

## **CURRICULUM VITA OF DEAN HESTERBERG**

William Neal Reynolds Distinguished Professor  
Department of Crop and Soil Sciences  
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### **EDUCATION**

B.S. Plant and Soil Science Southern Illinois University - Carbondale (1981)  
M.S. Agronomy Purdue University (1984)  
Ph.D. Soil Chemistry University of California – Riverside (1988)

### **PROFESSIONAL EXPERIENCE**

2012 - present WNR Distinguished Professor of Soil Science, NC State University  
2005 – 2012 Professor of Soil Science, NC State University  
2008 – 2009 Proposal Panel Manager, USDA-AFRI Soil Processes Program  
2008 Visiting Scientist, Argonne National Laboratory, Argonne IL and Duke University, Nicholas School of the Environment (sabbatical)  
1999-2005 Associate Professor of Soil Science, NC State University  
1993-1999 Assistant Professor of Soil Science, NC State University  
1990-1992 Soil Chemist, Institute for Soil Fertility Research, Haren, the Netherlands  
1988-1990 Research Chemist, Chevron Oil Field Research Co., La Habra, CA

### **AWARDS AND HONORS**

2<sup>nd</sup> Place Award – 2015 CALS Innovation Fair exhibit (S. Scheibener and D. Hesterberg), “Coal Ash and Water Quality”, Stewards of the Future Symposium: “Water for a Growing World”; Kenneth Post Award (as co-author) for best graduate student publication (Barnes et al., 2014) in Am. Soc. Hort. Sci. Journal, ASHS Floriculture Working Group; Student Recognition in NCSU Thank a Teacher Program (2014); William Neal Reynolds Distinguished Professorship (2012), Outstanding Manuscript Reviewer, Soil Science Society of America (2008); George J. and Rhoda W. Kriz Study Leave Endowment Award (NCSU) (2008); Fellow, American Society of Agronomy (2007); Fellow, Soil Science Society of America (SSSA) (2006); Outstanding Graduate Instructor, NC State College of Agriculture and Life Sciences (2006); Marion L. and Chrystie M. Jackson Soil Science Award (SSSA - 2003); Alex Laurie Award for outstanding research paper in Horticultural Sciences (co-awardee, 2001), Sunshine Mining Company Award for Excellence in the Geosciences (AAAS-WSSS, 1987); Southern Illinois Fertilizer and Herbicide Conference Award (1981)

### **SUMMARY OF SCHOLARLY AND CREATIVE ACTIVITIES**

Refereed Journal Articles	93	Invited Presentations	55
Book Chapters	7	Professional abstr. & presentations	140

## TEACHING, ADVISING, AND MENTORING ACTIVITIES

### Courses Taught

#### **NC State University**

SSC 521 (Soil Chemistry): 1994-2007, 2009-2016. Cumulative average evaluations (5 pt. scale): 4.72 (overall course) and 4.80 (overall instructor) (415 students total)

SSC 553, 553L (Soil Mineralogy, Mineralogy Lab): 1993, 1995, 1999, 2001, 2005, 2007

Cumulative average evaluations: 4.8 (overall course) and 4.7 (overall instructor) (23 students total)

SSC 609/809 (Colloquium – “Scientific Modeling and the Research Process”): 2011, 2013, 2015

SSC 620/820 (Special Topics: “Soil Chemical Speciation Using X-rays”): 2015

SSC 601/801 (Soil Science Seminar) Spring, Fall 2005; Cumulative average evaluations: 4.9 (overall course) and 5.0 (overall instructor) (12 students total)

**International:** Special Topics in Soil Chemistry: Principles and Practice of X-ray Absorption Spectroscopy (Instructor): 2014 Department of Soils, Federal University of Viçosa, Brazil (17 students); Special Topics in Soil Chemistry (Guest Lecturer): 2008, 2010, 2012, 2014 Department of Agricultural Chemistry, National Taiwan University (~120 students total); Special Topics in Soil Chemistry (Instructor): 2012, Department of Soil and Environmental Sciences, National Chung Hsing University, Taichung, Taiwan (~30 students)

Graduate Student Advisees: Paul D. Hansen (M.S. 1997), Sandra Z. Weitzel (M.S. 1999), Tim E. Alcacio (Ph.D. 2000), Ji-Su Bang (M.S. 2002), Kimberly J. Hutchison (M.S. 2003), Nidhi Khare (Ph.D. 2003), Elizabeth J. Fichtner (Ph.D. co-advise; Plant Path. & Soil Sci. 2003), G. Chris Murray (M.S. 2004), Daphine McKinney (Ph.D.), Christopher Brownfield (M.S. 2007), Yu Ting Liu (Ph.D. 2010); Fiona Kizewski (Ph.D. co-advise; Chemistry & Soil Sci. 2010); Amanda Zelasko-Morris (M.S. 2007, Ph.D. 2011); Jeff Massey (M.S. co-advise Soil Science & Microbiology); Aakriti Sharma (Ph.D. Aug. 2015-present)

