

CURRICULUM VITAE

Nina Keul

+49 176 629 645 71 nina.keul@gmail.com
ninakeul.com

CURRENT POSITION

- 2017 –present **Scientist**, Christian-Albrechts-Universität zu Kiel (Kiel, Germany)
I am working at the development of new methods to reconstruct atmospheric pCO₂ going back in time using marine calcifying plankton- pteropods and foraminifera, which are present in all oceans. Currently I am establishing a pCO₂ calibration using pteropods that have been cultured under a range of pCO₂, which I will then implement on pteropod samples from a 10-year sediment trap in the Arctic and on an Arctic sediment core.

EDUCATION & WORK EXPERIENCE

- 2017 **Postdoc**, Christian-Albrechts-Universität zu Kiel (Kiel, Germany)
Project title: "Double trouble: Tracing the effect of Ocean Acidification and Ocean Warming in the shells of pteropods and potential proxy implications" within the Cluster of Excellence 'Future Ocean'.
- 2013/14 **Postdoc**, Columbia University, Department of Earth and Environmental Sciences Lamont-Doherty Earth Observatory (Palisades,USA)
Biology and Paleo Environment
Research adviser: Prof. Peter deMenocal
Studies on trace elemental incorporation and biomineralization of pteropods
- 2012 **PhD**, Marine Geosciences, Jacobs University (Bremen, Germany), & Biogeosciences, Alfred-Wegener-Institute (Bremerhaven, Germany),
Research adviser: Prof. Jelle Bijma, "The consequences of Ocean Acidification on benthic foraminifera: calcification and potential proxy applications"
- 2009 **Diplom**, Biological Oceanography, Christian-Albrechts-Universität zu Kiel (Kiel, Germany) & GEOMAR (Kiel, Germany)
- 2006 **Vordiplom**, Biology, Christian-Albrechts -niversität zu Kiel, (Kiel, Germany)

PUBLICATIONS

PEER- REVIEWED

- under review Langer G., Nehrke G., **Keul N.**, Littmann S., Kuypers M., Greaves M., Bijma J., 2016, Mg and Sr banding in the symbiont-barren foraminifer *Ammonia aomoriensis* as revealed by NanoSIMS analyses.
- 2017 **Keul N.**, Peijnenburg K.T.C.A, Andersen, N., Kitidis V., Goetze, E., Schneider, R., Pteropods are excellent recorders of surface temperature and carbonate ion concentration, *Sci. Rep.*, 7: 12645, doi: 10.1038/s41598-017-11708-w.
- 2017 Manno C., (et al., inkl. **Keul N.**), Shelled pteropods in peril: Assessing vulnerability in a high CO₂ ocean, *Ear.-Sci. Rev.*, 169: 132-145, doi: 10.1016/j.earscirev.2017.04.005.
- 2016 **Keul N.**, Langer G., Thoms S., de Nooijer L., Reichart G.-J, Bijma J., Exploring foraminiferal Sr/Ca as a new carbonate system proxy, *Geochim. Cosmochim. Acta*, 202, 374 - 386, doi: 10.1016/j.gca.2016.11.022.
- 2016 Langer G., Sadekov A., Thoms S., **Keul N.**, Nehrke G., Mewes A., Greaves M., Misra S., Reichart G.-J., de Nooijer L., Bijma J., Elderfield H., 2016, Sr partitioning in the benthic foraminifera *Ammonia aomoriensis* and *Amphistegina lessonii*, *Chemical Geology*, 440, 206 - 312, doi:10.1016/j.chemgeo.2016.07.018.
- 2013 Nehrke G., **Keul N.**, Langer G., de Nooijer L., Bijma J., Meibom A., A new model for

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- biomineralization and trace-element signatures of foraminifera tests, *Biogeosciences* 10, 6759-6767, doi:10.5194/bg-10-6759-2013.
- 2013 **Keul N.**, Langer G., de Nooijer L., Bijma J., Effect of ocean acidification on the benthic foraminifera *Ammonia* sp. is caused by a decrease in carbonate ion concentration, *Biogeosciences* 10, 6185-6198, doi:10.5194/bg-10-6185-2013.
- 2013 **Keul N.**, Langer G., de Nooijer L., Nehrke G., Reichart G.-J., Bijma J., Incorporation of uranium in benthic foraminiferal calcite reflects seawater carbonate ion concentration, *Geochem. Geophys. Geosyst.*, doi:10.1029/2012GC004330.
- 2012 Glas M., Langer G., **Keul N.**, Calcification acidifies the microenvironment of a benthic foraminifer (*Ammonia* sp.), *Journal Mar. Biol. Ecol.*, 424-425, p53-58.
- 2010 **Keul N.**, Morse J., Wanninkhof R., Gledhill D., Bianchi T., Carbonate Chemistry Dynamics of Surface Waters in the Northern Gulf of Mexico, *Aquatic Geochemistry*, Vol 16, Nr 3, p337 -351.

