Katherine A. Allen

CONTACT

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INTERESTS

The ocean's role in climate change, past, present, and future; Ocean acidification and its impact on calcifying organisms; Global carbon cycle; Geochemistry of marine sediments; Development of paleoenvironmental proxies; Experimental culturing of foraminifera.

EDUCATION

Columbia University, New York, USA — 2007 - 2013
Ph.D. in Earth and Environmental Science (February 13, 2013)
Thesis: Boron in Foraminiferal Calcite as an Indicator of Seawater Carbonate Chemistry
Advisor: Dr. Bärbel Hönisch

Cambridge University, Cambridge, England — 2006 - 2007
M.Phil. in Earth Sciences

Case Western Reserve University, Cleveland, USA — 2002 - 2006
B.S. in Geological Sciences

University of Canterbury, Christchurch, New Zealand — 2005
Semester abroad, Geology

EMPLOYMENT

Assistant Research Professor — Spring 2016 - present
School of Earth & Climate Sciences, University of Maine, Orono, ME

NOAA Climate & Global Change Postdoctoral Fellow — 2013-2015
Funded by the National Oceanographic and Atmospheric Administration
Marine & Coastal Sciences, Rutgers University, New Brunswick, NJ

Postdoctoral Teaching Fellow — Fall 2013 - Spring 2014
Frontiers of Science Program, Columbia University, New York, NY

PUBLICATIONS

Allen, K.A., Hönisch, B., Eggins, S.M., Haynes, L.L., Rosenthal, Y., Yu, J., 2016. Trace element proxies for surface ocean conditions: A synthesis of culture calibrations with planktic foraminifera. Geochimica et Cosmochimica Acta, *accepted, available online* 20 August 2016, final proofs in press.

Allen, K. A., Sikes, E. L., Hönisch, B., Elmore, A. C., Guilderson, T. P., Rosenthal, Y., Anderson, R. F., 2015. Southwest Pacific deep water carbonate chemistry linked to high southern latitude climate change and atmospheric CO_2 during the Last Glacial Termination. Quaternary Science Reviews, v.122, 180-191.

Allen, K. A., 2015. When Carbon Escaped from the Sea. Nature, v. 518, 176-177.

Hönisch, B., Allen, K. A., Lea, D. W., Spero, H. J., Eggins, S. M., Arbuszewski, J., deMenocal, P., et al., 2013. The influence of salinity on Mg/Ca in planktic foraminifers: Evidence from cultures, core-top sediments and complementary $\delta^{18}O$. Geochimica et Cosmochimica Acta, v. 121, 196-213.

Hönisch, B., Allen, K.A., 2013. Carbon cycle proxies ($\delta^{11}B$, $\delta^{13}C_{calcite}$, $\delta^{13}C_{organic}$, shell weights, B/Ca, U/Ca, Zn/Ca, Ba/Ca). Encyclopedia of Quaternary Science, v. 2, 849-858.

Allen, K.A., Hönisch, B., Eggins, S.M., Rosenthal, Y., 2012. Environmental controls on B/Ca in calcite tests of the tropical planktic foraminifer species *Globigerinoides ruber* and *Globigerinoides sacculifer*. Earth and Planetary Science Letters, v. 351-352, 270-280.

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Allen, K.A., Hönisch, B., 2012. The planktic foraminiferal B/Ca proxy for seawater carbonate chemistry: A critical evaluation. Earth and Planetary Science Letters, v. 345-348, 203-211.

Allen, K.A., Hönisch, B., Eggins, S.M., Yu, J., Spero, H.J., Elderfield, H., 2011. Controls on boron incorporation in cultured tests of the planktic foraminifer *Orbulina universa*. Earth and Planetary Science Letters, v. 309, 291-301.

Hönisch, B., Allen, K.A., Russell, A.D., Eggins, S.M., Bijma, J., Spero, H.J., Lea, D.W., Yu, J., 2011. Planktic foraminifers as recorders of seawater Ba/Ca. Marine Micropaleontology, v. 79, issue 1-2, 52-57.

In Review, Submitted and In Progress

Sikes, E.L., Elmore, A.C., Allen, K.A., Cook, M.S., Guilderson, T.P. (in review at Earth and Planetary Science Letters) Glacial water mass structure and rapid δ^{18}O and δ^{13}C changes during the last glacial termination in the Southwest Pacific.

