

MARGARET A. G. HINKLE

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EDUCATION

Ph.D. (September 2010 – May 2015) in Earth & Planetary Sciences, Washington University in St. Louis. Dissertation: "Ion interactions at the mineral-water interface during biogeochemical iron and manganese cycling." *Advisor:* Prof. Jeffrey G. Catalano

A.M. (September 2010 – May 2012) in Earth & Planetary Sciences, Washington University in St. Louis. *Advisor:* Prof. Jeffrey G. Catalano

B.S. (September 2005 – May 2009) in Chemistry (academic minor: Anthropology), Sewanee: The University of the South, cum laude. *Research Advisor:* Prof. Robert E. Bachman, *Advisor:* Prof. John H. Shibata

PROFESSIONAL EXPERIENCE

2017-present **Assistant Professor**, Geology, Washington and Lee University

2015-2017 **Peter Buck Postdoctoral Fellow**, Mineral Sciences, National Museum of Natural History, Smithsonian Institution

2012-2014 **Washington University STEM Teaching-As-Research Intern**, Earth & Planetary Sci., Washington University in St. Louis

2012 **Student Mentor**, Students & Teachers as Research Scientists, St. Louis, MO

2010-2015 **Ph.D. Candidate**, Earth & Planetary Sci., Washington University in St. Louis

2008-2009 **Undergraduate Research Assistant**, Chemistry, Sewanee

2008 **I. Croom Beatty Research Intern**, Chemistry, Sewanee

TEACHING EXPERIENCE

Washington and Lee University, Assistant Professor, Fall 2017-Present

Courses Currently Teaching

1. GEOL240 Hydrology, Fall 2017, 4 credits (class + lab course).

Washington University in St. Louis, Graduate Student, 2010-2015

Teacher Training Activities

1. STEM Teaching-As-Research (WU-STAR) Intern, 2012-2014.
 - Designed and implemented a research project comparing structured-inquiry modeling assignments with traditional rote-based modeling assignments on enhancing students' conceptual knowledge and ability to interpret data and graphs. Learning gains were assessed by changes in pre- and post-questions for each assignment.
 - Audited a course on Teaching-As-Research methodology.
 - Presented a poster on the findings of this research at Washington University's Graduate Research Symposium in Spring 2013.
 - Gave a talk on my TAR results to Washington University's Education Research Group (ERG) in Fall 2013.

2. Mentor, Students & Teachers as Research Scientists (STARS), Summer 2012.
 - Mentored a high school student in the Catalano lab over the summer as part of the St. Louis STARS program. Responsibilities included:
 - developing a successful, independent research project for the high school student
 - guiding the research through daily progress meetings with the student
 - teaching the student about instruments and lab techniques, and
 - providing constructive feedback each week on paper writing skills.

3. Guest Lecturer, Biology 101 (Nerinx Hall High School, St. Louis), Spring 2011.
 - Held an afternoon lecture and Q&A session to a junior high school class on Earth and Planetary Sciences. Talked briefly about geophysics, geology, and geochemistry, focusing on the geodynamo, the Tōhoku earthquake, ArcGIS applications, and my research on ion adsorption to iron oxide minerals.

4. Activity Leader, Association for Women in Science (AWIS), 2010 & 2011.
 - Co-led and designed discussions and demonstrations on mineralogy and radial chromatography for high school female students interested in STEM fields at the annual Women in Science Day hosted by the AWIS, St. Louis Regional Chapter.

Teaching Assistantships

1. EPSc444 Environmental Geochemistry, Fall 2012 (class course)
 - Co-lectured the course, prepared and led discussions of assignment material, held weekly office hours, graded geochemical modeling assignments, and implemented the STEM Teaching-As-Research project described above.
2. EPSc201 Earth & the Environment (Introduction to Geology), Fall 2011 (class + lab course)
 - Taught a weekly lab section of 20 students, prepared and presented short lab lectures, graded exams and lab assignments, and held weekly office hours.
3. EPSc 108 Oceans & the Atmosphere, Fall 2010 (class).
 - Held weekly office hours for 80 students and graded assignments and exams.

Sewanee: The University of the South, Undergraduate Student, 2005-2009

Teacher Training Activities

1. Lab Assistant, CHEM 308 (Inorganic Chemistry), 2008.
 - Assisted with the weekly lab section, taught students how to use instruments (ATR-FTIR and UV-vis spectroscopy), collected NMR spectra of students' samples, and helped students interpret data.
2. Tutor, Chemistry Department, 2007-2008.
 - Held weekly sessions to provide tutoring for Sewanee students in General Chemistry I & II and Advanced General Chemistry.

