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Education

- Ph.D.** Chemistry (Analytical specialization), Ohio State University, Columbus, OH, 2006
Thesis: *The organic geochemistry of charcoal black carbon in forest soils.*
Advisor: Patrick G. Hatcher
- B.Sc.** Chemistry, Environmental Science, Muskingum College, New Concord, OH, 2001
Thesis: *Methane ¹³C/¹²C isotopic fractionation by stem transport in two rice cultivars*
Advisor: Rebecca S. Bilek

Professional Appointments

- 2016-present Associate Professor, Baylor University, Department of Geosciences
Graduate Program Director, Baylor University, Institute of Ecological, Earth, and Environmental Sciences
- 2010-2016 Assistant Professor, Baylor University, Department of Geology
- 2006-2010 Post-Doctoral Fellow, Rice University, Department of Earth Science
Sponsor: Caroline A. Masiello

Teaching

I teach three courses per year at Baylor. The courses in my regular rotation are:

- GEO 5322 **Organic Geochemistry** (lecture + lab)
- GEO 4322 **Global Biogeochemical Cycles** (lecture + lab)
- GEO 5V90 **The Anthropocene** (lecture)
- GEO 5V90 **Grant Writing** (lecture)
- GEO 1402 **The World Oceans** (lecture)
- FAS 1407 **Grand Challenges in Earth Science** (lecture + lab)

Peer Reviewed Publications (underlining denotes student author)

1. Cusack, D.F., Halterman, S.M., **Hockaday, W.C.**, Tanner, E.V.J., Wright, S.J., Turner, B.L., Decadal-Scale Litter Manipulation Drives Rapid Changes in Mineral-Associated Soil Organic Carbon, *Soil Biology & Biochemistry*, 124, 199-209, 2018. DOI: [10.1016/j.soilbio.2018.06.005](https://doi.org/10.1016/j.soilbio.2018.06.005)
2. Nguyen, Michael, Hockaday, W.C., Lau, B.L., Is the adsorption of soil organic matter onto Hematite temperature-dependent?, *European Journal of Soil Science* (DOI:10.1111/ejss.12694)
3. Pyle, L.A., Magee, K.L., Gallagher, M.E., **Hockaday, W.C.**, Masiello, C.A., Short term changes in physical and chemical properties of soil charcoal support enhanced landscape

