

Teaching and Mentoring

Graduate Student Advisor, MIT/WHOI Joint Program:

Evan Howard (started July, 2011)

Cara Manning (started June, 2011)

Postdoctoral Advisor/Co-Advisor:

David Nicholson (September, 2009 to August, 2011)

Undergraduate Student Advisor:

Paul Roman (Summer, 2010)

Melika Uter (Summer, 2010, part of Woods Hole Partnership in Education Program)

Zoe Sandwith (Spring 2011)

High School Student Mentor:

Kim Johansson (2009-2010, now at Harvard University)

Aoife Callinan (Summer, 2012)

Thesis Committee:

Carly Buchwald (2010 to 2012)

Graduate Teaching in MIT/WHOI Joint Program:

Marine Chemistry Seminar (course 12.759). Spring 2011 and Spring 2013.

Graduate teaching assistant: MIT/WHOI: Marine Chemistry (course 12.742). Fall 2003.

Undergraduate teaching assistant: MIT: Thermodynamics (course 5.60). Spring 2000.

Undergraduate advisor for freshmen seminar on global change: MIT. Fall 1998 and 1999.

Grants Awarded

Current Projects

2013-2015 National Science Foundation. “Quantifying Rates of Biological Production to Better Understand the Carbon Cycle in the Canada Basin.” Sole PI. \$212,504.

2012-2015 National Science Foundation. “Eutrophication Effects on Sediment Metabolism and Benthic Algal-bacterial Coupling: An Application of Novel Techniques in a LTER Estuary.” Lead PI. Total funding: \$786,289. Stanley part: \$384,493.

2011-2014 National Science Foundation. “Developing an Equilibrator Inlet Mass Spectrometer for Underway Measurements of a Suite of Noble Gases.” Sole PI. \$399,860.

2011-2014 National Science Foundation. “Collaborative Research: An Inverse and Forward Global Modeling Synthesis of Noble Gases to Better Quantify Biogeochemical Cycles”. Co-PI. Stanley part: \$55,000.

2012-2013 National Aeronautics and Space Administration (NASA). “Net Community Production Estimates from an At-Sea Equilibrator Inlet Mass Spectrometer: A Trial for the PACE/ACE Mission”. Sole PI. \$53,000.

Recently Completed Awards

2010-2013 National Science Foundation. “Sharpening Geochemical Tools for Assessing Oceanic Biological Production: Exploring the Limits of O₂/Ar and Triple Oxygen Isotopes.” Sole PI. \$392,889.

2010-2013 National Oceanic and Atmospheric Administration (NOAA). “A Novel Constraint for Biogeochemical Modeling: Triple Oxygen Isotopes.” Lead PI. \$454,686.

Publications

(papers denoted by * are authored by current or former supervised graduate student or postdoctoral scholar)