Visiting Graduate Student Mentoring: Damien Reymond (6-mo. visiting Ph.D. student from Univ. of Lausanne, Switzerland in 2002); David Eveborn (4-wks. visiting Ph.D. student from KTH-Stockholm, Sweden between 2007 & 2009); Chiou-Pin Chen (4-wks. visiting post-Ph.D. student from National Taiwan University in 2009); Carin Sjöstedt (6-wks. visiting Ph.D. student from KTH-Stockholm, Sweden in 2010); Liang-Ching Hsu (12-mo. visiting Ph.D. student from National Chung Hsing Univ., Taiwan in 2012), Luiz Francisco Da Souza Silva Filho (6-mo. visiting Ph.D. “Sandwich” student from Univ. of Sao Paulo, Brazil in 2013); Wedisson Santos (12-Mo. visiting Ph.D. “Sandwich” student from Federal University of Viçosa in 2014-2015); Sheila Santos (6-mo. visiting Ph.D. “Sandwich” student from Univ. of Sao Paulo, Brazil in 2015); Elton Novais Alves (12-mo. visiting Ph.D. “Sandwich” student from Federal University of Viçosa in 2015-2016); Marina Colzato (3-month visiting Ph.D. “Sandwich” student from Univ. of Sao Paulo, Brazil in 2016), Silmara Costa Silva (6-mo. visiting Ph.D. “Sandwich” student from Federal University of Viçosa Sept. 2016-Mar. 2017), Welldy Teixeira (2.5-mo. visiting Ph.D. “Sandwich” student from Federal University of Viçosa Feb. – Apr. 2017), Cristiano Della Picolla (6-month visiting Ph.D. “Sandwich” student from Univ. of Sao Paulo, Brazil, Apr.-Sept. 2017); Natalia Rodrigues Eloy (4-month visiting Ph.D. “Sandwich” student from Sao Paulo State Univ., Brazil, July-Nov. 2017)

Graduate Committee member: Served or serving as member of 57 additional M.S., Ph.D., or A.L.S. student committees since 1993 in the following departments: NCSU - Soil Science, Biological and Agricultural Engineering, Botany, Civil Engineering, Crop Science, Horticultural Sciences, Nuclear Engineering, Plant Pathology, Toxicology, Forestry & Environmental Resources; Duke University - School of the Environment and Earth Sciences, North Carolina A&T University - Department of Natural Resources and Environmental Design, University of Delaware - Department of Plant and Soil Science, Wageningen University, The Netherlands (Department of Plant and Soil Science - Ph.D. defense opponent); Umeå University, Umeå, Sweden (Department of Chemistry - Ph.D. defense opponent).

Undergraduate Research Student Mentoring: NC State - Jason Lowrey, Lori A. Moll, Jonathon Zehr, Brittany Nowak, Shane Scheibener (co-mentor, Toxicology), Allison Sams (co-mentor, Soil Sci.), Michael D. Barnes (Agronomy); Benjamin Jackson (Civil and Environ. Engin.). International - Glauce Lorenzo (4-mo. visiting undergraduate student from Federal University of Viçosa, Brazil in 2010); Helen Amorim (3 mo. visiting undergraduate student from Federal University of Viçosa, Brazil in 2015); Peangdin Chaiyapo (2-month visiting undergraduate student from Kasetsart University, Thailand in 2015)

Postdoctoral Researcher Supervisor: Dr. Shan-Li Wang (2001-02), Dr. Maria Hernandez-Soriano (2010-11; Fulbright Fellow); Dr. Navdeep Kaur (2010-12), Dr. Nelson Rivera (2012-14); Dr. Sarah Doydora (Aug. 2015-present)

Visiting Scientist Host: Dr. Dar-Yuan Lee, (Dept. of Agricultural Chemistry, National Taiwan University); Dr. Chunjuan Bi (China Normal University, Shanghai); Dr. Rachel Cook (Southern Illinois University – Carbondale); Dr. Jiuyu Li (Chinese Academy of Sciences)

Faculty Mentoring Committees (NC State Dept. of Soil Science): Dr. Matthew Polizzotto, Asst. Professor of Soil Hydrogeochemistry (Chair, 2010-); Dr. Owen Duckworth, Assoc. Professor of Soil Biogeochemistry (Chair, 2007-2015); Dr. Wei Shi; Professor of Soil Microbiology (Chair, 2006-); Dr. Jeff White, Assoc. Professor of Soil Productivity, Nutrient Management, and Remote Sensing (participant, 2006).

