College "Dirty soil: the fate of lead and mercury in earthworms". \$1000
- 2013 - 2015 Ernest Everett Just Program Graduate Fellow – Dartmouth College
- 2013 Northern Studies Grant – Dartmouth College "The effect of vegetation type and soil properties on Hg accumulation at Mt. Moosilauke and Chase Mountain". \$3,500
- 2011 - 2015 Dartmouth College Fellowship – Dartmouth College
- 2010 Alliance of Graduate Education and Professoriate – UC Riverside/ National Science Foundation
- 2010 Chancellor's Distinguished Fellowship – UC Riverside
- 2009 Fall Undergraduate Research Grant – UC Riverside "The effects of vegetation proximity, moisture, and climate on the optimum temperature for soil microbial respiration along an elevation gradient in Southern California" - \$1000

INVITED PRESENTATIONS

- 2017 Richardson JB “Geoscience: moving from ‘Rocks for Jocks’ to tackling the future of Earth” Cornell Engineering CATALYST Academy. Cornell University, Ithaca, NY.
- 2017 Richardson J.B. “Mercury in the Critical Zone: A global problem with few global solutions” Earth System Science Seminar. Stanford University, Palo Alto, CA.
- 2017 Richardson J.B. “Metal pollutants and geochemical tracers in the Critical Zone” Virginia Polytechnic Institute and State University, Blacksburg, VA.
- 2017 Richardson J.B. “Trace metals in the Critical Zone across the northeastern United States” University of Massachusetts Amherst, Amherst, MA.
- 2016 Richardson J.B. “Tracing Critical Zone processes using trace metals” Brown University, Providence, RI.
- 2016 Richardson J.B. “A tale of two metals: Lead and Gallium in the Critical Zone” Johns Hopkins University, Baltimore, MD.
- 2016 Richardson J.B. “Critical Zone science – In and Beyond the Classroom” Teacher Resources Day, Museum of the Earth, Ithaca, NY.
- 2016 Richardson J.B. “Cross-scale discussion: Changes to mercury and lead biogeochemistry from invasive earthworms in New England forests” Biogeochemistry and Climate Seminar Series, Cornell University, Ithaca, NY.
- 2015 Richardson J.B., “Earthworm and vegetation effects on mercury accumulation in forest soils in northern New England” Plant and Soil Science Seminar Series, University of Vermont, Burlington, VT.
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CONFERENCE AND SOCIETY PRESENTATIONS

- 2017 Richardson JB, Richter DD, Derry LA. “Weathering losses and phase partitioning of Aluminum in the Critical Zone using Gallium/Aluminum ratios” Geological Society of America Joint Northeastern / North-Central Annual Meeting. Pittsburgh, PA.
- 2016 Richardson J.B., Derry L.A. “Using gallium as a tracer of aluminum in the Critical Zone: influences on terrestrial cycling from vegetation.” American Geophysical Union Fall Meeting, San Francisco, CA.
- 2014 Richardson J.B., Friedland A.J., Görres J.H., Renock D.J., Jackson B.P. “Invasive and exotic earthworms: an unaccounted change to mercury cycling in northeastern US forest soils” American Geophysical Union Fall Meeting, San Francisco, CA.
- 2014 Richardson J.B. “Mercury Cycling in Soils: Existing Knowledge and Areas of Consideration” Soil Science Society of America General Meeting, Long Beach, CA.
- 2014 Richardson J.B., Friedland A.J., Vario C.L. “Mercury pools in forest soils along three chronosequences in the northeastern US” Soil Science Society of America General Meeting, Long Beach, CA.
- 2014 Richardson J.B., Friedland A.J., Vario C.L. “Mercury, Pb, Cu and Zn concentrations in forest soils along three clear-cut chronosequences in northeastern US” Biogeomon 8th International Symposium on Ecosystem Behavior, University of Bayreuth, Germany.

