

Colleen M. Hansel

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Degrees

B.S.: Geology, Dept. of Geological Sciences, California State University, Sacramento, 1997

M.S.: Environmental Chemistry, Dept. of Plant, Soil, and Entomological Sci., U. of Idaho, 1999

Ph.D.: Biogeochemistry, Dept. of Geological and Environ. Sciences, Stanford University, 2004

History of Employment

2015-present Associate Scientist with tenure, Department of Marine Chemistry and Geochemistry, Woods Hole Oceanographic Institution

2012-2015 Associate Scientist, Department of Marine Chemistry and Geochemistry, Woods Hole Oceanographic Institution

2011-2012 Associate Professor, School of Engineering and Applied Sciences and Department of Earth and Planetary Sciences, Harvard University

2007-2011 Assistant Professor, School of Engineering and Applied Sciences and Department of Earth and Planetary Sciences, Harvard University

2004-2006 Postdoctoral Scholar, Department of Geological and Environmental Sciences, Stanford University

Narrative of Experience: Colleen is an interdisciplinary scientist with an education and research experience in geochemistry, mineralogy, and microbial physiology. Her initial research focused on the activity of plants and microbes in the mineralization and cycling of metals within soils and wetland ecosystems. Over the years, this research expanded to include a diversity of organisms within numerous terrestrial and marine systems, spanning desert varnish to seamounts, enabled using a suite of synchrotron-based spectroscopic and microscopic techniques. Most recently, Colleen's research program has focused on coupled elemental cycles and cryptic processes that control the biogeochemistry and health of various marine ecosystems, ranging from coral reefs to the deep biosphere. One particular emphasis is the cycling and sources of reactive oxygen species (ROS) and the impact of their formation on other elemental cycles and organismal health. To enable this research, Colleen has established a collaborative program to design and develop new *in situ* submersible sensing technologies to enable measurement of short-lived intermediates like ROS over various spatial scales. Colleen has been dedicated to scientific and professional development of her students and postdocs, and to building a more diverse and inclusive community in her lab and the Earth sciences, in general.

Select Key Publications

Sutherland, K., S.D. Wankel, C.M. Hansel. 2020. Dark biological superoxide production as a significant flux and sink of marine dissolved oxygen. *Proc. Nation. Acad. Sci., USA* 117:3444-3439.

Grabb, K.C., J. Kapit, S.D. Wankel, K. Manganini, A. Apprill, M. Armenteros, and C.M. Hansel. 2019. Development of a handheld submersible chemiluminescent sensor: Quantification

- of superoxide at coral surfaces. *Environ. Sci. Technol.* 53, 13850-13858
- Hansel, C.M. 2017. Manganese in Marine Microbiology. In: Robert K. Poole, editor, *Advances in Microbial Physiology*, Vol. 70, Oxford: Academic Press, pp. 37-83.
- Learman, D.R., B.M. Voelker, A.I. Vazquez-Rodriguez, and C.M. Hansel. 2011. Formation of manganese oxides by bacterially generated superoxide. *Nature Geo.* 4, 95-98.
- Estes, E.R., R. Pockalny, S. D'Hondt, F. Inagaki, Y. Morono, R.W. Murray, D. Nordlund, A.J. Spivack, S.D. Wankel, N. Xiao, and C.M. Hansel. 2019. Persistent organic matter in oxic seafloor sediment. *Nature Geo.* 8, 299-304.
- Hansel, C.M., J.M. Diaz, S. Plummer. 2019. Tight regulation of extracellular superoxide points to its vital role in the physiology of the globally relevant *Roseobacter* clade. *mBio* 10:e02668-18 (doi: 10.1128/mBio.02668-18)
- Farfan, G.A., A. Apprill, S.M. Webb, C.M. Hansel. 2018. Coupled X-ray fluorescence and X-ray absorption spectroscopy for microscale imaging and identification of sulfur species within tissues and skeletons of scleractinian corals. *Anal. Chem.* 90, 12559-12566.
- Diaz, J.M., C.M. Hansel, A. Apprill, C. Brighi, T. Zhang, L. Weber, S. McNally, L. Xun. 2016. Species-specific control of external superoxide levels by the coral holobiont during a natural bleaching event. *Nature Comm.* 7, 13801.
- Andeer, P.F., D.R. Learman, M. McIlvin, J.A. Dunn, C.M. Hansel. 2015. Extracellular heme peroxidases mediate Mn(II) oxidation in a marine *Roseobacter* bacterium via superoxide production. *Environ. Microbiol.* 17, 3925-3936.
- Hansel, C.M., C.L. Lentini, Y. Tang, D.T. Johnston, and S.D. Wankel. 2015. Dominance of sulfur-fueled iron oxide reduction in low sulfate freshwater sediments. *ISME Journal* 9, 2400-2412.
- Diaz, J.M., C.M. Hansel, B.M. Voelker, C.M. Mendes, P.F. Andeer, and T. Zhang. 2013. Widespread production of extracellular superoxide by heterotrophic bacteria. *Science* 340, 1223-1226.
- Learman, D.R., S.D. Wankel, S.M. Webb, N. Martinez, A.S. Madden, C.M. Hansel. 2011. Coupled biotic-abiotic Mn(II) oxidation pathway mediates the formation and structural evolution of biogenic Mn oxides. *Geochim. Cosmochim. Acta* 75, 6048-6063.
- Santelli, C.M., S.M. Webb, A.C. Dohnalkova, C.M. Hansel. 2011. Diversity of Mn oxides produced by Mn(II)-oxidizing fungi. *Geochim. Cosmochim. Acta* 75, 2762-2776.

Honors

- 2019 AGU William S. & Carelyn Y. Reeburgh Lecture Award
- 2018 Marion L. and Chrystie M. Jackson Mid-Career Clay Scientist Award, Clay Mineral Society
- 2018 Hanse-Wissenschaftskolleg Institute of Advanced Study Earth Fellow
- 2013 Edward I. Stiefel Lecture Award for the 2014 Metals in Biology, Gordon Research Conference
- 2013 JGI-EMSL Facilities Integrating Collaborations for User Science (FICUS) Award
- 2009 National Science Foundation CAREER Award

Society Memberships

- American Geophysical Union, Geochemical Society, American Society for Limnology and Oceanography, Soil Science Society of America, International Society for Coral Reef Studies