- mobility, *JGR-Biogeosciences*, 2017, DOI: [10.1002/2017JG003938](https://doi.org/10.1002/2017JG003938).
4. Gallagher, M.E., [Liljestrand, F.L.](#), **Hockaday, W.C.**, Masiello, C.A., Plant species, not climate, controls biomass O₂:CO₂ exchange ratios in deciduous and coniferous ecosystems. *JGR-Biogeosciences* 2017, DOI: [10.1002/2017JG003938](https://doi.org/10.1002/2017JG003938).
 5. Gulbranson, E. L., B. F. Jacobs, W. C. **Hockaday**, M.C. Wiemann, L. A. Michel, Ancient Angiosperm nitrogen uptake strategies inferred from stable isotope analysis of fossil tree rings, Oligocene, Ethiopia, *Geology*, 2017. DOI:[10.1130/G39213.1](https://doi.org/10.1130/G39213.1)
 6. [Longbottom, T.L.](#), **W.C. Hockaday**, K.S. Boling, S.I. Dworkin, Effect of ocean oxidation on the chemical structure of marine kerogen, *Organic Geochemistry*, 106, 1-12, 2017. DOI: [10.1016/j.orggeochem.2017.01.002](https://doi.org/10.1016/j.orggeochem.2017.01.002)
 7. [Valdez, Z.P.](#), **W.C. Hockaday**, C.A. Masiello, M.E. Gallagher, G.P. Robertson, Soil Carbon and Nitrogen Responses to Nitrogen Fertilizer and Harvesting Rates in Switchgrass Cropping Systems, *Bioenergy Research*, 10,1, 2017. DOI: [10.1007/s12155-016-9810-7](https://doi.org/10.1007/s12155-016-9810-7).
 8. [Chang, J.](#), [Jugeshwar Singh](#), [Sungshil Kim](#), **W.C. Hockaday**, [Cheolho Sim](#), and [Sung Joon Kim](#), Solid-state NMR reveals differential carbohydrate utilization in diapausing *Culex pipiens* *Nature*, *Scientific Reports*, 6, 37350, 2016. DOI: [10.1038/srep37350](https://doi.org/10.1038/srep37350).
 9. [Longbottom, T.L.](#), **W.C. Hockaday**, [K.S. Boling](#), [G.Y. Li](#), [Y. Letourmy](#), H.L. Dong, S.I. Dworkin, Organic structural properties of kerogen as predictors of source rock type and hydrocarbon potential, *Fuel*, 184, 792-798, 2016. DOI: [10.1016/j.fuel.2016.07.066](https://doi.org/10.1016/j.fuel.2016.07.066)
 10. [Pyle, L.A.](#), **W.C. Hockaday**, T. Boutton, K. Zygourakis, T. Boutton, C.A. Masiello, Chemical and isotopic thresholds in charring: implications for the interpretation of charcoal mass and isotopic data, *Environmental Science & Technology*, 49 (24), 14057–14064, 2015. DOI: [10.1021/acs.est.5b03087](https://doi.org/10.1021/acs.est.5b03087)
 11. **Hockaday**, W.C., M. Gallagher, C. Masiello, J. Baldock, C. Iversen, R. Norby, Forest soil carbon oxidation state and oxidative ratio responses to elevated CO₂. *Journal of Geophysical Research-Biogeoscience* 120, 2015. DOI: [10.1002/2015JG003010](https://doi.org/10.1002/2015JG003010).
 12. Nesmith, S.M., C.J. Wynveen, [E. Dixon](#), C.W. Matson, B.W. Brooks, **W.C. Hockaday**, M. Schaum, Exploring educators' environmental education attitudes and Efficacy: Insights from a Texas Wetland Academy, *International Journal of Science Education Part B: Communication and Public Engagement*. DOI: 10.1080/21548455.2015.1078519.
 13. Miesel, J., **W. Hockaday**, R. Kolka, P. Townsend. Soil organic matter composition and quality across fire severity gradients in coniferous and deciduous forests of the southern boreal region, *Journal of Geophysical Research-Biogeosciences*, 120, 1124–1141. DOI: 10.1002/2015JG002959
 14. Vogel, J., [D. He](#), E. Jokela, **W. Hockaday**, E. Schuur, The effect of fertilization levels and genetic deployment on soil organic carbon constituents, chemistry, and mean residence time in managed loblolly pine (*Pinus taeda* L.) forests, *Forest Ecology and Management* (in press) DOI:10.1016/j.foreco.2015.05.020.
 15. [Dhugana, B.](#), C. Becker, B. Zekavat, **W. Hockaday**, C.K. Chambliss, Characterization of slow pyrolysis bio-oil from pine shavings and corn stover feedstocks by negative electrospray ionization-ion mobility high-resolution mass spectrometry, *Energy and Fuels*, 29(2), 744-753, 2015, DOI: 10.1021/ef5016389.