- 2013 Richardson J.B., Friedland A.J., Kaste J.M. Jackson B.P. "Linking mercury and lead retention in the forest floor across the northeastern United States" Soil Science Society of America General Meeting, Tampa, FL.
- 2012 Richardson J.B., Friedland A.J., Jackson B.P. "The effects of soil properties and vegetation on mercury accumulation in upland forest soils across the northeastern United States" Soil Science Society of America General Meeting, Cincinnati, OH.
- 2012 Richardson J.B., Friedland A.J., Engerbretson T.R., Kaste J.M., Jackson B.P. "Temporal changes and vertical distribution of trace metals in upland forest soils across the northeastern United States" Biogeochem, 7th International Symposium on Ecosystem Behavior, Northport, Maine.
- 2010 Richardson J.B., Jenerette G.D., Chatterjee A., "Soil respiration patterns along a 3000 m elevation gradient" Western Soil Science Society Annual Meeting, Las Vegas, Nevada

TEACHING EXPERIENCE

- 2015 ENVS 25 Ecological Agriculture, Professor. 45 students in course. Designed course, taught laboratory sections, lectured, graded reports and exams.
- 2014 Dartmouth Adventures in STEM. Mentored 14 first-year underrepresented students through one week of colloquiums, lectures and exercises in STEM fields.
- 2012, 2014 EARS 35/ENVS 79, The Soil Resource, Teaching Assistant. 15 students in course. Co-lead laboratory sections, gave guest lectures, assisted grading homework assignments and laboratory reports.
- 2012 – 2014 ENVS 25 Ecological Agriculture. 45 students in course. Co-lead laboratory sections, gave guest lectures, assisted grading homework assignments and laboratory reports.
- 2012 EARS 2, Early Life History, Teaching Assistant. 140 students in course. Held office hours and assisted grading homework assignments and examinations.
- 2011 – 2013 ENVS 2: Introduction to Environmental Science, Teaching Assistant. 80 Students in course. Held office hours and assisted graded homework assignments and examinations.
- 2010 ENSC 101: Water Resources, Teaching Assistant. 80 students in course. Lead discussion sections, gave lectures in professors absence, graded assignments.

ACADEMIC ACHIEVEMENT AWARDS AND DISTINCTIONS

- 2015 Graduate Student Teaching Award – Dartmouth College
- 2014 Outstanding Department Teaching Assistant – Dartmouth College
- 2010 Chancellor's Honor List – UC Riverside
- 2009 – 2010 Dean's Honor List: Spring, Winter, and Fall Quarter – UC Riverside

PROFESSIONAL SERVICE

- 2016 – Present Cornell University Postdoctoral Advisory Committee

2016	Poster "Creating Critical Zone science within the CZO network and Broadcasting Beyond". Critical Zone Observatory Network, National Science Foundation, Arlington, VA.
2016	National Science Foundation Grant Reviewer
2014	Chaired Mercury in soils: patterns and processes Session SSSA Fall Meeting
2014	Co-organized Graduate Student Leadership Workshop Soil Science Society of America
2013	Dartmouth College Earth Sciences Dept. Biogeochemistry faculty search committee – graduate student rep.
2012 – 2014	Graduate Student Subcommittee Soil Science Society of America
2012 – 2013	Vice-President of Dartmouth College Graduate Student Council
2012 – Present	Member of Geological Society of America, Member of American Geophysical Union
2010 – Present	Member of Soil Science Society of America Member of Botanical Society of America.

EDUCATION AND OUTREACH

2016 – Present	Adventures in the Critical Zone Blog
2016 – Present	Cornell University Men of Color Group
2016	GEO Opportunities for Leadership in Diversity (GOLD) Idea Laboratory
2016	Visits with Howard University's Math and Science Middle School

ADVISING AND MENTORING

Isabel Caldwell, 2014. Senior Honors Thesis: *Arsenic and Uranium Mobilization and Accumulation from Bedrock to Soil Throughout New Hampshire*. Dartmouth College.

Benjamin Kumpf, 2017. Summer Research Experience for Undergraduates: *Gallium and Aluminum during igneous rock weathering*. Cornell University.

PEER-REVIEWED FOR

Biogeochemistry, Soil Biology and Biochemistry, Biogeosciences, Plant and Soil, Science of the Total Environment, Environmental Pollution, Journal of Geophysical Research, Nature Scientific Reports, Bulletin of Environmental Contamination and Toxicology, Journal of Plant Nutrition and Soil Science, International Journal of Biodiversity and Conservation, and Journal of Geochemical Exploration.