PEER-REVIEWED PUBLICATIONS

1. **Hinkle M.A.G.**, Becker K.G., Catalano J.G. (2017) "Impact of Mn(II)-manganese oxide reactions on Ni and Zn speciation." *Environmental Science & Technology* **51**, 3187-3196.
2. **Hinkle M.A.G.**, Flynn E.D., Catalano J.G. (2016) "Structural response of phyllomanganates to wet aging and Mn(II)." *Geochimica et Cosmochimica Acta* **192**, 220-234.
3. Arvidson R.E., Squyres S.W., Morris R.V., Knoll A.H., Gellert R. Clark B.C., Catalano J.G., Jolliff B.L., McLennan S.M., Herkenhoff K.E., VanBommel S., Mittlefehldt D.W.,

Grotzinger J.P., Guinness E.A., Johnson J.R., Bell III J.F., Farrand W.H., Stein N., Fox V.K., Golombek M.P., **Hinkle M.A.G.**, Calvin W.M., Desouza Jr. P.A. (2016) “High concentrations of manganese and sulfur in deposits on Murray Ridge, Endeavour Crater, Mars.” *American Mineralogist* 101, 1389-1405.

4. **Hinkle M.A.G.** and Catalano J.G. (2015) “Effect of phosphate and sulfate on Ni repartitioning during Fe(II)-catalyzed Fe(III) oxide mineral recrystallization.” *Geochimica et Cosmochimica Acta* **165**, 62-74.
5. **Hinkle M.A.G.**, Wang Z., Giammar D.E., Catalano J.G. (2015) “Interaction of Fe(II) with phosphate and sulfate on iron oxide surfaces.” *Geochimica et Cosmochimica Acta* **158**, 130-146.
6. Bachman R.E., Bodolosky-Bettis S.A., Pyle C.J., **Gray M.A.** (2008) “Reversible oxidative addition and reductive elimination of fluorinated disulfides at gold (I) thiolate complexes: A new ligand exchange mechanism.” *Journal of the American Chemical Society* **130**, 14303-14310.

MANUSCRIPTS IN PREPARATION

1. **Hinkle M.A.G.**, Post J., Santelli C.M. “Effect of Good’s buffers on mycogenic manganese oxide formation.” *Planned submission October 2017*.

PRESENTATIONS (*denotes presenting author)

1. ***Hinkle M.A.G.**, Flynn E.D., Dye K.G., Santelli C.M., Post J.E., Catalano J.G. (2017) “Interfacial reactions during Mn biogeochemical cycling: Impact on Mn oxide structures and reactivities towards trace metals.” Invited oral presentation by Hinkle at the *253rd American Chemical Society Meeting*, San Francisco, CA, April 2017.
2. *Rosenfeld C., **Hinkle M.A.G.**, James B.R., Santelli C.M. (2017) “Dualing biominerals? Characterizing simultaneously produced fungal biogenic Mn oxides and Se(0). Invited oral presentation by Rosenfeld at the *253rd American Chemical Society Meeting*, San Francisco, CA, April 2017.
3. ***Hinkle M.A.G.** (2016) “Interfacial reactions during manganese biogeochemical cycling: Impact on mineral transformations and mycogenic manganese oxide

formation.” Invited oral presentation at the *Department of Geology, University of Maryland Geochemistry Seminar*, April 2016.

4. ***Hinkle M.A.G.**, Santelli C.M., Post J.E. (2015) “Impact of buffers on mycogenic manganese oxide formation.” Oral presentation by Hinkle at *The Geological Society of America Annual Meeting*, Baltimore, MD, November 2015.
5. ***Hinkle M.A.G.** (2015) “Interfacial reactions during Fe and Mn biogeochemical cycling: Impact on mineral transformations and trace element fate.” Invited oral presentation at the *Department of Chemistry, Sewanee*, October 2015.
6. *Catalano J.G., **Hinkle M.A.G.** (2015) “Contrasting effects on trace element fate of iron and manganese oxide transformations induced by electron transfer reactions.” Invited oral presentation by Catalano at *25th Goldschmidt Conference*, Prague, Czech Republic, August 2015.
7. *Catalano J.G., Becker K.G., Flynn E.D., Friedrich A.J., Gadol H.J., **Hinkle M.A.G.**, Luo, Y. (2014) “Trace element redistribution during iron oxide recrystallization.” Invited oral presentation by Catalano at *Telluride Science Research Center Workshop: Biogeochemistry and Redox Transformations of Iron*, Telluride, CO, August 2014.
8. *Catalano J.G., Becker K.G., Flynn E.D., Friedrich A.J., Gadol H.J., **Hinkle M.A.G.** (2014) “Trace element partitioning between iron oxides and aqueous solutions: Evidence for recrystallization.” Invited oral presentation by Catalano at *24th Goldschmidt Conference*, Sacramento, CA, June 2014.
9. ***Hinkle M.A.G.**, Catalano J.G. (2014) “Introducing inquiry based assignments in a STEM course & assessing the efficacy of interventions.” Oral presentation by Hinkle to the Washington University in St. Louis’s Education Research Group, February 2014.
10. ***Hinkle M.A.G.**, Catalano J.G. (2013) “Effect of phosphate and sulfate on Fe(II)-catalyzed trace metal incorporation into and release from Fe(III) oxides.” Oral presentation at *23^d Goldschmidt Conference*, Florence, Italy, *Mineralogical Magazine*, 2013, 77(5), 1301.