16. M.A. Kleber, **W. Hockaday**, P.S. Nico, Characteristics of biochar Macromolecular Properties, Chapter 6, pp109-135. IN: Biochar for Environmental Management: Science and Technology, 2nd Edition, J. Lehmann and S. Joseph, editors. Earthscan publishers, London, 2015.
17. D.B. Wiedemeier, S. Abvien, **W. Hockaday**, M. Keiluweit, M. Kleber, C. Masiello, A.V. McBeath, P.S. Nico, L.A. Pyle, M.P.W. Schneider, R.J. Smernik, G.L. Wiesenberg, M.W.I. Schmidt, Aromaticity and degree of aromatic condensation of chars, *Organic Geochemistry*, 78, 135-143, 2015.
18. J. Yao, **W. Hockaday**, D. Murray, J. White, The storage change of fire-derived soil charcoal in a sub-humid woodland, *Journal of Geophysical Research-Biogeosciences*, 119, 9, 1807-1819, 2014.
19. M.E. Gallagher, C.A. Masiello, **W. Hockaday**, J.A. Baldock, S. Snapp, C.P. McSwiney, Controls on the Oxidative Ratio of Net Primary Production in Agricultural Ecosystems, *Biogeochemistry*, DOI 10.1007/s10533-014-0024-9, 2014.
20. A. D. Olaitan, Behrooz Zekavat, Birendra Dhungana, **W. Hockaday**, C. Kevin Chambliss, Touradj Solouki, Analysis of Volatile Organic Compound Mixtures Using Radiofrequency Ionization/Mass Spectrometry, *Chemical Analysis*, 6, 4982-4987, 2014.
21. Michael Nguyen, **W. Hockaday**, B.L.T. Lau, Probing Temperature-Dependent Organo-Mineral Interactions with molecular spectroscopy and Quartz Crystal Microgravimetry, pp. 189-195, in *Soil Carbon*, Progress in Soil Science series XXVI, Hartemink, A.E., McSweeney, K. (Eds.), Springer, 2014.
22. M.P.W. Schneider, L.A. Pyle, K.L. Clark, **W. Hockaday**, C. Masiello, M. Schmidt, Toward a “molecular thermometer” to estimate the charring temperature of wildland charcoals derived from different biomass sources, *Environmental Science & Technology*, 47, 11490-11495, 2013.
23. C. LeCroy, C. Masiello, J. Rudgers, **W. Hockaday**, J. Silberg, Nitrogen, Biochar, and Mycorrhizae: Alteration of the Symbiosis and Oxidation of Char Surface, *Soil Biology and Biochemistry*, 58,248-254, 2013
24. B.L.T. Lau, **W. Hockaday**, K. Ikuma, O. Furman, A.W. Decho, A preliminary assessment of the interactions between capping agents of silver nanoparticles and environmental organic matter, *Colloids and Surfaces A: Physicochemical and Engineering Aspects*, 435, 22-27, 2013.
25. Koarashi, J., **W. Hockaday**, Trumbore, S., Masiello, C. Dynamics of decadally-cycling carbon in subsurface soils, *Journal of Geophysical Research-Biogeosciences*, 117, G03033, 2012.
26. D.F. Cusak, O.A. Chadwick, **W. Hockaday**, P.M. Vistousek, Mineralogical controls on soil black carbon preservation, *Global Biogeochemical Cycles*, 26, GB004109, 2012.
27. H. Sun, **W. Hockaday**, C.A. Masiello, K. Zygourakis, Multiple controls on the physical and chemical properties of biochars, *Industrial & Engineering Chemistry Research*, 51, 3587-3597, 2012.
28. Kinney, T., C.A. Masiello, B. Dugan, **W. Hockaday**, M.R. Dean, K. Zygourakis, R.T. Barnes, Hydrologic properties of biochars produced at different temperatures, *Biomass and Bioenergy*, 34-43, 2012.
29. D. Li, **W. Hockaday**, C.A. Masiello, P.M. Alvarez, Earthworm avoidance of biochar can be mitigated by wetting, *Soil Biology and Biochemistry*, 43, 1732-1737, 2011.
30. J. Lehmann, M. Rillig, J. Thies, C.A. Masiello, **W. Hockaday**, Biochar effects on soil biota – a review, *Soil Biology and Biochemistry*, 43, 1812-1836, 2011.