NON-REFEREED

- 2016 Repschläger J., (et al., inkl. **Keul N.**), NASGAF: North Atlantic Subtropical Gyre and Azores Front Geometry, Cruise No. MSM58- September 10 - October 07, 2016 - Reykjavik (Island)- Ponta Delgada (Portugal), *Maria S. Merian Berichte*, 2016.
- 2016 Schneider R., (et al., inkl. **Keul N.**), LISA: Baltic Sea water budget and sediment transport changes since the Littorina Transgression and their effects on the ecosystem, Cruise No. MSM51-1 - February 01 - February 09, 2016 - Warnemünde (Germany) - Kiel (Germany), *Maria S. Merian Berichte*, 2016.
- 2015 Schneider R., (et al., inkl. **Keul N.**), PULSE: Paleoclimate- Understanding Labrador Sea, PULSE, Cruise No. MSM45 - August 02 - August 21, 2015 - Nuuk (Greenland) - Halifax (Canada), *Maria S. Merian Berichte*, 2015.
- 2015 **Keul N.**, Langer G., de Nooijer L., Nehrke G., Reichart G.-J., Bijma J., Schneider R., New Carbonate System Proxies: Foram Culturing and Pteropod Potentials, *Nova Acta Leopoldina* NF 121 408, 305 - 309.
- 2013 **Keul N.**, Langer G., de Nooijer L., Bijma J., Effect of ocean acidification on the benthic foraminifera *Ammonia* sp. is caused by a decrease in carbonate ion concentration, *Biogeosciences Discuss.*, 10, 9797-9818, doi:10.5194/bgd-10-9797-2013.
- 2012 **Keul N.**, The consequences of Ocean Acidification on benthic foraminifera: calcification and potential proxy applications, PhD thesis, Jacobs University.
- 2007 Hansen I., **Keul N.**, Sørensen J., Erichsen A., Andersen J., Baltic Sea Oxygen Maps 2000- 2006 Balance Interim Report No. 17.

GRANTS AND FELLOWSHIPS

- 2015 Daimler Benz Stiftung Postdoctoral Scholarship (40 000 EUR)
"Double trouble: Tracing the effect of Ocean Acidification and Ocean Warming in the shells of pteropods and potential proxy implications"
- 2014 Cluster of Excellence-Future Ocean Research Grant (270 000 EUR)
"Double trouble: Tracing the effect of Ocean Acidification and Ocean Warming in the shells of Arctic Pteropods and potential proxy implications"
- 2013 Columbia University Climate Center, Research Grant (10 000 USD)
"Pteropods, the new foraminifera? Establishing an Oxygen isotope- temperature calibration"

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- 2013 Columbia University Climate Center, Research Grant (10 000 USD)
"Double trouble: Tracing the effect of Ocean Acidification and Ocean Warming in the shells of Arctic Pteropods"
- 2011 BioVisionNxt Scholar 2011 (ca. 1 000 EUR)
- 2009 AXA Research Fund Doctoral Fellowship (120 000 EUR)
"The consequences of Ocean Acidification on benthic foraminifera: calcification and potential proxy applications"

TALKS

INVITED TALKS

- 2017 American Geophysical Union Fall Meeting, December 11- 15 2017 *"New proxies for climate change parameters: foram culturing and pteropod potentials"*
- 2017 Symposium: Biodiversity in the open ocean (Leiden, The Netherlands) *"Pteropods, the smallest gliders in the world?"*
- 2016 Naturalis (Leiden, The Netherlands)
"Pteropods, the new foraminifera? Establishing an Oxygen isotope- temperature calibration"
- 2016 TU Dresden (Dresden, Germany)
"Ocean acidification- the evil twin of climate change"
- 2015 Yale University (New Haven, USA)
"Culturing foraminifera- biomineralization insights and new C-system proxies"
- 2015 Daimler und Benz Stiftung (Ladenburg, Germany)
"Ocean Acidification- the other CO₂ problem"
- 2014 Woods Hole Oceanographic Institution (Falmouth, USA)
"Double trouble: tracing Ocean Acidification and Ocean Warming in the shells of pteropods"
- 2014 Christian-Albrechts Universität zu Kiel, Future Ocean Excellence Cluster (Kiel, Germany)
"Double trouble: Tracing the effect of Ocean Acidification and Ocean Warming in the shells of Arctic Pteropods and the potential proxy implications"
- 2013 Christian-Albrechts Universität zu Kiel, Institute of Geosciences (Kiel, Germany)
"Carbonate system proxies- novel insights from culturing"
- 2012 Utrecht University, Department of Earth Sciences (Utrecht, The Netherlands)
"Impacts of ocean acidification on foraminiferal calcification and (trace) element incorporation"
- 2012 Cambridge University, Department of Earth Sciences (Cambridge, United Kingdom)
"Vesicle dynamics in foraminifera"
- 2011 GEOMAR, Department of Marine Ecology (Kiel, Germany)
"Impacts of ocean acidification on foraminiferal calcification"
- 2010 Interuniversity Institute for Marine Sciences (Eilat, Israel)
"The influences of seawater Mg/Ca on Mg/Ca of foraminiferal calcite as a function of temperature"