## **REPRESENTATIVE INVITED PRESENTATIONS**

- Hesterberg, D. et al. “Assessing impacts of trace elements from the Eden coal ash release on agriculture in the Dan River Basin” Soil Science Society of North Carolina Annual Meetings, Raleigh, Jan. 21, 2015.
- Hesterberg, D. “Chemical speciation of soil phosphorus and the challenge of soil complexity” Guangdong Institute of Eco-Environmental and Soil Sciences, Guangzhou, China. Dec. 12, 2014.
- Hesterberg, D. “The reactive microsite model: a concept for predicting environmental impacts of trace elements” University of Massachusetts, Amherst. Nov. 10, 2014.
- Hesterberg, D. “Arsenic accumulation in soil matrices in relation to microsite composition”. LNLS (Brazilian Synchrotron Light Laboratory), Campinas, Brazil. Oct. 15, 2014
- Hesterberg, D. “Complexity limits on chemical speciation analysis of soil phosphorus”. Synchrotron Light Research Institute, Nakhon Ratchasima, Thailand. Dec. 11, 2013.
- Hesterberg, D. “Forensic Soils”. Soil Science Society of North Carolina. Raleigh, Jan. 22-23, 2013.
- Hesterberg, D. “The Power, Limitations, and Opportunities for Synchrotron X-ray Analysis of Soils and Environmental Systems”. Keynote Speaker. Workshop: Synchrotron Radiation in Environmental and Soil Science. Lund, Sweden. May 30-31, 2013.
- Hesterberg, D. “The Power and Limitations of Synchrotron X-rays in Agro-Environmental Research”. Keynote for International Symposium on Heavy Metal Remediation in Agricultural Ecosystems. Kangwon National University, Chuncheon, Korea. Nov. 15, 2012.
- Hesterberg, D. “Successes and Challenges in Applying Chemical Principles in Molecular Environmental Soil Science”. Davidson College, Dept. of Chemistry. March 30, 2012.
- Hesterberg, D. “Hitting the ‘Complexity Wall’ in the Quest for Reaction Mechanisms in Geochemical Systems”. Kansas State University, ADVANCE Distinguished Lecture Series, Dept. of Agronomy. March 7, 2012.
- Hesterberg, D. “The Chemical Speciation Model and Micro-Site Analysis of Soil Contaminants”. National Taiwan University, Taipei & National Chhsung Hsing University, Taichung, Taiwan (2010).
- Hesterberg, D. “Mechanisms of Phosphate Mobilization Following Conversion of Agricultural Lands to Wetlands”. Royal Institute of Technology (KTH), Stockholm, Sweden. (2008).

- Hesterberg, D. “Principles of XAS and Its Applicability to Soil Science”. co-Keynote (with Ingmar Persson); Symposium: “X-ray Absorption Spectroscopy and Its Applications to Soil and Water Sciences”. Swedish University of Agricultural Sciences (SLU), Uppsala, Sweden (2008).
- Hesterberg, D. “Research Pathways for Soil Micro-Management in the 21st Century”; Workshop: “The Future of Soil Science”, Joint Soil Sci. Soc. Am.–Geol. Soc. Am. meetings, Houston, TX (2007).
- Hesterberg, D. “Advanced Analytical Methods for Understanding the Chemistry of Nutrient Elements in Soils”; Symposium: “Speciation and Interactions of Iron And Phosphorus In Soils”, Soil Sci. Soc. Am. meetings, New Orleans, LA (2007).
- Hesterberg, D. “Probing Structures and Processes in Soil Chemistry Using X-ray Spectromicroscopy”; Workshop: “X-ray spectromicroscopy – a Tool for Environmental Sciences”, Advanced Photon Source Users’ Meeting, Argonne, IL (2006).
- Hesterberg, D. and M.J. Vepraskas. 2006. “Spatially-Variable Redox Processes in Soils”. Symposium: “Biogeochemical and Biophysical Characterization of Soil Microsite Processes”. Soil Sci. Soc. Am. Annual Meetings. Indianapolis, IN (2006).
- Hesterberg, D. “Molecular-Scale Binding and Reductive Dissolution of Phosphate in Soils and Model Mineral Systems” and “Formation and Stability of Heavy Metal Sulfides in Soils”: Workshop: “Upscaling Process Knowledge to the Field Level – Do We Know Enough?: I. Phosphorus and II. Heavy Metals” Wageningen Agricultural University and Alterra, the Netherlands. (2004).
- Hesterberg, D. “Analysis of Soils and Minerals Using XAFS Spectroscopy”. Symposium: “On the Shoulders of M. L. Jackson: Mineralogical Methods”. Soil Science Society of America meetings, Indianapolis, IN (2002).
- Hesterberg, D. “Inorganic Contaminant Interactions with Soil Minerals and their Characterization”. Symposium: “Role of Mineralogy and Surface Chemistry in Soil Remediation and Quality”. Soil Sci. Soc. Am. Annual Meetings, Indianapolis, IN (2002).
- Hesterberg, D. and D. E. Sayers. “Applications of Soft X-rays in Soils and Agricultural Systems”; Workshop: “Molecular Environmental Sciences In the Soft X-ray Region”, Lawrence Berkeley National Laboratory, Berkeley, CA (1997).
- Hesterberg, D. “Biogeochemical Cycles and Processes Leading to Changes in Mobility of Chemicals in Soils”; co-Keynote (with Johan Bouma) at “Working Conference on Long-Term Perspectives for Effects of Rural Land Use Changes on Soil Contaminants”, Arona, Italy (1995).
- Hesterberg, D. “An Overview of Inorganic Contaminant Behavior in Soil and Groundwater”; Workshop: “International Workshop on Long-term Environmental Risks For Soils, Sediments, And Groundwater In The Volga Catchment Area” Moscow, Russia (1992).

