

CURRICULUM VITA OF DEAN HESTERBERG

William Neal Reynolds Distinguished Professor

Department of Soil Science

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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

Thank a Teacher Program (student recognition) (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	77	Invited Presentations	45
Book Chapters	7	Professional abstr. & presentations	140

TEACHING, ADVISING, AND MENTORING ACTIVITIES

Courses Taught: SSC 521 (Soil Chemistry): 1994-2007, 2009-2014. Cumulative average evaluations (5 pt. scale): 4.74 (overall course) and 4.81 (overall instructor) (401 students total); SSC 553, 553L

(Soil Mineralogy, Mineralogy Lab): 1993, 1995, 1999, 2001, 2005, 2007. Cumulative average evaluations: 4.79 (overall course) and 4.74 (overall instructor) (23 students total); SSC 601/801 (Soil Science Seminar) Spring 2005, Fall 2005; Cumulative average evaluations: 4.88 (overall course) and 4.97 (overall instructor) (12 students total); SSC 609/809 Professional Development (lecture on publication writing); Special Topics in Soil Chemistry (Guest Lecturer): 2008, 2010, 2012, Department of Agricultural Chemistry, National Taiwan University (~90 students total); Special Topics in Soil Chemistry (Instructor): 2012, Department of Soil and Environmental Sciences, National Chung Hsing University, Taichung, Taiwan (~30 students); SSC 609/809 (Scientific Modeling and the Research Process): 2011, 2013.

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), Daphne 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); Liang-Ching Hsu (Ph.D. – 12-mo. visiting student from National Chsung Hsing Univ., Taiwan), Luiz Francisco da Souza Silva Filho (6-mo. visiting student from Univ. of Sao Paulo, Brazil); Wedisson Santos (12-mo. visiting student from Federal University of Viçosa), Sheila Santos (Wedisson Santos (6-mo. visiting student from Univ. of Sao Paulo, Brazil)
Undergraduate Research Students: Jason Lowrey, Lori A. Moll, Jonathon Zehr, Brittany Nowak, Shane Scheibener, Allison Sams (co-advise).

Graduate Committee member: Served or serving as member of 55 additional M.S., Ph.D., or A.L.S. student committees since 1993 in the following departments: Soil Science, Biological and Agricultural Engineering, Botany, Civil Engineering, Crop Science, Horticulture, Nuclear Engineering, Plant Pathology, Toxicology, Forestry, 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).

Postdoctoral Researcher Advisees: Dr. Shan-Li Wang (2001-02); currently Assoc. Professor of Soil Chemistry, Dept. of Soil and Environmental Sciences, National Chung Hsing University, Taichung, Taiwan; Dr. Maria Hernandez-Soriano (2010-11; Fulbright Fellow); Dr. Navdeep Kaur (2010-12), Dr. Nelson Rivera (2012-14).

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)

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-); Dr. Wei Shi; Professor of Soil Microbiology (Chair, 2006-); Dr. Jeff White, Assoc. Professor of Soil Productivity, Nutrient Management, and Remote Sensing (participant, 2006).

Ad Hoc student mentoring: Synchrotron X-ray absorption spectroscopy data collection and analysis: 2002: Damien Reymond (University of Lausanne, Switzerland); 2007-2009: David Eveborn (KTH-Sweden); 2009 – 2010: Provided 3 to 4 week, hands-on training program in EXAFS data analysis to visiting students: Chiou-Pin Chen (National Taiwan University), Carin Sjöstedt (KTH-Sweden), and Glauce Lorenzo (Federal University of Viçosa, Brazil).

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 Sci. Soc. 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”. 56th Annual Meetings of the Soil Science Society of North Carolina. 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 and National Chsung 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. “Phosphorus Chemistry in Mineral Systems and its Application to Soilless Potting Media”. NC State Department of Horticultural Science Seminar (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 Johann Bouma) for Conference: “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 Chemical Society, Clay Minerals Society, American Society of Agronomy, Geochemical Society, North Carolina Soil Science Society, American Association for the Advancement of Science, Alpha Zeta, Pi Alpha Xi (National Honor Society for Horticulture).