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DEPARTMENTAL TALKS

- 2014 Lamont-Doherty Earth Observatory at Columbia University (Palisades, USA)
"Double trouble: tracing Ocean Acidification and Ocean Warming in the shells of pteropods "
- 2012 Alfred-Wegener-Institute, Biogeosciences (Bremerhaven, Germany)
"Impacts of ocean acidification on foraminiferal calcification and (trace) element incorporation"
- 2012 Jacobs University, School of Engineering and Sciences (Bremen, Germany)
"U/Ca in benthic foraminifera as a proxy for carbonate ion concentration"
- 2011 Alfred-Wegener-Institute, Biogeosciences (Bremerhaven, Germany)
"Vesicle dynamics in foraminifera"
- 2010 Alfred-Wegener-Institute, Biogeosciences (Bremerhaven, Germany)
"Sr/Ca incorporation in benthic foraminifera"
- 2009 Alfred-Wegener-Institute, Biogeosciences (Bremerhaven, Germany)
"Aragonite saturation state in the Greater Caribbean Region"

CONFERENCE PARTICIPATION

- 2017 American Geophysical Union Fall Meeting, December 11- 15 2017, *"New proxies for climate change parameters: foram culturing and pteropod potentials"*
- 2017 Goldschmidt 2017, August 13 – 18 2017, *"NEW CARBONATE SYSTEM PROXIES: Sr/Ca and U/Ca in Foraminifera"* (Oral Presentation)
- 2017 European Geosciences Union General Assembly 2017 (EGU 2017), April 23 – 28 2017, *"Exploring foraminiferal Sr/Ca as a new carbonate system proxy"* (Poster Presentation)
- 2016 12th International Conference on Paleoceanography (ICP12), August 29 – 31 2016, *"Exploring foraminiferal Sr/Ca as a new carbonate system proxy"* (Poster Presentation)
- 2016 ICES/ PICES 6th Zooplankton Production Symposium, May 9 – 13 2016, *"Pteropod abundance in correlation to sea ice- finally some good news for Southern Ocean pteropods? Results from a 20-year sediment trap study"* (Oral Presentation)
- 2016 Ocean Sciences Meeting, February 21 – 26 2016, *"The smallest gliders in the ocean- temperature recordings from pteropods using SIMS"* (Oral Presentation)
- 2015 Sustainable Ocean Development Symposium, September 28 – 30 2015, *"Assessing marine biodiversity – pteropods as indicator species for climate change"* (Poster Presentation)
- 2015 XIX Inqua Congress, July 26 – Aug 2 2015, *"Trace elements in pteropods: Proxy development and paleoceanographic implications"* (Oral and Poster Presentation)
- 2015 Response of Pteropods to ocean acidification and climate change, Workshop, June 1 – 3 2015, *"Double trouble: Tracing Ocean Acidification and Ocean Warming in the shells of pteropods"* (Oral Presentation)
- 2015 Planktic gastropods: biology, ecology and paleontology, Annual Meeting Malacological Society London, April 1 2015, *"Double trouble: Tracing Ocean Acidification and Ocean Warming in the shells of pteropods"* (Oral Presentation)

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- 2015 Deglacial Changes in Ocean Dynamics and Atmospheric CO₂, Leopoldina Symposium, March 18- 21 2015, “*New Carbonate System Proxies: Foram Culturing and Pteropod Potentials*” (Poster Presentation)
- 2014 Ocean Sciences Meeting, February 23- 28 2014, “*Double Trouble: Tracing the effect of Ocean Acidification and Ocean Warming in the shells of Arctic pteropods*” (Oral Presentation)
- 2013 American Geophysical Union Fall Meeting, December 9- 13 2013, “*Double Trouble: Tracing the effect of Ocean Acidification and Ocean Warming in the shells of Arctic pteropods*” (Poster Presentation)
- 2012 Japan Geoscience Union Meeting, May 20- 25 2012, “*Impacts of ocean acidification on foraminiferal calcification*” (Oral Presentation)
- 2011 American Geophysical Union Fall Meeting, December 5- 9 2011, “*Impacts of ocean acidification on foraminiferal calcification*” (Poster Presentation)
- 2011 Bioacid Meeting, September 26- 30 2011, “*Seawater endocytosis not related to chamber formation in foraminifera*” (Oral Presentation)
- 2010 Bioacid Meeting, September 27- 30 2010, “*Vesicle dynamics in foraminifera*” (Poster Presentation)
- 2010 FORAMS 2010- International Symposium on Foraminifera, September 5- 10 2010, “*Vesicle dynamics in foraminifera*” (Oral Presentation)
- 2010 European Geosciences Union General Assembly, May 2- 7 2010, “*Impacts of ocean acidification on calcification in the benthic foraminifera *Ammonia tepida**” (Poster Presentation)

