

**Hyewon ‘Heather’ Kim**

Assistant Scientist  
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**Professional appointments**

- 2019-present Assistant Scientist (tenure-track), Department of Marine Chemistry & Geochemistry, Woods Hole Oceanographic Institution, Woods Hole, MA
- 2019-present Faculty, MIT-WHOI Joint Program in Oceanography/Applied Ocean Science & Engineering, Cambridge, MA
- 2017-2019 Postdoctoral Research Associate, Department of Environmental Sciences, University of Virginia, Charlottesville, VA (advisor: Dr. Scott Doney)
- 2017 Postdoctoral Research Scientist, Division of Biology & Paleo Environment, Lamont-Doherty Earth Observatory, Columbia University, Palisades, NY (advisor: Dr. Hugh Ducklow)

**Education**

- 2017 Ph.D., Columbia University, Department of Earth & Environmental Sciences, Lamont-Doherty Earth Observatory, New York, NY (advisor: Dr. Hugh Ducklow)
- 2012 M.S., University of Rhode Island, Biological Oceanography, Graduate School of Oceanography, Narragansett, RI (advisor: Dr. Susanne Menden-Deuer)
- 2010 B.S., Seoul National University, School of Earth & Environmental Sciences, Seoul, South Korea

**Honors and awards**

- 2016 Antarctica Service Medal, United States Antarctic Program
- 2014 C-MORE summer course participant, University of Hawaii at Manoa
- 2013 Dean’s Fellow, Columbia University, Graduate School of Arts & Sciences
- 2012 Travel Award, National Oceanic and Atmospheric Administration
- 2010 Graduation Honors, Seoul National University, School of Earth & Environmental Sciences
- 2009-2010 Lee Hye Jeong Fellowship, Seoul National University Foundation
- 2007-2008 Merit Scholarship, Seoul National University, School of Earth & Environmental Sciences

**Grants and funding**

- 2020 WHOI Independent Research & Development Award to Kim (\$62,965),  
*“Quantifying microbial control of the global oceanic carbon sink”*

**Professional affiliations**

- 2014-present Member, American Geophysical Union
- 2013-present Member, Association for the Sciences of Limnology & Oceanography

**Publications**

- [8] **Kim, H.**, D. E. Lee, and H. W. Ducklow (2019). Winter extratropical cyclones as a potential driver of a long-term decline of bacterial production in the Sargasso Sea near Bermuda. *Geophysical Research Letters*, 46 (10), 5404–5412. doi:10.1029/2018GL081243.
- [7] **Kim, H.**, D. E. Lee, and H. W. Ducklow (2018). Mixing regime-dependent causality between phytoplankton and bacteria in the subtropical North Atlantic Ocean ecosystem. *Marine Ecology Progress Series*, 600, 41–53. doi:10.3354/meps12643.
- [6] **Kim, H.**, H. W. Ducklow, D. Abele, E. M. R. Barlett, A. G. J. Buma, M. P. Meredith, P. D. Rozema, O. M. Schofield, H. J. Venables, and I. R. Schloss (2018). Inter-decadal variability of phytoplankton biomass along the coastal West Antarctic Peninsula. *Philosophical Transactions of the Royal Society A*, 376 (2122), 20170174. doi:10.1098/rsta.2017.0174.
- [5] **Kim, H.** and H. W. Ducklow (2016). A decadal (2002-2014) analysis for dynamics of heterotrophic bacteria in an Antarctic coastal ecosystem: Variability and physical and biogeochemical forcings. *Frontiers in Marine Science*, 3 (214), 1–18. doi:10.3389/fmars.2016.00214.
- [4] **Kim, H.**, S. C. Doney, R. A. Iannuzzi, M. P. Meredith, D. G. Martinson, and H. W. Ducklow (2016). Climate forcing for dynamics of dissolved inorganic nutrients at Palmer Station, Antarctica. *Journal of Geophysical Research: Biogeosciences*, 121 (9), 2369–2389. doi:10.1002/2015JG003311.
- [3] **Kim, H.**, Y. H. Kim, S.-G. Kang, and Y.-G. Park (2016). Development of environmental impact monitoring protocol for offshore carbon capture and storage (CCS): A biological perspective. *Environmental Impact Assessment Review*, 57, 139–150. doi:10.1016/j.eiar.2015.11.004.
- [2] **Kim, H.** and S. Menden-Deuer (2013). Reliability of rapid, semi-automated assessment of plankton abundance, biomass, and growth rate estimates: Coulter Counter versus light microscope measurements. *Limnology & Oceanography: Methods*, 11 (7), 381–393. doi:10.4319/lom.2013.11.382.
- [1] **Kim, H.**, A. J. Spivack, and S. Menden-Deuer (2013). pH alters the swimming behaviors of the raphidophyte *Heterosigma akashiwo*: Implications for bloom formation in an acidified ocean. *Harmful Algae*, 26, 1–11. doi:10.1016/j.hal.2013.03.004.