SELECTED UNIVERSITY AND PROFESSIONAL SERVICE ACTIVITIES

NC State University Service

- Administrative Processes Streamlining Committee (2011-present); 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); Search Committee, Soil Biogeochemistry faculty position (2006); Soil Science Department Head Advisory Committee (2006-2007); Soil Science Department Head Search Committee (2005); CALS Research Committee (2000-2003; Chair 2002-2003); Dept. of Soil Science, Post-tenure review committees (three since 2008); Dept. of Soil Science Marketing Committee (new, Chair – 2007; 2008); Member of NC State faculty team to participate in Chancellor (Maryanne Fox) “Breakfast” sessions (2003).

State, Regional, National, and International Professional Activities

- Imaging Beamline Review Team member. Stanford Synchrotron Radiation Lightsource (SSRL), Stanford, CA (Mar. 4, 2015)
- Beamline Advisory Team (BAT) Spokesperson. Submicron Resolution X-ray Spectroscopy (SRX) Beamline under construction at NSLS-II, Brookhaven National Laboratory, Upton, NY (2013 - 2014).
- Chair of Mineralogy Division, International Union of Soil Science (2010 - 2014)
- Soil Sci. Soc. Am. “Marion L. and Chrystie M. Jackson Soil Science Award Committee” (member 2012-2014; 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. 2011, 2013 ICOBTE (Int'l Conference on the Biogeochemistry of Trace Elements)
- 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 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”. 20th 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. 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 – 6/30/2016)
2. 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).
3. 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).
4. 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 (9/1/2005-8/31/2010).
5. 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.).
6. Hesterberg, D. 2000. Phosphate Retention in Mixed Mineral Systems as Affected by Redox Potential. USDA-NRI. \$190,000 (36 mo.).
7. 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.).
8. Hesterberg, D. 1998-99 DuPont Educational Aid program. \$20,000/12 mo. Unrestricted grant to enhance university teaching and research in environmental chemistry.
9. Haney, C. A., D. E. Sayers, and D. Hesterberg. 1998. Characterization of arsenic containing compounds in soils and groundwater. NSF. \$19,998 (24 mo.).
10. 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.).
11. McLaughlin, R., D. Hesterberg, J. Kleiss, W. Faircloth, C. Franklin, G. Jennings, J. E. Parsons. 1997. Sedimentation Basin Design Improvements Demonstration Project. US-EPA 319 Project. \$61,050 (28 mo.).
12. Hesterberg, D., J. E. Parsons, J. W. Gilliam, and D. K. Cassel. 1997. Demonstration Package for Sedimentation Basin Skimmers and Chemical Flocculants. NC-DEHNR - Sediment Control Commission. \$27,812 (24 mo.) .
13. Hesterberg, D. 1997. Development of a Flocculation Treatment for Reducing Turbidity of Water Discharged from the Silverstone Subdivision. Charlotte-Mecklenburg Storm Water Services. \$14,916 (4 mo.).
14. Hesterberg, D. 1997. Kinetics of Heavy-Metal Dissolution in Soils from MCAS Site 7 as Affected by Atomic-Scale Chemical Speciation, Redox Potential, and pH. US Marine Corps. \$16,338 (14 mo.).
15. Sayers, D. E. and D. Hesterberg. X-ray Absorption Spectroscopy Analysis of Groundwater Aquifer Samples from the By-Pass 601 Site. NC-DEHNR, Division of Solid Waste Management. \$9,950 (2 mo.).
16. 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.).
17. Hesterberg, D. and R. L. Mikkelsen. 1994. Radioisotope Training Program for International Atomic Energy Agency (IAEA) Fellow. IAEA. \$5,460 (6 mo.).