### **PROFESSIONAL SOCIETY MEMBERSHIPS**

Soil Science Society of America, American Society of Agronomy, American Chemical Society, Clay Minerals Society, Geochemical Society, North Carolina Soil Science Society, American Association for the Advancement of Science, Alpha Zeta, Pi Alpha Xi (National Honor Society for Horticulture).

### **UNIVERSITY AND PROFESSIONAL SERVICE ACTIVITIES**

#### NC State University Service (selected)

- Director – CALS Environmental and Analytical Services (EATS) Laboratory (July 2015-present)
- CALS Innovation and Efficiency Committee (2015)
- NCSU Administrative Processes Streamlining Committee (2011-2015)
- University Research Committee (2005-2011, Chair 2009-2010)
- Scholarship and Research Strategic Planning Committee Team 2 – Investing in Faculty and Infrastructure (2011)
- College of Agriculture and Life Sciences (CALS) Associate Dean and Research Director Nomination Committee (2008-2009)

- Soil Science Department Head Advisory Committee (2006-2007);
- Departmental Search Committees: Soil Biogeochemistry faculty position (2006); Head (2005)
- Dept. of Soil Science Marketing Committee (Chair – 2007; 2008)
- Member of NC State faculty team participating in Chancellor (Maryanne Fox) “Breakfast” sessions (2003).
- CALS Research Committee (2000-2003; Chair 2002-2003)

#### State, Regional, National, and International Professional Activities

- Beamline Advisory Team (BAT) Memberships for new National Synchrotron Light Source – II (NSLS-II), Brookhaven National Laboratory, Upton, NY: Tender X-ray Spectroscopy (TES) Beamline (Spokesperson, Sept. 2015 - present); X-ray Fluorescence Microprobe (XFM) Beamline (Member, Sept. 2015-present); Submicron Resolution X-ray Spectroscopy (SRX) Beamline (Spokesperson, 2013 - 2014).
- Proposal Review Panel member: Stanford Synchrotron Radiation Lightsource (SSRL), Stanford, CA; (Aug. 2015-present)
- Imaging Beamlines Review Team member: Stanford Synchrotron Radiation Lightsource (SSRL), Stanford, CA (Mar. 4, 2015)
- Chair of Soil Mineralogy Division: International Union of Soil Science (2010 - 2014)
- Soil Sci. Soc. Am. “Marion L. and Chrystie M. Jackson Soil Science Award Committee” (member 2012-2013; Chair 2014)
- Guest Editor: Applied Clay Science (2010-2011); Associate Editor - Journal of Environmental Quality (1998 - 2001)
- Superfund Advisory Committee: Wayne State University NIEHS Proposal to establish a Superfund Research Center. (2010 - 2011)
- Technical Committee Member: ICOBTE (Int’l Conference on the Biogeochemistry of Trace Elements) (2011, 2013)
- Member of Policy Development Committee, Soil Science Soc. Am. (2009)
- Chair of Soil Sci. Soc. Am. Div. S-9 (Soil Mineralogy) (2005 - 2006)
- Member of Bouyoucos Conference committee of Soil Sci. Soc. Am. (2003 - 2006)
- Member of Emerging Issues Committee of Soil Sci. Soc. Am. (2005 - 2006)
- Member of Clay Minerals Society Council (2003 - 2006); Program Development Committee (2006 – 2009), and Member and Chair of Education Committee (2001-2003); Member of Policy Committee (2015-)
- Member of User Executive Committee at the National Synchrotron Light Source, Brookhaven National Laboratory (2003 - 2005).
- Member of Proposal Review Panel (2004-2006)– National Synchrotron Light Source (NSLS), Brookhaven National Laboratory.
- Chair (2006) of NC-1022 Multi-State Research Project. “The Chemical and Physical Nature of Particulate Matter Affecting Air, Water and Soil Quality”.
- Member of S-1014 Multi-State Research Project. Mineral Controls on P Retention & Release in Soils & Soil Amendments.
- Manuscript Reviewer for numerous journals, including *Soil Sci. Soc. Am. J.*, *J. Environ. Qual.*, *Environ. Sci. Technol.*, *Environ. Engin. Sci.*, *Geochim. Cosmochim. Acta*, *Europ. J. Soil Sci.*, *Soil Science*, *Land Degradation & Rehabilitation*, *Clay Minerals*, *Clays Clay Miner.*, *Geoderma*, *J. Electron Spectrosc.*, *J. Synchrotron Rad.*, *J. Am. Chem. Soc.*, *J. Colloid Interface Sci.*, *Langmuir*, *Chemosphere*, *Analyt. Chimica Acta*.