FIELD WORK AND CRUISES

- 2016 MSM 58 (September 10- October 7; Reykjavik, Iceland - Pt. Delgada, Portugal): Sampling of planktonic foraminifera for biomineralization studies
- 2016 MSM 51 (January 31- February 9; Warnemünde, Germany - Kiel, Germany): Sampling of benthic foraminifera for biomineralization studies
- 2015 MSM 45 (August 2- 21; Nuuk, Greenland - Halifax, Canada): Biomineralization and dissolution studies on pteropods
- 2009 –2012 Monthly sampling of foraminifera in intertidal flats in Wadden Sea (Dorum, Germany)
- 2010 8 weeks Field Campaign: Culturing of planktonic foraminifera (Inter-University Institute for Marine Sciences (Eilat, Israel)
- 2008 Cruise EotS, Caribbean Sea (December 1- 12, New York, USA - New York, USA)
- 2008 Cruise MCH, Gulf of Mexico (July 17- 20, Cocodrie, USA - Cocodrie, USA)

TEACHING

- 2017 Seagoing Practical and Seminar (5 SWS)
- 2017 Geological field excursions (3 SWS, co-teaching)
- 2016-present Introduction to Paleooceanography (2 SWS, co-teaching)
- 2015-present Paleoclimate Research Lecture and Seminar (2 SWS, co-teaching)
- 2015-present Biomineralization Lecture and Seminar (4 SWS)
- 2011 Teaching assistant for course "Bioarchives"
- 2005 Teaching assistant for course "Biol. Großpraktikum"

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SUPERVISED THESES AND MENTORING

2017	supervisor Master Thesis Charlotte Eich
2017	supervisor Bachelor Thesis Maria Paulsen
2017	supervisor Bachelor Thesis Marlene Stark
2016	supervisor Bachelor Thesis Sarina Schmidt
2016	co-supervisor Master Thesis Lia Brunke
2015	co-supervisor Bachelor Thesis Karl Meier
2015-2017	Matthis Frey, student assistant
2016-present	Alessia Carini, student assistant
2016-present	Sebastian Steffen, student assistant
2016-present	Rebecca Dettbarn, student assistant
2013-2014	Jessica Schenkman, high school student (Tenafly Highschool), final year project
2011	Caroline Otten, Marc Bullwinkel and Yvette Bublitz, apprentices

ACADEMIC SERVICES & SOCIETY MEMBERSHIPS

REVIEWER: Biogeosciences; Geochemistry, Geophysics, Geosystems; Geochimica Cosmochimica Acta; Marine Biology; Marine Micropaleontology; NSF (National Science Foundation); Proceedings of the Royal Society B; Quaternary Science Reviews

SOCIETY MEMBERSHIPS: American Geophysical Union; European Geosciences Union; European Association of Geochemistry; Earth Science Women's Network

ACADEMIC SERVICE & PUBLIC OUTREACH

Member in the Senate Committee for Ethics (2017-2019)
Member in the Senate Committee for Research and Knowledge Transfer (2015-2017)
European Science Night (2017)
Co-organizer of ECC 2015 (Early Career Conference, Kiel, October 5- 7)
Participation in press conference at the fall meeting of the American Geophysical Union 2011 ("Ocean Acidification 1: Increasing ocean acidification, declining reef health")
PhD representative at Alfred-Wegner-Institute (2010/ 2011)
AWI open House (2011)
Tutor for international students at Kiel University (2003- 2005)
Implementation of online learning webpage for school children on Ocean Acidification (online laboratory experiments://i2i.stanford.edu/AcidOcean/AcidOcean_DE.htm)

PROFESSIONAL DEVELOPMENT

ANALYTICAL TECHNIQUES: (LA)-ICP-MS ((laser ablation) inductively coupled mass spectrometry), ICP-OES (inductively coupled optical emission spectrometry), TIMS (thermal ionization mass spectrometry), SEM (scanning electron microscopy), CLSM (confocal laser scanning microscopy)

LANGUAGES: German (native), English (fluent), French (conversational)

COMPUTER SKILLS: R, ODV, Latex, Adobe Illustrator, InDesign, Photoshop, MS Office

PADI DIVEMASTER with over 150 logged dives and regular working experiences at Nicedive4you, Scharbeutz, Germany since 05/2014