1. **Stanley, R.H.R.**, Z. O. Sandwith and Ferrari, R., “Quantifying patchiness in net community production.” Submitted to Geophysical Research Letters.
2. *Nicholson, D. P., **Stanley, R. H. R.**, and Doney, S. C. “The triple oxygen isotope tracer of primary productivity in a dynamic ocean.” Submitted to Global Biogeochemical Cycles.
3. **Stanley, R. H. R.**, and E. Howard*, “Quantifying rates of benthic microalgal photosynthesis using the triple isotope composition of dissolved oxygen.” *Limnology and Oceanography Methods* 11 360-373. (2013).
4. **Stanley, R.H.R.** and W. J. Jenkins “Noble gases in seawater as tracers for physical and biogeochemical ocean processes” in *The Noble Gases as Geochemical Tracers*, Ed. P. Burnard. Springer Verlag. Berlin. pp.55-80 (2013).
5. **Stanley, R.H.R.**, S.C. Doney, W. J. Jenkins, and D.E. Lott III, “Apparent oxygen utilization rates calculated from tritium and helium-3 profiles at the Bermuda Atlantic Time-series Study site.” *Biogeosciences*. doi:10.5194/bg-9-1969-2012:9977-10015. (2012).
6. *Nicholson, D. P., **Stanley, R. H. R.**, Barkan, E., Karl, D. M., Luz, B., Quay, P.D., and Doney, S.C. “Evaluating triple oxygen isotope estimates of gross primary production at the Hawaii Ocean Time-series and Bermuda Atlantic Time-series Study sites.” *J Geophys Res-Oceans* 117:C05012 doi:10.1029/2010JC006856. (2012).
7. **Stanley, R.H.R.**, J.B. Kirkpatrick, N. Cassar, B.A. Barnett, and M.L. Bender. “Net community production and gross production rates in the Western Equatorial Pacific.” *Global Biogeochemical Cycles*. doi:10.1029/h2009GB003651. (2010).
8. **Stanley, R.H.R.**, W. J. Jenkins, S. C. Doney, and D. E Lott III. “Noble Gas Constraints on Air-Sea Gas Exchange and Bubble Fluxes.” *Journal of Geophysical Research - Oceans*, 114 doi:10.1029/2009JC005396. (2009).
9. **Stanley, R.H.R.**, B. Baschek, D.E. Lott III, and W.J. Jenkins. “A new method for measuring five noble gases using stainless steel cryogenic trapping and quadrupole mass spectrometry.” doi:10.1029/2009GC002429. (2009).
10. **Stanley, R.H.R.**, W.J. Jenkins and S.C. Doney. “Quantifying seasonal air-sea gas exchange processes using noble gas time-series: A design experiment.” *Journal of Marine Research*. 64: 267-295. (2006).
11. Stark, S., P.J. Statham, **R.H.R. Stanley**, and W.J. Jenkins. “Using tree ring cellulose as a tool to estimate past tritium inputs to the ocean.” *Earth Planet. Sci. Lett.* 237: 341-353. (2005).
12. **Stanley, R.H.R.**, K.O. Buesseler, S.J. Manganini, D.K. Steinberg and J.R. Valdes. “A comparison of major and minor elemental fluxes collected in neutrally buoyant and surface-tethered sediment traps.” *Deep Sea Research I*. 51: 1387-1395. (2004).

13. Brabander, D.J., N. Keon, N., **R.H.R. Stanley**, and H.F. Hemond. "Intra-ring variability of Cr, As, Cd, and Pb in red oak revealed by secondary ion mass spectrometry: Implications for environmental biomonitoring." *Proceedings of the National Academy of Sciences of the United States of America*, 96(25): 14635-14640. (1999) .
14. **Stanley, R.H.R.**, N.V. Dokholyan, S.V. Buldyrev, S. Havlin and H.E. Stanley. "Clustering of identical oligomers in coding and noncoding DNA sequences." *Journal of Biomolecular Structure & Dynamics*, 17(1): 79-87. (1999).
15. Buldyrev, S.V. N.V. Dokholyan, S. Havlin, H.E. Stanley, and **R.H.R. Stanley**. "Expansion of tandem repeats and oligomer clustering in coding and noncoding DNA sequences." *Physica A-Statistical Mechanics and Its Applications*, 273(1-2): 19-32. (1999).