- Proposal reviewer for USDA, DOE, NSF, Canadian Light Source (CLS), Stanford Synchrotron Radiation Lightsource (SSRL).

#### Symposia and Workshops Co-organized

- “Mineralogy and Reactivity of Soil Microsites”. 20<sup>th</sup> World Congress of Soil Science. June 8-13, 2014. Jeju, S. Korea. D. Hesterberg and M. Gräfe (Universidad de Las Americas).
- “Soil Minerals for Uptake & Control of Contaminants”. 19th World Congress of Soil Science. Aug. 1-6, 2010. Brisbane, Australia. B. Singh (Univ. of Sydney) and D. Hesterberg.
- “Characterization and Reactivity of Natural and Synthetic Nanoparticles in Soils”. Soil Sci. Soc. Am. Meeting. Nov. 4-8, 2007, New Orleans, LA. D. Hesterberg and J. Chorover (Univ. of Arizona).
- “Environmental Mineralogy and Toxic Metals”. Joint Clay Minerals Society – French Clay Group Meeting, June 3-7, 2006. Ile de Oleron, France. A. Manceau (Univ. J. Fourier, Grenoble) and D. Hesterberg.
- “Biogeochemical and Biophysical Characterization of Soil Microsite Processes”. Soil Sci. Soc. Am. Meeting. Nov. 12-16, 2006, Indianapolis, IN. N. Cavallaro (USDA-NRI), A. Smucker (Michigan State Univ.), and D. Hesterberg.
- “In-situ Kinetic Analyses in Environmental and Chemical Systems”. 2005 NSLS Users’ Meeting, National Synchrotron Light Source, Brookhaven National Laboratory, Upton, NY. D. Hesterberg and J. Fitts (Brookhaven National Laboratory).
- “Electron Transfer Processes at Mineral Surfaces” Soil Sci. Soc. Am. Annual Meetings, Oct. 31-Nov. 4, 2004. Seattle, WA. S. Fendorf (Stanford Univ.) and D. Hesterberg).

#### **SELECTED GRANTS**

1. LeBeau, J., D. Hesterberg, A. Brown, V. Augustyn, and E. Dickey. 2017. Acquisition of a Transmission Electron Microscope for In-situ Studies of Soft and Hard Matter. NSF. \$1,430,030 (08/01/2017-07/31/2020).
2. Hesterberg, D., M. Fuentes, and M. Polizzotto. 2015. Microscale Reactivity of Trace Elements in Complex Geochemical Systems. NSF. \$270,000 (3/2015 – 3/2018).
3. Hesterberg, D., J. Havlin, O. Duckworth, and W.P. Robarge. Research on Enhancing Plant Availability of P. Verdesian Life Sciences. Unrestricted gifts. ~\$170,000 6/2015-5/2018.
4. Hesterberg, D., M. Polizzotto, T. Gannon, and W.P. Robarge. 2014. Assessment of Impacts of the Dan River Coal Ash Release on Agricultural Soils and Crops. Duke Energy Corp. \$274,949 (7/1/2014 – 8/15/2016)
5. Hesterberg, D., D. Buchwalter, and O. Duckworth. 2009. Predicting Mobilization and Bioaccumulation of Trace Elements from Coal Fly Ash Using Speciation Analysis. \$363,397 TVA/ORAU (6/1/2010 – 5/31/2013).
6. Vepraskas, M. J., J. White, D. Hesterberg, R. Huffman, and S. Broome. 2009. Multi-scale Analysis of Mechanisms and Impact of Phosphorus Mobilization in Wetland Soils Created from Drained Agricultural Fields. USDA-NRI. \$399,043 (10/1/2009 – 9/30/2012).
7. Hesterberg, D., J. D. Martin, and W. Shi. 2005. Molecular Mechanisms of Phosphate Retention and Dissolution in Organic Matter and Clay-Organic Systems. USDA-NRI. \$455,000 (9/1/2007-8/31/2010).
8. Shah, S. B., G. Grabow, R.L. Huffman, J.E. Parsons, and D. Hesterberg. 2004. Arsenic and Heavy Metal Leaching Potential from Broiler Litter Stockpiled on Bare Soil. Water Resources Research Institute. \$50,000 (12 mo.).
9. Hesterberg, D. 2000. Phosphate Retention in Mixed Mineral Systems as Affected by Redox Potential. USDA-NRI. \$190,000 (36 mo.).
10. Hesterberg, D. 1999. Solid-phase speciation and stability of soil heavy metal contaminants at MCALF Bogue and MCOLF Atlantic incinerator sites. US Marine Corps. \$150,000 (36 mo.).

