

Rosie L. Oakes

Oceanography, Biogeochemistry, Paleoclimatology

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Appointments

2017 – present

Post-Doctoral Researcher

Academy of Natural Sciences of Drexel University, Philadelphia, USA

Department of Biodiversity, Earth & Environmental Science, Philadelphia, USA

Research focus: Assessing the impact of ocean acidification on pteropods over the past ~150 years using specimens from modern and museum collections

Supervisor: Dr. Jocelyn A. Sessa

Education

2012 – 2017

Ph.D. in Geosciences

The Pennsylvania State University, University Park, U.S.A.

Thesis: Towards understanding the impact of ocean acidification on the shell condition of thecosome pteropods

Advisor: Dr. Timothy Bralower

2011 – 2012

Master of Science in Geology

The University of Toronto, Toronto, Canada

Thesis: Phosphorous cycling in the Early Aptian

Advisor: Dr. Ulrich Wortmann

2007 – 2011

Bachelor of Science in Geology and Physical Geography - 1st Class hons.

The University of Edinburgh, Edinburgh, U.K.

Thesis: Isotope evidence for climatic and tectonic changes during the early Cretaceous

Advisor: Dr. Rachel Wood

2009 – 2010

International Exchange Student at the *University of Toronto, Canada*

Publications

2019

Oakes, R.L., Peck, V.L., Manno, C., Bralower, T.J. (*accepted*) Degradation of internal organic matter is the main control on pteropod shell dissolution after death. *Global Biogeochemical Cycles*

Jones, M.M., Sageman, B.B, **Oakes, R.L.**, Parker, A.L., Leckie, R.M., Bralower, T.J., Supúlveda, J., Fortiz, V. (2019) Astronomical pacing of relative sea level during Oceanic Anoxic Event 2: Preliminary studies of the expanded SH#1 Core, Utah, USA. *GSA Bulletin*, doi: <https://doi.org/10.1130/B32057.1>

Chandra, P., Gorski, C.A., **Oakes, R.L.**, Fantle, M. S. (2019) Low temperature stable mineral recrystallization of foraminiferal tests and implications for the fidelity of geochemical proxies. *Earth and Planetary Science Letters*, 506, 428-440

2018

Oakes, R.L., Peck, V.L., Manno, C., Bralower, T.J. (2018) Impact of preservation techniques on pteropod shell condition. *Polar Biology*, <https://doi.org/10.1007/s00300-018-2419-x>

Peck, V.L., **Oakes, R.L.**, Harper, E.M., Manno, C., Tarling, G. (2018) Extensive shell repair in pteropods exposed to acidic waters. *Nature Communications*, 9:264

2017

Manno, C., Bednaršek, N, et al. (**inc. Oakes, R.L.**) (2017) Shelled pteropods in peril assessing vulnerability in a high CO₂ ocean. *Earth Science Reviews*, 169, 132 - 145

- 2012 deBond, N., **Oakes, R.L.**, Paytan, A., and Wortmann, U.G. (2012) Early Aptian carbon and sulphur isotope signatures at ODP Site 765. *Isotopes in Environmental & Health Studies*, 48:1, 180-194
- In the system* **Oakes, R.L.**, Hill, M, Siddall, M.E., Sessa, J.A. (*in revision*) Finding the goldilocks zone for research-quality CT scan data. *Palaeontologia electronica*