Selected Presentations

* denotes invited presentation

- Stanley, R. H. R. "Estimates of rates of biological productivity at BATS: Is there convergence?" *Ocean Carbon and Biogeochemistry Annual Summer ScienceWorkshop*. (2013).* Woods Hole, MA
- Stanley, R. H. R. "Net Community Production and Gross Primary Production from Dissolved Gas Tracers." *EXPORTS workshop*. (2013).* Santa Barbara, CA
- Stanley, R.H.R., Z.O. Sandwith, and W.J. Williams, "Rates of Summertime Biological Productivity in the Beaufort Gyre: A Comparison between the Record-Low Ice Conditions of August 2012 and Typical Conditions of August 2011". *Liege Colloquium on Ocean Productivity*. (2013).
Liege, Belgium
- Stanley, R.H.R., Z.O. Sandwith, and W.J. Williams, "The Effect of Sea Ice on Gross Primary Production and Net Community Production: a Study in the Canada Basin." *SOLAS Open Science Conference*. (2012).
Cle Elum, WA
- Stanley, R.H.R. "Oxygen, Oxygen Isotopes, and Argon as Tracers for Submesoscale Variations in Biological Productivity." *Marine Geology and Geophysics Seminar*. University of Rhode Island, Graduate School of Oceanography. (2011).* Narragansett, RI
- Stanley, R.H.R. "Submesoscale Variations in Biological Productivity: Insights from Dissolved Gases". *Department of Marine Sciences Seminar*. University of Connecticut (2011).* Groton, CT
- Stanley, R.H.R. "New observations of variability in biological production: Insights from gas tracers." *SMASST Seminar*. University of Massachusetts, Dartmouth (2011). * Dartmouth, MA
- Stanley, R.H.R. "Submesoscale NCP and GPP rates from Underway O2/Ar and Triple Oxygen Isotope Measurements." *Presentation at ACE Ocean Productivity and Carbon Cycle Workshop*. (2011).*
Santa Barbara, CA
- Stanley, R.H.R. "Variability in Biological Production: Insights from Dissolved Oxygen." *Chemical Oceanography and Biogeochemistry Seminar*. Massachusetts Institute of Technology. (2011).*

Cambridge, MA

Stanley, R.H. R. “Dissolved oxygen in the ocean: Why is it changing and what can it tell us about biological productivity?” Environmental Science and Engineering Seminar. Caltech. (2011).*
Pasadena, CA

Stanley, R.H.R., Jenkins, W.J., Doney, S.C., and Lott, D.E. “Export production quantified by apparent oxygen utilization rates at the Bermuda Atlantic Time-series Study site.” ASLO meeting. (2011).
San Juan, PR

Stanley, R.H.R. “Air-sea gas exchange and bubble fluxes: Constraints from noble gases.”
Departmental Seminar at the University of Delaware. (2010).* Newark, DE

Stanley, R.H.R. “Towards an improved understanding of biological production and air-sea gas exchange.”
Departmental Seminar at the University of Washington. (2010).* Seattle, WA

Stanley, R.H.R. “Air-sea gas exchange and biological production: Insights from dissolved gases.”
Departmental Seminar at the University of Victoria. (2010).* Victoria, Canada

Stanley, R.H.R. and R. Ferrari “The dissolved gas toolbox for quantifying biological production” Ocean
Sciences Meeting (2010).* Portland, OR

Stanley, R.H.R., and M. L. Bender “The triple isotopic signature of oxygen in the Equatorial Pacific.”
Goldschmidt Conference. (2009). Davos, Switzerland

Stanley, R.H.R. “The Marine Carbon Cycle: New Insights from Dissolved Gases.” Departmental
seminar at Princeton University (2009).* Princeton, NJ

Stanley, R.H.R. “The Marine Carbon Cycle: New Insights from Dissolved Gases.” Departmental
seminar at University of Chicago (2009).* Chicago, IL

Stanley, R.H.R. “Investigating the Carbon Cycle in the Equatorial Pacific Ocean.” Departmental seminar
at Woods Hole Oceanographic Institution. (2008). * Woods Hole, MA

Stanley, R.H.R., J.B. Kirkpatrick, N. Cassar, and M.L. Bender. “Towards a mechanistic understanding of
carbon cycling in the equatorial Pacific Ocean.” CLIMECO workshop. (2008).
Brest, France

Stanley, R.H.R., J.B. Kirkpatrick, N. Cassar, and M.L. Bender. “Towards a mechanistic understanding of
carbon cycling in the equatorial Pacific.” Leverhulme Climate Symposium. (2008).
Cambridge and London, UK