Anderson, R.F., Sachs, J.P., Fleisher, M.Q., Allen, K.A., Yu, J., Koutavas, A., Jaccard, S. (in preparation) Deep-sea oxygen depletion and the ice-age drawdown of atmospheric CO_2

Proposals

Title: **"Collaborative Research: Pacific Ocean stratification since the last ice age: New constraints from benthic foraminifera"**
Funding agency: National Science Foundation
Program: NSF Marine Geology & Geophysics
Status: Recommended for funding (100% of requested)
Anticipated start date: October 1, 2016
Role: Principal Investigator
Budget: $388,200 (3 years)
Collaborators: Elisabeth Sikes, Rutgers University

Title: **"Mapping the distributions of boron isotopes within foraminifera"**
Funding agency: Columbia University
Program: Climate Center
Status: Awarded 2015 (in progress)
Role: Principal Investigator
Budget: $8,416
Collaborator: Bärbel Hönisch

Title: **"Estimating Dissolved CO_2 Storage in the Southwest Pacific Ocean Since the Last Glacial Maximum"**
Funding agency: National Oceanographic and Atmospheric Administration
Program: NOAA Climate & Global Change Postdoctoral Fellowship Program
Status: Awarded 2013 (completed)
Role: Principal Investigator (Post-doctoral scientist)
Budget: Two years of support ($130,000 for salary and research funds)
Collaborators: Elisabeth Sikes and Yair Rosenthal, Rutgers University

Title: **"Ground truthing the B/Ca proxy in tropical planktic foraminifer shells: Investigating the effects of pH, temperature, salinity and carbonate ion**
Funding agency: Columbia University
Program: Climate Center
Status: Awarded 2009 (completed)
Role: Principal Investigator
Budget: $8,000
Collaborator: Bärbel Hönisch

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Title:**"Mapping Spatio-temporal pH Variability in the Damariscotta River Estuary with Crustose Algae: Identifying Refugia for Maine's Aquaculture in an Acidifying Ocean"**
Funding agency: Northeast Sea Grant Consortium, NOAA
Program: NOAA Ocean Acidification Program
Status: Not funded
Role: Co-Investigator
Budget: $193,790
Collaborators: Jay Lunden (PI), Douglas Rasher, Damian Brady, Robert Steneck (UMaine SMS)

Title: **"Ocean Acidification in the Gulf of Maine: Establishing Past Records to Inform Modern Shellfisheries"**
Funding agency: University of Maine System
Program: Research Reinvestment Fund Seed Grant Program
Status: Not funded (October 1, 2015)
Role: Principal Investigator
Budget: $74,646
Collaborators: William Mook, President/Owner of Mook Sea Farm in Bristol, ME

Fellowships and Awards

NOAA Climate and Global Change Postoctoral Research Fellowship	2013-2015
Columbia Frontiers of Science Teaching Fellowship	2013-2014
Twin Fellow, Hanse-Wissenschaftskolleg (Germany)	2013
Columbia University Presidential Teaching Award ($5,000)	2011
NSF Graduate K-12 Fellowship ($81,000)	2010-2012
Chevron Student Initiative Fund ($400)	2011
Department of Earth Science Teaching Assistant Award ($250)	2010
Student Poster Award, International Conference on Paleoclimate	2010
Sara Langer Book Prize for Contributions to Student Life	2009
Columbia Climate Center Grant ($8,000)	2009
Winston Churchill Foundation Scholarship ($50,000)	2006-2007
Senior Project Award, Case Western Reserve University	2006
Adelbert-Squire Scholarship, Case Western Reserve University	2002-2006

Field Work

Oceanographic research
University-National Oceanographic Laboratory System (UNOLS) — May-June 2014
Chief Scientist Training Cruise, *Barbados to Bermuda*

Experimental culturing of marine plankton
Puerto Rico — March-April 2010
Catalina Island, California — July-August 2008

Tidal wetlands: carbon sequestration, plankton studies
Piermont Marsh, New York — 2010-2012

Tropical lakes: sediment collection and geochemistry
Lake Tanganyika, Tanzania — June-July 2006

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Professional Training

Marine Geoscience Leadership Symposium in Washington D.C.	2015
UNOLS Chief Scientist Training Cruise	2014
Natural Science Illustration Workshop, Darling Marine Center, Maine	2014
Presenting Data and Information, Edward Tufte Workshop, New York City	2012
Summer School in Paleoceanography, Urbino, Italy	2010
Scientific SCUBA Diving Certification, American Academy of Underwater Sciences	2008
Experimental Methods in Culturing Planktonic Foraminifera, Catalina Island	2007
NSF Research Experience for Undergraduates in Tropical Lakes, University of Arizona	2006
Laboratory Assistant in Geochemistry, Case Western Reserve University	2005
NSF Research Experience for Undergraduates in Mineral Physics, SUNY Stony Brook	2004

Teaching & Mentoring

Primary advisor to Cassandre Stirpe, Masters Student — Summer 2016 - present
School of Earth and Climate Sciences, University of Maine

Consultant to the Columbia Core Science committee — 2014-2015
Serving as one of four teaching consultants during development and testing of new core science curricula at Columbia.