11. *Catalano J.G., Becker K.G., Frierdich A.J., **Hinkle M.A.G.**, Luo Y., Otemuyiwa B. (2013) "Trace element and contaminant fate during Fe(II)-catalyzed iron oxide surface transformations." Invited oral presentation by Catalano at *23rd Goldschmidt Conference*, Florence, Italy, *Mineralogical Magazine*, 2013, 77(5), 840.
12. ***Hinkle M.A.G.**, Catalano J.G. "Interactions of phosphate and sulfate with aqueous Fe(II) on Fe(III) oxide surfaces." (2013) Oral presentation at *245th American Chemical Society Meeting*, New Orleans, LA, April 2013.
13. ***Hinkle M.A.G.**, Catalano J. G. (2013) "A comparison of assignment design: Enhancing conceptual and scientific knowledge with structured inquiry methods." Poster presentation at *17th Graduate Research Symposium*, Washington University in St. Louis, MO, February 2013.
14. ***Hinkle M.A.G.**, Catalano J.G. (2012) "Interaction of Fe(II) with phosphate and sulfate on iron oxide surfaces: Implications for interfacial electron transfer." Poster presentation at *Midwest Geobiology Symposium*, St. Louis, MO, September, 2012.
15. ***Hinkle M.A.G.**, Catalano J.G. (2012) "Interaction of Fe(II) with phosphate and sulfate on iron oxide surfaces: Implications for interfacial electron transfer." Poster presentation at *22nd Goldschmidt Conference*, Montreal, QC, *Mineralogical Magazine*, 2012, 76(6), 1845.
16. ***Gray M.A.**, Buckley A.J., Bachman R.E. (2008) "Solution aggregation and complexation in bipyridine platinum(II) dihalide complexes." Poster presentation at *60th Southeast Regional Meeting of the American Chemical Society*, Nashville, TN, November 2008, SERM-914.

AWARDS, SCHOLARSHIPS, INTERNSHIPS, & FELLOWSHIPS

Peter Buck Postdoctoral Fellowship, Smithsonian Institution, *2015-2017*

Washington University STEM Teaching-As-Research Internship, *2012-2014*

Carl Tolman Prize (outstanding teaching assistant), E&PS, Washington University, *2013*

Goldschmidt Travel Grant, Florence, Italy, *2013*

Dean's Award for Teaching Excellence for 2012-2013, Washington University, *2013*

T.A. Letter of Recognition, E&PS, Washington University, *2012*

Goldschmidt Travel Grant, Montreal, Quebec, *2012*

Wilkins Scholar, Sewanee, *2005-2009*

Tennessee Hope Scholar, Sewanee, *2005-2009*

Order of the Gownsmen (academic honor society), Sewanee, *2006-2009*

I. Croom Beatty Chemistry Research Internship, Sewanee, *2008*

SERVICE

Reviewer for: Environmental Science & Technology, Geochimica et Cosmochimica Acta, American Mineralogist

Peer Mentor, Earth & Planetary Sciences, Washington University in St. Louis, 2012-2014.

Student Mentor, Students & Teachers as Research Scientists (STARS), Summer 2012.

Activity Leader, Association for Women in Science (AWIS), 2010 & 2011.

INSTRUMENTATION EXPERIENCE

XAFS spectroscopy

ATR-FTIR spectroscopy

ICP-OES

IC

XRD

NMR spectroscopy

UV-vis spectroscopy

BET analysis

SEM/EDS

SOFTWARE PROFICIENCY

MatLab, Geochemist's Workbench, ArcGIS, SixPack, FEFF, Ifeffit—Athena, Hephaestus, ATOMS

PROFESSIONAL AFFILIATIONS

International X-ray Absorption Society

Mineralogical Society of America

National Association of Geoscience Teachers

Omicron Delta Kappa National Leadership Honor Society

The Geochemical Society

Soil Science Society of America

American Chemical Society