11. Hesterberg, D. and D. E. Sayers. 1997. Molecular-Scale Characterization of Copper(II) and Arsenate Binding to Organic Matter and an Organo-Mineral Complex. NSF. \$228,590 (36 mo.).
12. Hesterberg, D., J. W. Gilliam, D. K. Cassel, and J. E. Parsons. 1995. Feasibility and Cost Effectiveness of Using Gypsum as a Chemical Flocculant to Maximize Sediment Removal at Urban Sites. NC-DEHNR. \$73,272 (24 mo.).

#### PEER-REVIEWED JOURNAL PUBLICATIONS

1. Lopez, A.R., D. Hesterberg, S. Costa Silva, and D. Buchwalter. Periphyton and abiotic factors influencing arsenic speciation in aquatic environments. *Environmental Toxicology and Chemistry*. In revision, post-review.
2. Li, J., K. Deng, D. Hesterberg, Y. Xia, C. Wu, R. Xu. Mechanisms of enhanced inorganic phosphorus accumulation by periphyton in paddy fields as affected by calcium and ferrous ions. *Science of the Total Environment* (Revised 12 July 2017, post review).
3. Santos, S.R., D. Hesterberg, and L.R.F. Alleoni. Phosphate speciation and citrate-induced mobilization of P in an Acric Oxisol. *Communications in Soil Science and Plant Analysis*. Accepted.
4. Scheibener, S., N. Rivera, D. Hesterberg, O. Duckworth, D. Buchwalter. 2017. Periphyton uptake and trophic transfer of coal-ash derived trace elements. *Environmental Toxicology and Chemistry*. Pre-Published 17 July 2017. doi: 10.1002/etc.3864.
5. Hesterberg, D. I. McNulty, and J. Thieme. 2017. Speciation of soil phosphorus assessed by XANES spectroscopy at different spatial scales. *Journal of Environmental Quality*. Pre-published 27 July 2017. doi:10.2134/jeq2016.11.0431.
6. Barnes, J., P. Nelson, B.E. Whipker, D.A. Dickey, D. Hesterberg, and W. Shi. 2017. Modeling impact of nitrogen carrier and concentration on substrate pH. *J. Plant Nutrition*. Pre-published. 19 July 2017. doi:10.1080/01904167.2016.1143502.
7. Rivera, N., D. Hesterberg, N. Kaur, and O.W. Duckworth. 2017. Chemical speciation of potentially toxic trace metals in coal fly ash associated with the Kingston fly ash spill. *Energy and Fuels*. Pre-published 18 July 2017. doi: 10.1021/acs.energyfuels.7b00020.
8. Colzato, M., M.Y. Kamogawa, H.W.P. Carvalho, L.R.F. Alleoni, and D. Hesterberg. Temporal changes in cadmium speciation in Brazilian soils. *Journal of Environmental Quality* Pre-published 12 Dec. 2016. doi:10.2134/jeq2016.08.0316.
9. Deiss, L., A. Franzleubbers, A. Amoozegar, M.L. Polizzotto, D.L. Hesterberg, and F.W. Cubbage. Soil carbon fractions from an alluvial soil texture gradient in North Carolina. *Soil Sci. Soc. Am. J.* Pre-published Sept. 2016. doi:10.2136/sssaj2016.09.0304.
10. Doydora, S., D. Hesterberg, and W. Klysubun. 2017. Phosphate Solubilization from Poorly Crystalline Iron and Aluminum Hydroxides by AVAIL Copolymer. *Soil Science Society of America Journal*. 81:20-28.
11. Terres, M.A., M. Fuentes, D. Hesterberg, and M. Polizzotto. 2016. Bayesian spectral modeling of microscale spatial distributions in a multivariate soil matrix. *Bayesian Analysis*. (Online Publication) DOI: 10.1214/16-BA1034.
12. Gillispie, E.C., R.E. Austin, N.A. Rivera, R. Bolich, O.W. Duckworth, P. Bradley, A. Amoozegar, D. Hesterberg, and M.L. Polizzotto. 2016. Soil weathering as an engine for manganese contamination of well water. *Environmental Science and Technology*. 50:9963-9971.
13. Santos, W., D. Hesterberg, E.M. Mattiello, L. Vergutz, M.S.C. Barreto, L.F. da Silva Souza Filho, and I.D.P. de Resende Filho. 2016. Increasing soluble phosphate species by treatment of rock phosphate with acidic mine waste. *Journal of Environmental Quality* 45:1988-1997.
14. Eriksson, A.K., D. Hesterberg, W. Klysubun, and J.P. Gustafsson. 2016. Phosphorus dynamics in Swedish agricultural soils as influenced by fertilization and mineralogical properties: Insights gained from batch experiments and XANES spectroscopy. *Science of the Total Environment* 566:1410-1419.
15. Eriksson, A.K., S. Hillier, D. Hesterberg, W. Klysubun, B. Ulen, and J.P. Gustafsson. 2016. Evolution of phosphorus speciation with depth in an agricultural soil profile. *Geoderma* 280:29-37.