31. M. Gallagher, **W. Hockaday**, C. Masiello, S. Snapp, C. McSweeney, J. Baldock, Biochemical Suitability of crop residues for cellulosic ethanol: Disincentives to nitrogen fertilization in corn agriculture, *Environmental Science & Technology*, 45, 2013 – 2020, 2011.
32. F.-W. Zeng, C. Masiello, **W. Hockaday**, Controls on the cycling of dissolved inorganic carbon in the Brazos River, Texas, *Biogeochemistry*, 104, 275-291, 2011.
33. E. Kane*, **W. Hockaday***, C. Masiello, M. Turetsky, Topographic controls on black carbon accumulation in Alaskan black spruce forest soils: implications for organic matter dynamics. *Biogeochemistry*, 100, 39-56, 2010. * authors contributed equally
34. B. Nguyen, J. Lehmann, S. Joseph, **W. Hockaday**, C. Masiello, Temperature sensitivity of black carbon decomposition, *Environmental Science & Technology*, 44, 3324-3331, 2010.
35. K. Schreiner, T. Filley, R. Blanchette, B. Bowen, R. Bolskar, **W. Hockaday**, and C. Masiello, White rot basidiomycete-mediated decomposition of C₆₀ fullerol, *Environmental Science & Technology*, 43, 3162-3168, 2009.
36. **W. Hockaday**, C. Masiello, R. Smernik, J. Baldock, O. Chadwick, and J. Harden, The measurement of soil carbon oxidation state by ¹³C nuclear magnetic resonance, *Journal of Geophysical Research-Biogeosciences*, 114, G02014, doi.10.1029/2008jg000803, May 2009.
37. **W. Hockaday**, J. Purcell, J. Baldock, P. Hatcher, Electrospray and photo-ionization mass spectrometry for the characterization of organic matter in natural waters: A qualitative assessment, *Limnology and Oceanography: Methods*, 7, 81-95, 2009.
38. J. Fernández, **W. Hockaday**, C. Plaza, A. Polo, P. Hatcher, Effects of long-term soil amendment with sewage sludges on soil humic acid thermal and molecular properties, *Chemosphere*, 2008. Doi:10.1016/j.chemosphere.2008208.001
39. **W. Hockaday**, A. Grannas, S. Kim, P. Hatcher, The transformation and mobility of charcoal black carbon in a fire-impacted watershed, *Geochimica et Cosmochimica Acta*. 71, 3432-3445, 2007.
40. K. Hammes, M. Schmidt, and 40 other authors including **W. Hockaday**, Comparison of quantification methods to measure fire-derived (black/elemental) carbon in soils and sediments using reference materials from soil, water, sediment, and the atmosphere, *Global Biogeochemical Cycles*. 21, GB3016, 2007.
41. A. Grannas, **W. Hockaday**, P. Hatcher, L. Thompson, E. Mosley-Thompson, New revelations on the nature of water-soluble organic matter preserved in ice cores, *Journal of Geophysical Research-Atmospheres*, 111, D04304, 2006.
42. **W. Hockaday**, S. Kim, A. Grannas, P. Hatcher, Direct molecular-level evidence for the degradation of black carbon in soils from ultrahigh resolution mass spectral analysis of dissolved organic matter from a fire impacted forest soil, *Organic Geochemistry*, 37, 501-510, 2006.
43. P. Trompowsky, V. Benites, A. Pimenta, B. Madari, **W. Hockaday**, P. Hatcher, Characterization of humic-like substances obtained by chemical oxidation of eucalyptus charcoal, *Organic Geochemistry*, 36, 1480-1489, 2005.

Supervision of Student Research

I actively mentor, and sponsor undergraduate student, graduate students, and postdocs in laboratory and field-based research. Their research topics and current affiliations are tabulated below.

Student Name	Position / degree date	Research Area / Thesis topics	Current Affiliation
<i>Graduate Students</i>			
Zhao Wang	Ph.D. candidate, Geology	Plant molecular markers of abiotic stress	Baylor University
Zachary P. Valdez	Ph.D. candidate (ABD) Ecological, Earth, & Environmental Science 2011 - present	Sustainable Bioenergy: The effects of fertilization and harvesting rates on root chemistry and soil carbon storage potential in <i>Panicum virgatum</i> (switchgrass) plantations	Baylor University US Senate Democratic Committee on Energy & Natural Resources (AAAS Fellow)
Owen Craven	M.S. Geology, May 2018	Organic Matter Structural Changes During Catagenesis: Implications of Kerogen Chemical Structure on Petroleum Yield and Composition	Pioneer Natural Resources (Intern)
Todd Longbottom	Ph.D. Geology, Aug. 2017	Sedimentary Organic Matter Diagenesis: Oxidative Transformations and Dynamics upon Pyrolysis	Baylor University
Michael Nguyen (co-advisor)	Ph.D. candidate Geology 2012 – present	Temperature dependence of organo-mineral interactions	Transferred to University of Massachusetts Amherst with professor Boris Lau (funded by NSF graduate fellowship) Now faculty at Loyolla University, Arrupe College
Justin Von Barga	M.S geology, May. 2013	Charcoal Molecular structure: Developing a Proxy for Paleo-fire Regime	Pioneer Natural Resources, Fort Worth, TX
<i>Postdoctoral Scientists</i>			
Dr. Nathaniel Adegboyega	Postdoc, March 2015 - 2018	Molecular-level investigation of engineered silver nanoparticle interactions with natural organic matter in aqueous systems	Southern Illinois University, Edwardsville (tenure track)
Dr. Rixiang Huang	Postdoc, Jan – May 2014	Synthesis and characterization of hydrous pyrolysis chars and aqueous leachates	State University of New York, Albany (tenure track)
Dr. Nelson van der Velde	Postdoc, 2013-2014	Gas Chromatographic analysis of polar fractions (pyroligneous acids) from the pyrolytic conversion of biomass liquids	Buckman Laboratories, Houston, TX. (specialty chemicals for industrial water treatment)