Postdoctoral Teaching Fellow, Frontiers of Science Program — 2013-2014
Full-time instructor within Columbia's Core Curriculum, New York City
Responsibilities: two small (20-student) discussion groups, course development.
Course goal: foster scientific habits of mind and curiosity regarding the natural world.
Course topics: Neuroscience, Physics, Evolution, Earth Science

Graduate Teaching Fellow, National Science Foundation Graduate K-12 Program — 2010-2012
The Young Women's Leadership School of East Harlem (Public High School)
Learning Through Ecology and Environmental Field Studies Program (LEEFS)

Mentor, Young Science Achievers Program — 2010-2012
New York City and INTEL International Science & Engineering Fair
2011-2012 Students: Rossibel Fernandez, Areej Haroon, Destiny Torres
American Meteorological Society Award, Association of Women Geoscientists Award
2nd Place at the New York City Science & Engineering Fair
2010-2011 Students: Marjana Chowdhury and Maryama Diaw
1st Place at the New York City Science & Engineering Fair
Participants at the INTEL International Science & Engineering Fair

Teaching Assistant, Columbia University — Spring & Fall 2009
Introduction to Climate Systems

Demonstrator (Teaching Assistant), Cambridge University — 2006-2007
Introductory Geology, Isle of Arran Field Trip

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Invited Talks

2016

Colby College, Waterville, Maine

University of South Carolina, Columbia, South Carolina

Case Western Reserve University, Cleveland, Ohio

Keynote Address, Annual Meeting of the Geological Society of Maine

2015

American Geophysical Union Fall Meeting, San Francisco, California

Geological Society of America Annual Meeting, Baltimore, Maryland

Science Seminar Series, University of Maine at Presque Isle

Massachusetts Institute of Technology, Boston, Massachusetts

Woods Hole Oceanographic Institute, Woods Hole, Massachusetts

2014

Institute of Earth and Environment, Chinese Academy of Sciences, Xi'an, China

Dalhousie University, Halifax, Nova Scotia

Rensselaer Polytechnic Institute, Troy, New York

University of Hawaii at Manoa

2013

Alfred Wegener Institute, Bremerhaven, Germany

2012

American Geophysical Union Fall Meeting, San Francisco

Woods Hole Oceanographic Institute

2011

Queens College, New York

Additional presentations (*presenter)

New constraints on Southwest Pacific deep water carbonate chemistry from B/Ca of benthic foraminiferal calcite (scheduled, August 2016) K. Allen*, E. L. Sikes, A. C. Elmore, B. Hönisch, T. P. Guilderson, Y. Rosenthal, R. F. Anderson. Poster, International Conference on Paleoceanography, Utrecht, Netherlands.

Deep water carbonate ion shifts during the last glacial termination in the Bay of Plenty, New Zealand (2014) K. Allen*, E. L. Sikes, A. C. Elmore, B. Hönisch, T. P. Guilderson, M. S. Cook, Y. Rosenthal, R. F. Anderson. Poster, American Geophysical Union Fall meeting, San Francisco, California.

Deep water carbonate ion shifts during the last glacial termination in the Bay of Plenty, New Zealand (2014) K. Allen*, E. L. Sikes, A. C. Elmore, B. Hönisch, T. P. Guilderson, M. S. Cook, Y. Rosenthal. Talk, iPODS-OC3 meeting in Bern, Switzerland.

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Carbonate chemistry of intermediate waters in the Southwest Pacific Ocean since the Last Glacial Maximum (2013) K. Allen*, E. L. Sikes, A. C. Elmore, B. Hönisch, P. deMenocal, Y. Rosenthal. Poster, American Geophysical Union Fall meeting, San Francisco, California.

Trace elements in cultured foraminiferal calcite: Nascent paleo-proxies and a new perspective on cation incorporation (2013) K. Allen*, B. Hönisch. Talk, Geochemistry Seminar at Lamont-Doherty Earth Observatory.

Influence of seawater carbonate chemistry on B/Ca in cultured planktic foraminifera (2012) K. Allen*, B. Hönisch, S. Eggins, Y. Rosenthal. Talk, Goldschmidt Conference on Geochemistry, Montréal, Canada.

Secondary Schools Field Research Programs: A Model for Raising Student Achievement (2012) S. Vincent*, R. Newton*, K. Allen*. Workshop, The National Conference on Girls Education, Washington, D.C.

Carbonate system and salinity controls on B/Ca of tropical and subtropical planktic foraminifera: Insight from culture experiments (2011) K. Allen*, B. Hönisch, S. M. Eggins, Y. Rosenthal. Poster, American Geophysical Union Fall meeting, San Francisco, California.