**Manuscript in review**

- [2] **Kim, H.**, Y.-W. Luo, H. W. Ducklow, O. M. Schofield, D. K. Steinberg, and S. C. Doney. Marine ecosystem dynamics in the changing polar ocean revealed by data-assimilative modeling, *In Review, Journal of Geophysical Research: Biogeosciences*.
- [1] **Kim, H.**, J. S. Bowman, Y.-W. Luo, H. W. Ducklow, O. M. Schofield, D. K. Steinberg, and S. C. Doney. Microbial diversity-informed modelling of the polar marine ecosystem functions, *In Review, Biogeosciences*.

**Manuscript in preparation**

- [2] Keul, N., **H. Kim**, D. M. Karl, M. Erickson, D. K. Steinberg, and H. W. Ducklow. Finally good news from the Southern Ocean? Environmental and climate impacts on one of the most vulnerable zooplankton group: pteropods. *In Preparation, Nature Communications*.
- [1] Jeong, H. J., H. C. Kang, K. Lee, P. J. S. Franks, A. S. Lim, J. H. Kim, J. H. Ok, S. J. Kim, J. H. You, J. E. Kwon, K. H. Lee, S. Y. Lee, S. H. Jang, K. Y. Kim, and **H. Kim**. Possession of many predator species, an evolutionary strategy for frequent and global red-tide formation. *In Preparation, Nature*.

**Proceedings and books**

- [3] Nam, S. H., **H. Kim**, and C. Y. Hwang (2015). Blue Planet Earth Series: 4. Polar Research, Approaching with Science. *eBook, Books I & I, KSI (Korean Studies Information)*.
- [2] **Kim, H.** and S. Menden-Deuer (2014). Estimating the effects of ocean acidification-induced behavioral shifts on primary production of *Heterosigma akashiwo*. *Proceedings of the International Society for the Study of Harmful Algae*.
- [1] **Kim, H.** and Y. H. Kim (2013). Review of environmental risk assessment, regulations, standards on Carbon Capture and Storage. *Development of Technology for CO<sub>2</sub> Marine Geological Storage Research & Development Report*.

**Invited presentations**

- September, 2019. "Microbial control of ocean carbon and biogeochemical cycling in a changing climate," Seoul National University, School of Earth and Environmental Sciences, Seoul, South Korea.
- September, 2019. "Microbial control of ocean carbon and biogeochemical cycling in a changing polar ocean," Korea Polar Research Institute, Incheon, South Korea.
- September, 2019. "Microbial control of ocean carbon and biogeochemical cycling in a changing climate," Chungnam National University, Oceanography and Ocean Environmental Sciences, Daejeon, South Korea.
- March, 2019. "Modeling the impacts of marine microbial interactions on upper-ocean carbon and biogeochemical cycling in a changing climate," University of Delaware, School of Marine Science and Policy, Newark, DE.
- March, 2019 "Quantifying the impacts of marine microbial interactions on upper-ocean carbon and biogeochemical cycling in a changing climate," Woods Hole Oceanographic Institution, Department of Marine Chemistry and Geochemistry, Woods Hole, MA.
- September, 2017. "Microbial interactions in coupled climate-biogeochemical systems: Antarctica and Bermuda," Department of Environmental Sciences, University of Virginia, Charlottesville, VA.