Selected Fellowships, Scholarships, and Awards

- 2019 **AGU Centennial Award** – International – *American Geophysical Union*
Funding to send four students from the Women in Natural Sciences (WINS) Program to field camp in New Jersey, or in Montana and Wyoming with an aim to increase opportunities for underrepresented women in the geosciences - **\$9400**
- 2018 **Paleosociety Outreach & Education Grant** – International – *Paleontological Society*
Money to fund one girl from the WINS program to travel to and attend the GeoDESLA field camp in Montana and Wyoming – **\$2500** (proponent, Sessa lead)
Arthur J. Boucot Research Grant – International – *Paleontological Society*
For travel to museums to assess pteropod collections and funds for CT scanning - **\$3600**
- 2016 **Deike Research Fellowship** – co-PI with Bralower – Institutional – *PSU*
For the study of the impact of ocean acidification on pteropods – funds covered salary, research costs, and travel - **\$50,000**
Ellis L. Yochelson Award – International – *Paleontological Society*
For a decay experiment conducted to understand the impact of taphonomy on pteropod shells - **\$800**
Shell Geosciences Energy Research Facilitation Award – *PSU and Shell*
Funding to trial new techniques such as EBSD and FIB on pteropod shells - **\$1500**
Alley Family Graduate Scholarship in the Department of Geosciences – *PSU*
To analyse pteropods from an incubation experiment using CT scanning and SEM - **\$2400**
- 2015 **Travel Grant for Pteropod Conference** - International – *British Antarctic Survey*
For travel to and accommodation at the pteropod workshop at BAS in Cambridge
- 2014 -15 **Hiroshi and Koya Ohmoto Graduate Fellowship in Geosciences** – *PSU*
For facilitating research on the impact of ocean acidification on pteropods including funds for travel to the Southern Ocean for sample collection - **\$6500**
- 2014 **AGU Outstanding Student Poster Award** - International – *AGU*
Award given to for the best posters in the Paleocceanography and Paleoclimatology section
- 2013 **Department of Geosciences Teaching Assistant Award** – *PSU*
Award given to the best teaching assistant in the geosciences department
- 2012 **CCOD Summer School Scholarship** - National – *C.C.O.D. – Canada*
Award given to cover registration, travel, and accommodation at the Urbino Summer School in Paleoclimatology
Laurence Curtis Teaching Assistant Award - *University of Toronto Geosciences*
Award given to best teaching assistant in the geology department

Invited lectures

- 2019 **Invited Speaker** – *University of Texas Institute for Geophysics, Austin, TX*
Presented my research on the impact of ocean acidification on pteropods and the steps we need to take to monitor them to a broad geoscience audience. See a recording of my

talk here:

<https://mediasite.jsq.utexas.edu/UTMediasite/Play/9072b7e05ed04cbdbc808ee47c44b1751d>

Invited Speaker – *La Salle University, Philadelphia, PA*

Presented my research on how pteropods are impacted by ocean acidification to a broad audience of biologists and environmental scientists

Milstein Science Series– *American Museum of Natural History*

Invited to give a talk about pteropods, their role in the marine ecosystem, and their risk from ocean acidification to the over 5000 visitors who came to the ‘Layers of the Ocean’ event in the Hall of Ocean Life at AMNH

2018

NOAA SOARCE Webinar - *NOAA Ocean Acidification Program*

Gave a webinar to scientists and educators about the role of pteropods in the ocean, their risk from acidification, and how CT scanned pteropods can be 3D printed for education

<https://youtu.be/oeJxwDrJiKs>

Invited Speaker – *Philadelphia Shell Club, Philadelphia, PA*

Presented my research on how CT scanning can be used to research the impact of ocean acidification on pteropods to ammeter shell collectors

2017

Deines Lectureship– *Pennsylvania State University, University Park, PA*

Award for best graduate student oral presentation – invited back to deliver a lecture to the department

Selected Fieldwork Experience

2016

Drilling the Paleocene-Eocene Thermal Maximum in Coastal Maryland

Blackwater National Wildlife Refuge, Maryland, USA – land-based drill rig

2015

JR15002 Western Core Box Research Cruise

The Falklands, South Orkneys, South Georgia - 6 weeks at sea

Clastic Sequence Stratigraphy of the Book Cliffs

Price to Green River, Utah, U.S.A. – outcrop-based fieldwork

2014

Sampling the Cenomanian-Turonian (Cretaceous) Boundary in the Western Interior Seaway

Kaiparowits Plateau, Utah, U.S.A – outcrop work and land-based drill rig

2013

Biogeochemistry and reef health

Discovery Bay, Jamaica – snorkel surveys, lab-based water testing and sediment analysis

2011

A Regional Study of the Troodos Massif and Associated Sedimentary Cover

Cyprus – outcrop-based fieldwork

2010

Geologic Mapping of the Huronian Supergroup at Whitefish Falls

Whitefish Falls, Ontario, Canada – outcrop-based fieldwork

2008

Geologic Mapping of the Isle of Arran

Corrie, Arran, Scotland – outcrop-based fieldwork

Selected Teaching Experience

Camp Director

Aug. 2018

Drexel Environmental Science Leadership Academy in Geosciences (GeoDESLA)

Department of Biodiversity Earth and Environmental Sciences - Drexel University – 2013
Led a field trip to Montana and Wyoming aimed to introduce high school students to the geosciences. For more information about what we got up to, take a look at the blog www.geodesla2018.wordpress.com

