# Rachel H. R. Stanley

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## Education

**Massachusetts Institute of Technology and Woods Hole Oceanographic Institution Joint Program,**
Ph.D. Chemical Oceanography Cambridge and Woods Hole, MA
Thesis Title: "A Determination of Air-Sea Gas Exchange and Upper Ocean Biological Production from Five Noble Gases and Tritiugenic Helium-3" August, 2007. Advisor: Dr. William J. Jenkins.

**Massachusetts Institute of Technology** Cambridge, MA
B.S. Chemistry, Earth Sciences Minor, 2000. GPA 5.0/5.0

## Research Positions

*Assistant Scientist*, Department of Marine Chemistry and Geochemistry, Woods Hole Oceanographic Institution, Woods Hole, MA. July 2009 to present

*NOAA Climate Change and Hess Postdoctoral Fellow*, Department of Geosciences, Princeton University, Princeton NJ. Aug 2007 to June 2009

*Graduate Student Fellow and Research Assistant*, MIT-WHOI Joint Program in Chemical Oceanography, Woods Hole, MA. June 2001 to Aug 2007

*Fulbright Fellow*, National Oceanography Centre, Southampton, United Kingdom. September 2000 to June 2001.

*Summer Student Fellow*, Department of Marine Chemistry and Geochemistry, Woods Hole Oceanographic Institution, Woods Hole, MA. June 1999 to September 1999.

*Undergraduate Research Assistant*, Department of Civil and Environmental Engineering, Massachusetts Institute of Techonology, Cambridge, MA January 1997 to June 2000.

## Fellowships and Awards

NOAA Climate and Global Change Postdoctoral Fellowship, 2007-2009
Hess Postdoctoral Fellow (Princeton University), 2007-2009
Best Student Poster at International SOLAS conference, 2004
National Defense Science and Engineering Fellowship, 2001-2003
National Science Foundation Fellowship, 2001 (declined)
Fulbright Fellowship to the United Kingdom, 2000
Elected to Phi Beta Kappa, MIT chapter, 2000
American Chemical Society Award for Excellence in Analytical Chemistry, 2000
Best Undergraduate Student Advisor, MIT, 1999
Barry Goldwater Scholar, 1998
Westinghouse "Top 40" Finalist, 1996

## Research Interests

Gas biogeochemistry
Carbon and nutrient cycling
Upper ocean biological productivity
Air-sea gas exchange

## Teaching and Mentoring

Graduate Student Advisor, MIT/WHOI Joint Program:
Evan Howard (started July, 2011)
Cara Manning (started June, 2011)
Postdoctoral Advisor/Co-Advisor:
Dave Nicholson (September, 2009 to August, 2011)
Undergraduate Summer Student Advisor:
Paul Roman (Summer, 2010)
Melika Uter (Summer, 2010, part of Woods Hole Partnership in Education Program)
High School Student Mentor:
Kim Johansson (2009-2010, now at Harvard University)
Thesis Committee:
Carly Buchwald (2010 to present)
Graduate Teaching in MIT/WHOI Joint Program:
Marine Chemistry Seminar (course 12.759). Spring 2011.
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.

## Publications

(papers denoted by * are first authored by supervised graduate student or postdoctoral researcher)

**Stanley, R.H.R.**, Ferrari, R., "Submesoscale variability in marine biological production: Differences between physics and biology" In preparation for Science.

**Stanley, R.H.R.**, W.J. Jenkins, S.C. Doney, and D.E. Lott III, "Apparent oxygen utilization rates calculated from tritium and helium-3 profiles at the Bermuda Atlantic Time-series Study site". Submitted to Biogeosciences.

*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." In review at JGR-Oceans.

**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)

**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)

**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).

**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)

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)

**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).

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) .

**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)

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. "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 Air-sea gas exch**a**nge 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 Disssolved Gases." Departmental seminar at Princeton University (2009)* Princeton, NJ

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

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

## Field Experience

Sampled for triple oxygen isotopes and $O_2$/Ar at Dawn and Dusk transects at Plum Island Estuary Long-Term Ecological Reserve (PIE-LTER) site (2010 and 2011).

Sample at 4 sites with different anthropogenic loadings in Waquoit Bay for triple oxygen isotopes and O2/Ar. (2010 and 2011)

Used an at-sea Equilibrator Inlet Mass Spectrometer (EIMS) to collect continuous data of $O_2$/Ar for six weeks in the Equatorial Pacific. Also collected samples for triple oxygen isotopes. (2007)

Participated in 31 research cruises in the Sargasso Sea for doctoral work. Collected and processed samples for noble gases and tritium. (2001-2006)

Conducted fieldwork in wetlands in Woburn, MA and in parks and fields in Winchester, MA, collecting sediment cores and surface sediments for heavy metal analyses. (1997-2000)

## Skills

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