16. Lopez, A.R., D. Hesterberg, D.H. Funk, and D.B. Buchwalter. 2016. Bioaccumulation dynamics of arsenate at the base of aquatic food webs. *Environmental Science and Technology* 50:6556-6564.
17. Oh, Y.-M., P.V. Nelson, D.L. Hesterberg, and C.E. Nedziela Jr. 2016. Efficacy of a phosphate-charged soil material in supplying phosphate for plant growth in soilless root media. *International Journal of Agronomy* Article No. 8296560.
18. Oh, Y.-M., P.V. Nelson, D.L. Hesterberg, and C.E. Nedziela Jr. 2016. Desorption characteristics of three mineral oxides and a non-crystalline aluminosilicate for supplying phosphate in soilless root media. *Communications in Soil Science and Plant Analysis* 47:753-760.
19. Rippey, J., P.V. Nelson, D. Hesterberg, and W. Shi. 2016. Importance of limestone specific surface area for assessing neutralization effectiveness in soilless root substrate. *Communications in Soil Science and Plant Analysis* 47:521-526.
20. Hesterberg, D., M. Polizzotto, C. Crozier, and R. Austin. 2015. Assessment of trace-element impacts on agricultural use of water from the Dan River following the Eden coal ash release. *Integrated Environmental Assessment and Management*. 12:353-363.
21. Rivera, N., N. Kaur, D. Hesterberg, C.R. Ward, R.E. Austin, and O.W. Duckworth. 2015. Chemical composition, speciation, and elemental associations in coal fly ash samples related to the Kingston ash spill. *Energy & Fuels*. 29:954-967.
22. Eriksson, A.K., J.P. Gustafsson, and D. Hesterberg. 2015. Phosphorus speciation of clay fractions from long-term fertility experiments in Sweden. *Geoderma*. 241:68-74.
23. Smith, S., S. Prohn, L. Driscoll, D. Hesterberg, L. Bradley, and J. Grossman. 2014. Preparing students for a diverse future: Using service-learning to train students for careers in agricultural community outreach, *North American Colleges & Teachers of Agriculture (NACTA) J.* 58:293-301.
24. Guinness, J., M. Fuentes, D. Hesterberg, and Polizzotto, M. 2014. Multivariate spatial modeling of conditional dependence in microscale soil elemental composition data. *Spatial Statistics*. 9:93-108.
25. Barnes, J., P. Nelson, B.E. Whipker, D.A. Dickey, D. Hesterberg, and W. Shi. 2014. Statistical model for describing macronutrient impacts on container substrate pH over time. *HortScience* 49:207-214.
26. Conley, J., D. Funk, D. Hesterberg, L.-C. Hsu, J. Kan, Y.-T. Liu, and D. Buchwalter. 2013. Bioconcentration and biotransformation of selenite versus selenate exposed periphyton and subsequent toxicity to the mayfly *Centroptilum triangulifer*. *Environmental Science and Technology* 47:7965-7973.
27. Cook, R. L. and D. Hesterberg. 2013. Comparison of trees and grasses for rhizoremediation of petroleum hydrocarbons. *International Journal of Phytoremediation*. 15:844-860.
28. Sjöstedt, C., I. Persson, D. Hesterberg, D. Berggren Kleja, H. Borg, and J. P. Gustafsson. 2013. Iron speciation in soft-water lakes and soils as determined by EXAFS spectroscopy and geochemical modeling. *Geochimica et Cosmochimica Acta*. 105:172-186.
29. Churchman, J., D. Hesterberg, and B. Singh. 2012. Soil Clays. (Editorial as Guest Editors) *Applied Clay Science*. 64:1-3.
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#### **PEER REVIEWED BOOK CHAPTERS**