September, 2016. “Palmer LTER: Revealing ecological interactions in the coupled climate-biogeochemical system based on observations and data-driven modeling,” Princeton University, Atmospheric and Oceanic Sciences, Princeton, NJ.

June, 2015. “Climate forcing for bloom and nutrient dynamics at Palmer Station,” Seoul National University, School of Earth and Environmental Sciences, Seoul, South Korea.

### Conference presentations

**Kim, H.**, J. S. Bowman, Y.-W. Luo, H. W. Ducklow, O. M. Schofield, D. K. Steinberg, and S. C. Doney (2020). Microbial diversity-informed modelling of the polar marine ecosystem functions. *Abstract submitted* to the American Geophysical Union Fall Meeting.

**Kim, H.**, Y.-W. Luo, H. W. Ducklow, O. M. Schofield, D. K. Steinberg, and S. C. Doney (2020). Bacteria-mediated carbon cycling in the warming polar ocean revealed by data assimilation modeling. Poster presentation at the Ocean Sciences Meeting, San Diego, CA.

**Kim, H.**, Y.-W. Luo, H. W. Ducklow, O. M. Schofield, D. K. Steinberg, and S. C. Doney (2019). Data assimilative modeling of an Antarctic coastal ecosystem: Impacts of microbial food-web interactions on upper-ocean carbon cycling in a changing climate. Oral presentation at the Aquatic Sciences Meeting, San Juan, PR.

**Kim, H.**, Y.-W. Luo, and S. C. Doney (2019). Data assimilative ecosystem modeling of bacterial dynamics and upper-ocean carbon cycling in the coastal West Antarctic Peninsula. Poster presentation at the EnviroDay, University of Virginia, Charlottesville, VA.

**Kim, H.**, Y.-W. Luo, and S. C. Doney (2018). Data assimilative modeling of polar marine ecosystem dynamics using a variational adjoint scheme. Poster presentation at the Postdoctoral Research Symposium, University of Virginia, Charlottesville, VA.

**Kim, H.**, Y.-W. Luo, and S. C. Doney (2018). Data assimilative ecosystem modeling of bacterial dynamics and upper-ocean carbon cycling in the coastal West Antarctic Peninsula. Poster presentation at the Ocean Carbon and Biogeochemistry Workshop, Woods Hole, MA.

**Kim, H.**, D. E. Lee, and H. W. Ducklow (2018). Wintertime extratropical cyclones drive a long-term bacterial trend at the Bermuda Atlantic Time-series (BATS) site. Poster presentation at the EnviroDay, University of Virginia, Charlottesville, VA.

**Kim, H.**, D. E. Lee, and H. W. Ducklow (2018). Wintertime extratropical cyclones drive a long-term bacterial trend at the Bermuda Atlantic Time-series (BATS) site. Poster presentation at the Ocean Sciences Meeting, Portland, OR.

**Kim, H.** (2016). Palmer LTER: Revealing ecological interactions in the coupled climate-biogeochemical system based on observations and data-driven modeling. Oral presentation at the Palmer Long-Term Ecological Research Annual Meeting, New Brunswick, NJ.

**Kim, H.**, S. C. Doney, R. A. Iannuzzi, M. P. Meredith, D. G. Martinson, D. E. Lee, and H. W. Ducklow (2016). Palmer LTER: Climate-biogeochemical coupling in an Antarctic coastal ecosystem. Poster presentation at the Ocean Carbon and Biogeochemistry Workshop, Woods Hole, MA.