PEER-REVIEWED JOURNAL PUBLICATIONS

1. Hesterberg, D., M. Polizzotto, C. Crozier, and R. Austin. 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*. In revision post-review.
2. Barnes, J., P. Nelson, B.E. Whipker, D.A. Dickey, D. Hesterberg, and W. Shi. Modeling impact of nitrogen carrier and concentration on substrate pH. *J. Plant Nutrition* (accepted 20 Dec. 2014).
3. Rivera, N., N. Kaur, D. Hesterberg, C.R. Ward, R.E. Austin, and O.W. Duckworth. Chemical composition, speciation, and elemental associations in coal fly ash samples related to the Kingston ash spill. *Energy & Fuels*. In press. doi: <http://dx.doi.org/10.1021/ef501258m>.
4. Eriksson, A.K., J.P. Gustafsson, and D. Hesterberg. Phosphorus speciation of clay fractions from long-term fertility experiments in Sweden. *Geoderma* 241:68-74.
5. 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) Journal*. 58:293-301.
6. Guinness, J., M. Fuentes, D. Hesterberg, and Polizzotto, M. 2014. Multivariate spatial modeling of conditional dependence in microscale soil elemental composition data. *Spatial Statistics*. In press.
7. 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.
8. 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.
9. Cook, R. L. and D. Hesterberg. 2013. Comparison of trees and grasses for rhizoremediation of petroleum hydrocarbons. *International Journal of Phytoremediation*. 15:844-860.
10. 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.
11. Churchman, J., D. Hesterberg, and B. Singh. 2012. Soil Clays. (Editorial as Guest Editors) *Applied Clay Science*. 64:1-3.
12. Kim, H., D. M. Amatya, S.W. Broome, D. Hesterberg, and M. Choi. 2012. Sensitivity analysis of the DRAINWAT model applied to an agricultural watershed in the lower coastal plain, North Carolina, USA. *Water and Environment Journal* 26:130-145.
13. Morris, A. J. and D. Hesterberg. 2012. Iron(III) coordination and phosphate sorption in peat reacted with ferric or ferrous iron. *Soil Science Society of America Journal* 76:101-109.
14. Liu, Y. T. and D. Hesterberg. 2011. Phosphate bonding on non-crystalline Al/Fe-hydroxide co-precipitates. *Environmental Science and Technology* 45:6283-6289.
15. Kang, J. H., A. Amoozegar, D. Hesterberg, and D.L. Osmond. 2011. Phosphorus leaching in a sandy soil as affected by fertilizer source. *Geoderma*. 161:194-201.
16. Hesterberg, D., M. Duff, J. B. Dixon, and M. J. Vepraskas. 2011. X-ray microspectroscopy and chemical reactions in soil microsites. *Journal of Environmental Quality* 40:667-678.
17. Kizewski, F., A. Morris, Y.-T. Liu, and D. Hesterberg. 2011. Spectroscopic approaches for phosphorus speciation in soils and other environmental systems. *Journal of Environmental Quality* 40:751-766.
18. Bi, Y., D. L. Hesterberg, and O. W. Duckworth. 2010. Siderophore-promoted dissolution of cobalt from hydroxide minerals. *Geochimica et Cosmochimica Acta* 74:2915-2925.
19. Kizewski, F.R., P. Boyle, D. Hesterberg, and J. D. Martin. 2010. Mixed anion (phosphate/oxalate) bonding to iron(III) materials. *Journal of the American Chemical Society* 132:2301-2308.