Stanley, R.H.R., W. J. Jenkins, S. C. Doney, D.E. Lott III. “A time-series of five noble gases and
tritiogenic helium-3 as tracers for biogeochemical cycles.” Ocean Sciences Meeting. (2008).
Orlando, FL

Stanley, R.H.R. “The noble gas toolbox for air-sea gas exchange and biological production.” The MIT
Department Lecture Series. (2007).* Cambridge, MA

- Stanley, R.H.R. “Noble gases as tracers for biogeochemical cycles.” DISCO symposium. (2006).*
Honolulu, HI
- Stanley, R.H.R., W.J. Jenkins, and S.C. Doney. “Noble gases: A toolbox for quantifying air-sea gas exchange.” SOLAS Summer School. (2005).
Cargese, France
- Stanley, R.H.R., W.J. Jenkins and S.C. Doney. “Quantifying air-sea gas exchange processes with a noble gas time-series.” Gordon Conference on Chemical Oceanography. (2005).
Tilton, NH
- Stanley, R.H.R, W.J. Jenkins and S.C. Doney. “The noble gas toolbox for air-sea gas exchange.” SOLAS Open Science Conference. (2004). Won Best Student Poster award for this presentation. Halifax, Canada.
- Stanley, R.H.R., and W.J. Jenkins. “Noble gas measurements as tools for investigating air-sea gas exchange.” Eos. Trans. AGU 84(52), Ocean Sci. Meet. Suppl., Abstract OS421-05 (2003). Portland, OR
- Stanley, R.H.R., K.O. Buesseler, D.K. Steinberg, J.E. Andrews, S.J. Manganini, J.R. Valdes, and J.F. Price. “Understanding upper ocean particle flux: neutrally buoyant sediment traps and standard surface-tethered sediment traps.” Eos. Trans. AGU, 83(4), Ocean Sciences Meet. Suppl., Abstract OS11B-24 (2002).
Honolulu, HI
- Stanley, R.H.R., D.J. Brabander, N.K. Keon and H.F. Hemond. “Arsenic and lead in soils and riverine sediments of the Aberjona Valley” Presented to the Environmental Protection Agency and to the town of Winchester, MA. (1999). *
Boston, MA

Research Interests

Noble gas biogeochemistry
Oxygen isotopes
Air-sea gas exchange
Carbon and nutrient cycling

Recent Analytical and Field Experience

Noble Gases

- Developing an equilibrator inlet mass spectrometer for measuring noble gases continuously from the water or from the atmosphere (2011 to present).
- Deployed the mass spectrometer on a small boat to measure noble gases in waters in coastal Massachusetts (2012 to present).
- Measured noble gas using traditional techniques in samples from a salt marsh in Rowley, MA in order to quantify air-sea gas exchange in tidal creeks (2012 to present).

Triple Oxygen Isotopes and O₂/Ar ratios

- Custom-built a processing line and interfaced it with an isotope ratio mass spectrometer for measuring triple oxygen isotopes (¹⁶O, ¹⁷O, and ¹⁸O) in air and water samples (2009 to present).
- Built an equilibrator inlet mass spectrometer system for continuously measuring O₂/Ar (2009-2011).

- Collected samples for triple isotopic oxygen and O₂/Ar analysis in salt marsh in Rowley, MA to learn about total and benthic primary productivity (2012 to present).
- Measured O₂/Ar continuously for 6 weeks from a ferry building near a saline lake in Nova Scotia and collected daily samples for triple oxygen isotopic analysis to examine interplay between ice melting, air-sea gas exchange, and biological productivity (2013).
- Collected samples for triple oxygen isotopic analysis and for O₂/Ar in multiple regions in the open ocean, including locations in the Arctic Ocean, the subtropical South Atlantic, the subtropical North Atlantic, and the South Pacific. (2009 to present).

Skills

Quadrupole Mass Spectrometry
Isotope Ratio Mass Spectrometry
Magnetic Sector Mass Spectrometry
Ultra-High Vacuum Techniques
Numerical Modeling