**Kim, H.**, S. C. Doney, R. A. Iannuzzi, M. P. Meredith, D. G. Martinson, and H. W. Ducklow (2016). Climate-biogeochemical coupling in an Antarctic coastal ecosystem. Oral presentation at the Ocean Sciences Meeting, New Orleans, LA.

**Kim, H.** and H. W. Ducklow (2015). Physical forcing of bacterial dynamics at Palmer Station, Antarctica. Poster presentation at the Long-Term Ecological Research All Scientists Meeting, Estes Park, CO.

**Kim, H.**, D. G. Martinson, R. A. Iannuzzi, and H. W. Ducklow (2014). Interannual variability in seasonal drawdown of dissolved inorganic nutrients at Palmer Station, Antarctica. Poster presentation at the American Geophysical Union Fall Meeting, San Francisco, CA.

**Kim, H.**, D. G. Martinson, and H. W. Ducklow (2014). Physical and climate controls on drawdown of dissolved inorganic nutrients at Palmer Station: A 20-year study (1992-2012). Oral presentation at the Palmer Long-Term Ecological Research Annual Meeting, Williamsburg, VA.

**Kim, H.** and S. Menden-Deuer (2014). Effects of ocean acidification-induced swimming behaviors on population distributions and primary production of the raphidophyte *Heterosigma akashiwo*. Oral presentation at the Ocean Sciences Meeting, Honolulu, HI.

**Kim, H.** and S. Menden-Deuer (2012). Future-ocean  $p\text{CO}_2$  condition alters the movement behaviors of the toxic *Heterosigma akashiwo*: implications for harmful algal bloom formation in an acidifying ocean. Oral presentation at the International Conference on Harmful Algae, Changwon, South Korea.

**Kim, H.** and S. Menden-Deuer (2011). Feasibility of rapid, automated assessment of phytoplankton abundance, biomass, and growth rate: Coulter Counter vs. light microscope. Poster presentation at the United States Symposium on Harmful Algae, Austin, TX.

### **Published abstracts**

\*Solanke, O. and **H. Kim** (2020). Quantifying the biogeochemical role of microbial communities at the Bermuda Atlantic Time-series Study site. *Abstract submitted* to the American Geophysical Union Fall Meeting. (\*WHOI Summer Student Fellow 2020, advisor: Kim)

Chamberlain, E., **H. Kim**, S. C. Doney, and J. S. Bowman (2020). Leveraging microbial community structure data to inform ecosystem modeling, an approach based on microbial community segmentation. Ocean Sciences Meeting, San Diego, CA.

\*Baugh, K. R., **H. Kim**, and S. C. Doney (2019). The effects of hurricanes on the monthly anomalies of pH and dissolved inorganic carbon at the Bermuda Atlantic Time-series Study

site. Undergraduate Research Symposium, University of Virginia, VA. (\*UVA EVSC 4995 Supervised Research, advisor: Kim)

\*Baugh, K. R., **H. Kim**, and S. C. Doney (2019). The effects of hurricanes on the monthly anomalies of pH and dissolved inorganic carbon at the Bermuda Atlantic Time-series Study site. EnviroDay, University of Virginia, VA. (\*Mentored undergraduate student, advisor: Kim)

Chamberlain, E., **H. Kim**, S. C. Doney, and J. S. Bowman (2019). Leveraging microbial community structure to inform trait-based modeling, an approach based on microbial community segmentation. Trait-Based Approaches to Ocean Life Workshop, Buckinghamshire, U.K.

Ducklow, H. W., M. R. Stukel, J. S. Bowman, **H. Kim**, N. Cassar, R. Eveleth, Z. Li, S. Doney, S. F. Sailley, T. D. Jickells, A. R. Baker, R. Chance (2016). Exploring estimates of net community production and export along the Western Antarctic Peninsula (WAP), 1993-2014. American Geophysical Union Fall Meeting, San Francisco, CA.