Dr. K. Jugeshwar Singh	Postdoc, 2012-2013	Nuclear Magnetic Resonance Spectroscopy study of the plant biomass pyrolysis products: bio-oils and bio-chars	Indian Institute of Science, Experimental Physics, Bangalore, India Teacher Training Programs
<i>Undergraduate Thesis Students</i>			
Nicolas Cestari	B.S. geology, May 2013	Fidelity of n-Alkane Biomarkers for Ecosystem Reconstruction: A Forest-to-Grassland Transect in Central Texas	University of Kansas, M.S., now employed by Occidental Petroleum Corp.
Charles Keracik	B.S. geology, Aug. 2014	Relating kerogen chemical structure to pyrolytic oil potential of the Eagle Ford Shale	Texas Tech University, Graduate student
Rebecca Davis	B.S. geology, Aug. 2014	The geochemical origin of black carbon stability in boreal forest soils	Hampton Inn & Suites
Creighton Meyers	B.S. geology, Aug. 2014	High volume sampling methods for particulate organic matter in natural waters: A case study of the Brazos River in central Texas	Univ.of Texas at San Antonio, 2014-2017, M.S. Degree Texas A&M Univ. 2017-present, Ph.D. candidate
Emily Blackaby	B.S. geology, Dec. 2018 (expected)	Molecular Analysis of Flood Deposits in the Tennessee River Valley: Implications for Understanding Carbon Cycling in Fluvial Environments	Baylor University

Educational Outreach Activities

- **Visiting Scientist Program:** As part of NSF EAR-IF award 1132124, I am able to host visiting scientists for 2 – 4 weeks at Baylor University for individualized workshops and collaborations on the application of solid-state NMR spectroscopy to research questions in Earth Science. The visitor’s home institutional affiliations include: Michigan Technical University, University of Pennsylvania, Nanjing Forestry University, Texas A&M University, Michigan State University, University of Wisconsin, Milwaukee, Iowa State University, and University of California Los Angeles (UCLA).
- **Wetland Science Workshop for P-12 Educators:** Summers of 2012, 2013, and 2018. I was a co-organizer and presenter of an interdisciplinary wetland science workshop for P – 12 school teachers in the Dallas-Fort Worth, and Waco areas. We provide teachers with stipends covering participation costs, age-appropriate curriculum materials, and small grants for class research and community outreach projects grants. I participating in this effort as a STEM faculty and member of Baylor’s Center for Reservoir and Aquatic Systems Research) with key Baylor Faculty in the School of Education and Social Sciences.
- **Advanced instrumentation workshops:** These are annual workshop organized by the Baylor Chemistry Department (<http://www.baylor.edu/chemistry/index.php?id=75906>). The participants are undergraduate students in chemistry from primarily undergraduate and

minority-serving institutions in Texas, Oklahoma, and Louisiana. I run a session on the basic theory and practice of nuclear magnetic resonance spectroscopy for solid samples. I have participated for 5 years, and trained about 90 students.

- Elementary School Visits & Field Trips: I regularly interact with K-12 students and educators by hosting fieldtrips to Baylor's Geoscience Department, by going to their classroom, and virtually through interactive webinars:
 - Mountainview Elementary, Waco ISD, "geologist for a day", May 2012
 - Mountainview Elementary, Waco ISD, "geologist for a day", May 2014
 - Mountainview Elementary, Waco ISD, "geologist for a day", May 2015
 - Robinson ISD, Intermediate School, "water quality and availability in Waco, TX, Sept. 20, 2016
 - Woodgate Creek Intermediate School, Woodway ISD, and 190 students from 9 classrooms located in New Jersey, Louisiana, Texas, California, and North Carolina through the interactive webinar service hosted by Nepris.com "Meet an Aquatic Scientist", April 20, 2018
- Professional development workshop/demonstration (August, 2011) for City of Austin water utility (Hornsby Bend Plant) on the implementation of biosolids and green waste pyrolytic conversion to biochar and biogas. There were approximately 30 engineers and land managers and public utilities managers in attendance.
- Continuing Education Workshops: Central Texas (Region 12) Educator Service Center – workshops for local K-12 teacher, designed to address deficiencies on state standardized tests in Earth Science knowledge areas
- Judge for Student Research Competitions: Denman Undergraduate Research Forum, Ohio State University, Columbus, OH, March 29, 2017; Central Texas Science and Engineering Fair, Texas State Technical College, February 21, 2017