Culture experiments reveal carbonate system and salinity controls on B/Ca of three planktic foraminifer species (2011) K. Allen. Talk, Princeton University Graduate Student Symposium.

B/Ca and Mg/Ca in *O. universa* and *G. sacculifer*: Comparison of cultured and sediment-core material (2010) K. Allen*, B. Hönisch, S. Eggins, Y. Rosenthal, J. Yu, H.J. Spero, J.N. Richey. Poster, International Conference on Paleoclimatology, San Diego, California. *Received ICP student poster award*

Comparing planktic foraminiferal B/Ca and boron isotopes as paleo-CO_2 proxies (2010) K. Allen and B. Hönisch*. Poster, American Geophysical Union Ocean Sciences Meeting.

Reduced temperature sensitivity of foraminiferal Mg/Ca thermometry in ancient oceans (2010) S. Eggins*, B. Hönisch, S. Doo, L. Vetter, K. Allen, H.J. Spero, A.D. Russell. American Geophysical Union Ocean Sciences Meeting.

Validating the B/Ca proxy for seawater carbonate chemistry: evidence from culture experiments with the planktic foraminifer *Orbulina universa* (2009) K. Allen*, B. Hönisch, S. Eggins, H.J. Spero, J. Yu, H. Elderfield. Talk, American Geophysical Union Fall Meeting.

Insights into B/Ca from culturing experiments (2009) K. Allen* and B. Hönisch, Lamont-Doherty Earth Observatory Boron Meeting.

Effects of pH and temperature on calcification of the planktic foraminifer *O. universa* (2008) K. Allen*, B. Hönisch, K. James, S. Eggins, H.J. Spero. Poster, American Geophysical Union Fall Meeting.

Impacts of ocean acidification on zooplankton (2008) V. Fabry*, K. Allen, S. Eggins, B. Hönisch, F. Lombard, H.J. Spero. The Second Symposium on the Ocean in a High-CO_2 World, Monaco.

Geochemistry of Lake Tanganyika sediments: what can we learn from Ge/Si? (2007) K. Allen, Lamont-Doherty Earth Observatory Geochemistry Seminar.

Mid- to Late Holocene environmental changes recorded by sediment from Lake Erie's eastern basin (2006) K. Allen*, B. Saylor, E. Barrerra. Talk, North-Central Geological Society of America Meeting.

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Select presentations by mentored high school students (†):

Carbon Storage in Piermont Marsh, Hudson River Estuary (2012) D. Torres†, R. Fernández†, A. Haroon†, A. Chowdhury†, S. Feng†, C. Lopez†, M. Lopez†, S. Vincent, K. Allen, D. Peteet. Poster, INTECOL International Wetlands Conference, Orlando, Florida.

Influence of vegetation type on the carbon content of sediment in Piermont Marsh, Hudson River Estuary (2011) D. Torres†, R. Fernandez†, M. Lopez†, C. Lopez†, A. Haroon†, D. Peteet, K. Allen, and S. Vincent. Poster, Geological Society of America Annual Meeting, Minnesota.

Contrasting reproductive success of female stream fishes across drainages in northwestern Florida: A life history study on the *Gambusia holbrooki* (2011) M. Chowdhury†and M. Diaw†. Poster, NYCSEF 1st Place Award. Participants at ISEF International Science and Engineering Fair, Los Angeles.

Public Talks and Service

Co-chair of AGU session	2013
Guest Eco-Expert for The Big Green Theater, Brooklyn	2012
Pan American High School Talk	2011
Lamont Open House	2010, 2012
Columbia University Girls Science Day	2009
Hudson River Snapshot Day	2008

Peer review

Nature
Science
Nature Scientific Reports
Earth and Planetary Science Letters
Geochimica et Cosmochimica Acta
U.S. National Science Foundation
Princeton University Press
Marsden Fund (New Zealand)

Relevant Coursework

Chemical Oceanography, Physical Oceanography, Paleobiology, Terrestrial Paleoclimate, Quantitative Methods of Data Analysis, Chemical Geology, Chemistry of Continental Waters, Carbon Cycle, Geochronology & Thermochronology, Isotope Geology, Sedimentary Geology, Structural Geology, Mineralogy, Igneous & Metamorphic Petrology, Introduction to Field Mapping, Iceland Field Trip, Mono Lake Field Trip (California), Biomolecular Tools in Earth Sciences, Geophysical Fluid Dynamics Seminar on The Warming Papers.

Memberships

Geological Society of America	2006-present
American Geophysical Union	2007-present
Geochemical Society	2008-present
Society for Wetland Scientists	2012-2014
Association for Women Geoscientists	2013-present
Geological Society of Maine	2016-present

References

Bärbel Hönisch
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61 Route 9W, Palisades, NY 10960

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