20. Hashimoto, Y., T.J. Smyth, D.W. Israel and D. Hesterberg. 2010. Lack of soybean root elongation responses to micromolar magnesium additions and fate of root-exuded citrate in acid subsoils. *Journal of Plant Nutrition* 33:219-239.
21. Eveborn, D., J. P. Gustafsson, D. Hesterberg, and S. Hillier. 2009. XANES speciation of P in environmental samples: an assessment of filter media for on-site wastewater treatment. *Environmental Science and Technology* 43:6515-6521.
22. Shah, S. B., K. J. Hutchison, D. Hesterberg, G. L. Grabow, R. L. Huffman, D. H. Hardy, and J. T. Parsons. 2009. Leaching of nutrients and trace elements from stockpiled turkey litter into soil. *Journal of Environmental Quality* 38:1053-1065.
23. Kang, J., D. Hesterberg, and D. L. Osmond. 2009. Soil organic matter effects on phosphorus sorption: a path analysis. *Soil Science Society of America Journal* 73:360-366.
24. Hashimoto, Y., T. J. Smyth, D. Hesterberg, and D. W. Israel. 2007. Soybean root growth in relation to ionic composition in magnesium-amended acid subsoils: Implications on root citrate ameliorating aluminum constraints. *Soil Science and Plant Nutrition*. 53:753-763.
25. Rippy, J.F.M., P.V. Nelson, and D.L. Hesterberg. 2007. Reaction times of twenty limestones. *Communications in Soil Science and Plant Analysis*. 38:1775-1783.
26. Khare, N., J. D. Martin, and D. Hesterberg. 2007. Phosphate bonding configuration on ferrihydrite based on molecular orbital calculations and XANES fingerprinting. *Geochimica et Cosmochimica Acta* 71:4405-4415.
27. McKinney, D. and D. Hesterberg. 2007. Kinetics of AgI precipitation from AgCl as affected by background electrolyte. *Journal of Radionuclear Chemistry* 237:289-297.
28. Hesterberg, D., A.B. de Vos, and P.A.C. Raats. 2006. Chemistry of subsurface drain discharge from an agricultural polder soil. *Agricultural Water Management*. 86:220-228.
29. Shoher, A. L., D. L. Hesterberg, J. T. Sims, and S. Gardner. 2006. Characterization of phosphorus species in biosolids and manures using XANES spectroscopy. *Journal of Environmental Quality* 35:1983-1993.
30. Murray, G. C. and D. Hesterberg. 2006. Iron and phosphate dissolution during abiotic reduction of ferrihydrite-boehmite mixtures. *Soil Science Society America Journal* 70:1318-1327.
31. Maguire, R. O., D. Hesterberg, A. Gernat, K. Anderson, M. Wineland, and J. Grimes. 2006. Liming poultry manures to kill pathogens and decrease soluble phosphorus. *Journal of Environmental Quality* 35:849-857.
32. Fichtner, E. J., D. L. Hesterberg, T. J. Smyth, and H. D. Shew, H. D. 2005. Differential sensitivity of *Phytophthora parasitica* var. *nicotianae* and *Thielaviopsis basicola* to monomeric Al species. *Phytopathology* 96:212-220.
33. Khare, N., D. Hesterberg, and J. D. Martin. 2005. XANES investigation of phosphate sorption in single and binary mixtures of iron and aluminum oxide minerals. *Environmental Science and Technology*. 39:2152-2160.
34. Rippy, J.F.M., P.V. Nelson, D. L. Hesterberg, and E. J. Kamprath. 2004. Specific surface versus particle diameter of limestones. *Hortscience* 39:877-878.
35. Pfeifer, H. R., A. Gueye-Girardet, D. Reymond, C. Schlegel, E. Temgoua, D. Hesterberg, and J. W. Chou. 2004. Dispersion of natural arsenic in the Malcantone watershed, Southern Switzerland: field evidence for repeated sorption-desorption and oxidation-reduction processes. *Geoderma* 122:205-234.
36. McKinney, D. S., M.-S. Yim, and D. Hesterberg. 2004. Examination of Backfill Materials for High-Level Waste Repository. *Technology* 9:187-194.
37. Hutchison, K. J. and D. Hesterberg. 2004. Dissolution of phosphate in a phosphorus-enriched Ultisol as affected by microbial reduction. *Journal of Environmental Quality* 33:1793-1802.
38. Bang, J. and D. Hesterberg. 2004. Dissolution of trace element contaminants from two Coastal Plain soils as affected by pH. *Journal of Environmental Quality* 33:891-901.

39. Beauchemin, S., D. Hesterberg, J. Nadeau, and J. C. McGeer. 2004. Speciation of hepatic Zn in trout exposed to elevated waterborne Zn using X-ray absorption spectroscopy. *Environmental Science and Technology* 38:1288-1295.
40. Khare, N., D. Hesterberg, S. Beauchemin, and S. L. Wang. 2004. XANES determination of adsorbed phosphate distribution between ferrihydrite and boehmite in mixtures. *Soil Science Society of America Journal* 68:460-469.
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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*, 2nd 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 release 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 Site.

Teaching and Extension Presentations

1999, 2001, 2006: Soil Science Institute (held at NC State University for USDA-NRCS professionals): Presented five lectures 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: Presented lectures on clay mineralogy at the Soils 201 course (“Expansive vs. Non-expansive Soils”) for the Soils and On-site Wastewater Training Academy designed for working professionals designing on-site wastewater systems (Spring 2000, Fall 2000, 2001, Spring 2002, Fall 2002, 2003).