Course Instructor

Summer 2013	The Geology of the National Parks <i>Department of Geosciences - The Pennsylvania State University – 2013</i>
	Teaching Assistantships
2 Semesters	Field teaching experience <i>Utah and Wyoming, U.S.A. – The Pennsylvania State University – June 2014</i> <i>Whitefish Falls, Ontario, Canada – The University of Toronto – June 2012</i>
5 Classes	Lab-based teaching experience <ul style="list-style-type: none">- <i>The Geology of Oil and Gas - The Pennsylvania State University –2013</i>- <i>Physical Geology - The Pennsylvania State University –2013</i>- <i>The Sea Around Us - The Pennsylvania State University –2012</i>- <i>Structural Geology - The University of Toronto –2012</i>- <i>Earth Minerals - The University of Toronto –2011</i>
4 Semesters	Online teaching experience <i>Earth in the Future – World Campus – Pennsylvania State University - 2014 –16</i>
	Other teaching experiences
2015 - 2017	Graduate Writing Tutor <i>College of Earth and Mineral Sciences - Pennsylvania State University</i>
Sept. 2014	Online Teaching Certificate <i>World Campus - Pennsylvania State University</i>

Selected Service and Outreach

2019	Early Career Representative to AGU Council Voted by AGU members to be one of three Early Career Representatives on the American Geophysical Union Council to represent the views of early career scientists across the sections
2018	Presenter – Smithsonian Museum Day “Women Making History” Organised interactive activities showcasing pteropods and their role in the food chain WINS Climate Change Workshop – Academy of Natural Sciences Presented my research and strategies for OA mitigation at a workshop for the Women in Natural Sciences – a program designed to support high-school aged women from traditionally underrepresented groups
2015 – 2017	Student Representative - Graduate Program Development Committee Represented the graduate students on committee which re-evaluates the curriculum
2015 - 2016	Earth and Mineral Sciences Museum Ocean Acidification Exhibit Developer Developed an exhibit on ocean acidification aimed at undergraduates Learn more at: https://tinyurl.com/emsoaexhibit
2014 - 2015	Vice President of the Earth and Mineral Sciences Graduate Student Council Committee focused on increasing collaboration in the college (member 2012 –14)
2013	Mural Painting: Discovery Bay All Ages School, Jamaica Painted a mural to educate the local school children about the importance of reef health

Selected Courses and Workshops

June 2018	VG Studio Max - Training for Life Sciences, Paleontology and Archeology VG Academy - Volume Graphics – <i>Heidelberg, Germany</i>
January 2017	Demystifying the IODP Proposal Process for Early Career Scientists <i>I.O.D.P – University of Texas at Austin – Texas, U.S.A.</i>
February 2015	Basics of CT Data Acquisition, Visualization, and Analysis

- iDigBio - *University of Texas at Austin – Texas, U.S.A.*
- December 2014 **Communicating Climate Change**
American Geophysical Union - *San Francisco, California, U.S.A*
- April 2013 **Exploring the Cretaceous Greenhouse through Scientific Drilling**
I.O.D.P. – *London, U.K.*
- July 2012 **Urbino Summer School in Paleoclimatology**
I.O.D.P – *The University of Urbino, Urbino, Italy*