Huete-Stauffer, T. M., C. Bunse, C. J. Closek, R. M. Gradoville, R. Mohamed, C. Moreno, J. Taylor, P. Wilburn, M. A. Budinich Abarca, T. Burrell, M. T. Gazitua Zavala, C. Gimpel, **H. Kim**, W. L. Liao, L. Peoples, A. Vislova (2015). Genomes to Biomes: C-MORE Summer Course on Microbial Oceanography. Aquatic Sciences Meeting, Granada, Spain.

### Student and postdoc advising

#### WHOI

2020 Ore Solanke, Columbia University, Department of Earth & Environmental Sciences, WHOI Summer Student Fellow, “*Quantifying the biogeochemical role of microbial communities in the subtropical North Atlantic Ocean*”

#### University of Virginia

2018 Kira Baugh, University of Virginia, Department of Environmental Sciences, EVSC4995 Supervised Research, “*Understanding climate-biogeochemical coupling: quantitative data analysis with the Bermuda Atlantic Time-series Study*”

### Teaching

#### MIT-WHOI Joint Program

Fall 2020 MIT-WHOI 12.747 Modeling, Data Analysis, and Numerical Techniques for Geochemistry (coteaching with Dr. David Nicholson)

#### Columbia University

Fall 2016 Teaching Assistant, EESC UN1030 Oceanography, Columbia University, Department of Earth and Environmental Sciences

2015-2016 Teaching Assistant, EESC UN2100 Earth’s Environmental System: Climate System, Columbia University, Department of Earth and Environmental Sciences

2015 Guest Instructor, Columbia University, Double Discovery Center

*University of Rhode Island*

Fall 2012 Teaching Assistant, OCG301 General Oceanography, University of Rhode Island, Graduate School of Oceanography

2010-2012 Outreach Scientist, University of Rhode Island, Office of Marine Programs

**Academic service and outreach activities**

*WHOI*

2020-2021 Marine Chemistry & Geochemistry seminar organizer (with Dr. Ann Dunlea)

*Session organizer and co-chair*

2019 “Changing Biogeochemistry and Ecology Across Polar Aquatic Systems in the 21st century”, Aquatic Sciences Meeting

2018 Postdoctoral Symposium, University of Virginia

*Service at professional conferences*

2020 Student Poster Evaluator, Ocean Sciences Meeting

2019 Mentor, ASLO Multicultural Program, Aquatic Sciences Meeting

2018 Student Poster Evaluator, Ocean Sciences Meeting

2015 Student Poster Evaluator, Long-Term Ecological Research All Scientists Meeting

*Panelist*

2017 Science Panel Q&A and Poster Judge, Polar-ICE Student Polar Research Symposium, Rutgers University

2016 Science Panel Q&A for film screening, *Antarctic Edge: 80 degrees South*, Columbia Alumni Associations STEM Day, Columbia University

*Manuscript reviewer*

Remote Sensing of Environment; Journal of Experimental Marine Biology and Ecology; Geoscientific Model Development; Biogeosciences; Journal of Geophysical Research: Biogeosciences; Scientific Reports; Limnology & Oceanography; Ecosystems; Global Change Biology; Terrestrial, Atmospheric and Oceanic Sciences; Philosophical Transactions of the Royal Society A

*Outreach*

2012 Volunteer, Environmental Protection Agency (Narragansett, RI)

2012 Science Fair Volunteer, America’s Cup World Series

2011 Science Saturday, University of Rhode Island

*Other activities*

2016-2017 Vice President, Columbia University Korean-American Scientists and Engineers Association, Columbia University

2013 Biological Oceanographer (environmental consultant), RPS-ASA

**Research cruises**

2015-2016 *ARSV Laurence M. Gould*, Palmer Long-Term Ecological Research cruise, West Antarctic Peninsula

- 2014 *R/V Kilo Moana*, C-MORE Microbial Oceanography: Genomes to Biomes cruise, central North Pacific
- 2011 *R/V Endeavor*, North Atlantic Spring Bloom cruise, Gulf of Maine
- 2010 *R/V Tamyang*, Shipboard Training course, East/Japan Sea