1. Hesterberg, D. 2010. Macro-scale chemical properties and x-ray absorption spectroscopy of soil phosphorus. p. 313-356. In B. Singh and M. Gräfe (Ed.) *Synchrotron-based techniques in soils and sediments*. Developments in Soil Science, Vol. 34. Elsevier, Burlington, MA.
2. Kelly, S., D. Hesterberg, and B. Ravel. 2008. Analysis of soils and minerals using x-ray absorption spectroscopy. p. 387-463 In A. L. Ulery and R. Drees (Ed.) *Methods of Soil Analysis*. Part 5. Mineralogical Methods. Soil Sci. Soc. Am., Madison, WI.
3. Hesterberg, D. 2006. Metal-Clay Interactions. In R. Lal (Ed.). *Encyclopedia of Soil Science*, 2<sup>nd</sup> Ed.. Marcel-Dekker, New York (published online at <http://www.informaworld.com/smpp/content~content=a740186725?words=hesterberg&hash=2601514730>).
4. Hesterberg, D. 2002. Metal-Clay Interactions. p. 810-813. In R. Lal (Ed.). *Encyclopedia of Soil Science*. Marcel-Dekker, New York.
5. Nelson, N.O., R.L. Mikkelsen, and D.L. Hesterberg. 2000. Struvite formation to remove phosphorus from anaerobic swine lagoon effluent. p.18-26. In J.A. Moore (ed.) *Animal, agricultural and food processing wastes*. Proc. of the Eighth International Symposium. Des Moines, IA, October 9-11, 2000. ASAE, St. Joseph, MI.
6. Wang, Z., D. Hesterberg, W. Zhou, D. E. Sayers, and W. P. Robarge. 1998. Extended X-ray absorption fine structure study of mercury speciation in a flood plain soil. In: *Contaminated Soils: Third International Conference on the Biogeochemistry of Trace Elements*, Paris, May 15-19, 1995 (ed. Prost, R.), D:\data\communic\009.PDF, colloque 85, INRA Editions, Paris.
7. Hesterberg, D., J. Bril, and P. A. C. Raats. 1994. Coupled chemical-equilibrium/transport model calculations of soil trace-metal leaching as influenced by interactive effects of dissolved organic matter, pH, and electrolyte conditions. p. 1131-1140 In N. Senesi and T. M. Miano (ed.) *Humic Substances in the Global Environment and Implications on Human Health*, Elsevier Publ. Co., Amsterdam.

#### **SELECTED EXTENSION AND ENGAGEMENT ACTIVITIES**

##### Technical Outreach

Hesterberg, D., M. Polizzotto, and C. Crozier (2014) Assessment of Trace-Element Impacts on Agricultural Use of Water from the Dan River Following the Eden Coal Ash Spill. Report released to NC Cooperative Extension Service, NC Dept. of Agriculture and Consumer Sciences, NC Division of Water Quality, US-EPA, Duke Energy, the agricultural community, and the public to convey that the Dan River should be safe for agricultural use.

##### Technical Service Projects

Hesterberg, D. and K. J. Hutchison with Dr. Billy Oliver (Co-director, North Carolina Program for Forensic Science) (2007): Soil Forensic Investigation - Jonathon Blackwell Murder Case #04-4655: Identification of White Material in Forensic Soil #38.

- Hesterberg, D. with Department of Environmental Affairs, Marine Corps Air Station (MCAS)-Cherry Point (1998) Kinetics of Heavy-Metal Dissolution in Soils from MCAS Site 7 as Affected by Atomic-Scale Chemical Speciation, Redox Potential, and pH.
- Hesterberg, D. and A. Przepiora. (1997) for Charlotte-Mecklenburg Storm Water Services: Development of a Flocculation Treatment for Reducing Turbidity of Water Discharged from the Silverstone Subdivision.
- Hesterberg, D. and A. Przepiora (1997) for ReUse Technologies, Inc.: Column Studies to Evaluate Scrubber Byproduct as a Chemical Flocculant for Sedimentation Basins.
- Sayers, D. E. and D. Hesterberg. (1996) for North Carolina, Dept. of Environ., Health, and Natural Resources (DEHNR), Division of Waste Management. X-ray Absorption Spectroscopy Analysis of Groundwater Aquifer Samples from the By-pass 601 (Superfund) Site.

Teaching and Extension Presentations

- 1999, 2001, 2006: Soil Science Institute (held at NC State University for USDA-NRCS professionals): Presented five lectures each year on Soil Mineralogy and Soil Chemistry.
- 2006: Clapp, A., D. Hesterberg, and D. Lindbo. March 8, 2006. The science behind clay mineralogy and regulation. North Carolina On-site Wastewater Conference. presented by D. Lindbo. Central NCPHA Meeting, Lee County, NC.
- 2005: Clapp, A., D. Hesterberg, and D. Lindbo. 2005. The Science Behind Apparent CEC, Atterberg Limits, Morphology, and Expansive Mineralogy and Regulation. 21st Annual On-site Wastewater Treatment Conference. Oct. 25-27, 2005. Raleigh, NC.
- 2000 – 2003: Lectures on clay mineralogy at the Soils 201 course (“Expansive vs. Non-expansive Soils”) for the Soils and On-site Wastewater Training Academy for working professionals designing on-site wastewater systems (Spring 2000, Fall 2000, 2001, Spring 2002, Fall 2002, 2003).