Conference presentations

- 2018 **Oakes, R.L.**, Bralower, T.J., and Sessa, J.A. (2018) Establishing a baseline of the annual variability of pteropod shell thickness in the Cariaco Basin, presented at *American Geophysical Union Fall Meeting 2018*, Washington DC, 10-14 Dec 2018
- Oakes, R.L.**, Peck, V.L., Manno, C, Harper, E., and Bralower, T.J. (2018) Organic periostracum protects pteropod shells from dissolution in aragonite undersaturated waters, presented at *Ocean Carbon Biogeochemistry Workshop*, Woods Hole, MA, 25 – 28 Jun 2018
- Oakes, R.L.**, Peck, V.L., Manno, C., and Bralower, T.J. (2018) Internal organic matter degradation is a major control on pteropod shell dissolution after death, presented at *2018 Ocean Sciences Meeting*, Portland, OR, 12-17 Feb 2018
- 2017 **Oakes, R.L.**, Peck, V.L., Manno, C., and Bralower, T.J. (2017) Degradation of internal organic matter is a major control on pteropod shell dissolution after death, presented at *2017 GSA Annual Meeting*, Seattle, WA, 22-27 Oct 2017
- Oakes, R.L.**, Peck, V.L., Bralower, T.J. (2017) Using high-resolution imaging techniques to assess the impact of ocean acidification on the condition of pteropod shells, presented at *HighRes 2017*, Madison, WI, 18-21 June 2017
- Oakes, R.L.** (2017) Understanding how ocean acidification impacts pteropods, the potato chips of the sea. *Peter Deines Memorial Lecture*, Pennsylvania State University, 11 April 2017
- 2016 **Oakes, R.L.**, Jones, M.M., Fortiz, V., Fantle, M.S., Bralower, T.J., Arthur, M.A., and Sageman, B.B. (2016) Examining the role of volcanism on biotic changes at the Cenomanian-Turonian boundary, presented at *2016 GSA Annual Meeting*, Denver, CO, 25-26 Sept. 2016
- Oakes, R.L.**, Urbanski, J.M., Peck, V.L., Manno, C, Harper, E.M., and Bralower, T.J. (2016). Using Micro-CT scanning and nanoSEM to assess the state of pteropods in the modern and future ocean, presented at *2016 GSA Annual Meeting*, Denver, CO, 25-26 Sept. 2016
- Jones, M.M., Sageman, B.B., Selby, D., **Oakes, R.L.**, Parker, A.L., Leckie, R.M., and Bralower, T.J. (2016) Synchronous facies changes and quantified hiatuses at the onset of the mid-Cretaceous Oceanic Anoxic Event 2 in the Western Interior Basin (N. America), presented at *2016 GSA Annual Meeting*, Denver, CO, 25-26 Sept. 2016
- Boudinot, F.G., Sepulveda, J., Sageman, B.B., Jones, M.M. Bralower T.J., **Oakes, R.L.**, Leckie, R.M., and Parker, A.L. (2016) A high-resolution organic geochemical study of OAE2 in the U.S. Western Interior Seaway, presented at *2016 GSA Annual Meeting*, Denver, CO, 25-26 Sept. 2016

Peck, V., **Oakes, R.L.**, Harper, E.M., Manno, C., and Tarling, G. (2016) Considerations when using pteropod shells as an indicator of ocean acidification – past, present and future presented at *International Conference on Paleoceanography*, Utrecht, Netherlands, 29 Aug.– 2 Sept. 2016

Oakes, R.L., Urbanski, J.M., and Bralower, T.J. (2016) Using micro-CT scanning to investigate the state of pteropods in the modern ocean, presented at *GE's 2016 Industrial X-ray CT Forum at Penn State University*, University Park, PA, 17-19 May 2016

2015

Jones, M.M, Sageman, B.B., Selby, D.S., **Oakes, R.L.**, Bralower, T.J., Parker, A.L., Leckie, R.M., and Sepulveda, J. (2015) Combining local lithofacies and global geochemical signals to test the acidification hypothesis for the onset of Oceanic Anoxic Event 2 in the U.S. Western Interior Basin, Abstract PP33C-2320 presented at *2015 AGU Fall Meeting*, San Francisco, CA, 14-18 Dec. 2015

Parker, A.L., Leckie, R.M., Sageman, B.B., Jones, M.M., and Bralower, T.J., and **Oakes, R.L.** (2015) The onset of Oceanic Anoxia Event 2 (~94 Ma) in the U.S. Western Interior Sea: Foraminiferal Response to the Development of Anoxia in a shallow epicontinental sea, presented at *2015 GSA Annual Meeting*, Baltimore, MD, 1-4 Nov. 2015

Oakes, R.L., Urbanski, J.M., and Bralower, T.J. (2015) Micro CT Scanning – Adding a New Dimension to the Study of Pteropods presented at *Response of pteropods to ocean acidification and climate change workshop*, British Antarctic Survey, Cambridge, UK, 1-3 Jun. 2015

2014

Oakes, R.L., Urbanski, J., and Bralower, T.J. (2014) Adding a New Dimension to the Study of Calcareous Plankton Response to Ocean Acidification, Abstract PP11A-1323 presented at *2014 AGU Fall Meeting*, San Francisco, CA, 15-19 Dec. 2014

Bralower, T.J., Bice, D.M., Millet, A., **Oakes, R.L.**, Bruckner, M., and Iverson, E. (2014) Earth Futures: A Blended General Education Course at the Pennsylvania State University, Paper No. 305-1 presented at *2014 GSA Annual Meeting* in Vancouver, British Columbia, 19-22 Oct. 2014

2012

Oakes, R.L., Dittrich, M., and Wortmann, U.G. (2012) Phosphorus cycling in the Early Aptian, Abstract PP33C-2126 presented at *2012 AGU Fall Meeting*, San Francisco, CA, 3-7 Dec. 2012