Heather Hyewon Kim, Ph.D.
Woods Hole Oceanographic Institution
Marine Chemistry and Geochemistry, MS 25, 266 Woods Hole Road, Woods Hole, MA 02543
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Professional Appointments

Assistant Scientist, Woods Hole Oceanographic Institution, Woods Hole, MA	2019-Present
Postdoctoral Research Associate, University of Virginia, Charlottesville, VA	2017-2019
Postdoctoral Research Scientist, Lamont-Doherty Earth Observatory, Palisades, NY	2017

Education

Columbia University, New York, NY	Earth and Environmental Sciences	Ph.D.	2013-2017
University of Rhode Island, Narragansett, RI	Oceanography	M.S.	2010-2012
Seoul National University, Seoul, South Korea	Earth and Environmental Sciences	B.S.	2007-2010

Honors and Awards

2023	Faculty Fellow, NSF Center for Chemical Currencies of a Microbial Planet (C-CoMP)
2016	Antarctica Service Medal recipient, United States Antarctic Program
2014	C-MORE Summer Course participant, University of Hawai‘i at Mānoa
2013	Dean’s Fellow, Columbia University, Graduate School of Arts and Sciences
2012	Travel Award recipient, National Oceanic and Atmospheric Administration

Professional Affiliations

Member	American Geophysical Union
Member	European Geosciences Union
Member	The Oceanography Society
Member	Association for the Sciences of Limnology and Oceanography

Peer-Reviewed Publications

Kim, H. H., Laufkötter, C., Lovato, T., Doney, S. C., and Ducklow, H. W. (2023). Projected 21st-century changes in marine heterotrophic bacteria under climate change. *Frontiers in Microbiology*, 14:1049579, https://doi.org/10.3389/fmicb.2023.1049579

Cimino, M. A., Conroy, J. A., Connors, E., Bowman, J., Corso, A., Ducklow, H., Fraser, W., Friedlaender, A., **Kim, H. H.**, Larsen, G., Moffat, C., Nichols, Rl., Pallin, L., Patternson-Fraser, D., Roberts, D., Roberts, M., Steinberg, D., Thibodeau, P., Trinh, R., Schofield, O., and Stammerjohn, S. (2023). Long-term patterns in ecosystem phenology near Palmer Station, Antarctica. *Ecosphere*, 14(2), e4417, https://doi.org/10.1002/ecs2.4417

Kim, H. H., Bowman, J. S., Luo, Y.-W., Ducklow, H. W., Schofield, O. M., Steinberg, D. K., and Doney, S. C. (2022). Modeling polar marine ecosystems guided by bacterial physiological and taxonomic traits. *Biogeosciences*, 19(1), 117-136, https://doi.org/10.5194/bg-19-117-2022

Kim, H. H., Luo, Y.-W., Ducklow, H. W., Schofield, O. M., Steinberg, D. K., and Doney, S. C (2021). WAP-1D-VAR v1.0: development and evaluation of a one-dimensional variational data assimilation model for the marine ecosystem along the West Antarctic Peninsula. *Geoscientific Model Development*, 14, 4939-4975, https://doi.org/10.5194/gmd-14-4939-2021

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. https://doi.org/10.1029/2018GL081243

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. https://doi.org/10.3354/meps12643

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. https://doi.org/10.1098/rsta.2017.0174

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. https://doi.org/10.3389/fmars.2016.00214

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. https://doi.org/10.1002/2015JG003311

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. https://doi.org/10.1016/j.eiar.2015.11.004

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 and Oceanography: Methods*, 11 (7), 381-393. https://doi.org/10.4319/lom.2013.11.382

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. https://doi.org/10.1016/j.hal.2013.03.004

Manuscripts Under Review or Revision

Kim, H. H., Archibald, K. M., Terhaar, J., and Thomason, R. Projecting the future metabolic state of the Sargasso Sea near Bermuda, Under review, *Geophysical Research Letters.*

Mete, Ö., Subhas, A., **Kim, H.**, Dunlea, A., Whitmore, L., Shiller, A., Gilbert, M., Leavitt, W., and Horner, T. Barium in seawater: Dissolved distribution, relationship to silicon, and barite saturation state determined using machine learning. Under revision, *Earth System Science Data*. https://doi.org/10.5194/essd-2023-67

Turner, J., Dierssen, H., Schofield, O., **Kim, H. H.**, Stammerjohn, S., Munro, D., and Kavanaugh, M. Later start of the growing season: 25-year trends in phytoplankton phenology in the marginal ice zone west of the Antarctic Peninsula. Revised version under review, *Global Change Biology*.

Invited Presentations

2022 NOAA Geophysical Fluid Dynamics Laboratory, Princeton, NJ (virtual)
2022 University of Rhode Island, Graduate School of Oceanography, Narragansett, RI (virtual)
2022 Massachusetts Institute of Technology, Atmospheres, Oceans, and Climate, Cambridge, MA
2022 Scripps Institution of Oceanography, Scripps Polar Center, UC San Diego (virtual)
2022 University of Virginia, TransUniversity Microbiome Initiative, Charlottesville, VA (virtual)
2022 Microbiome Centers Consortium Seminar Series (virtual)
2021 Scripps Institution of Oceanography, UC San Diego, San Diego, CA (virtual)
2020 Woods Hole Oceanographic Institution, Dept. of Biology, Woods Hole, MA (virtual)
2019 Seoul National University, School of Earth and Environmental Sciences, Seoul, South Korea
2019 Korea Polar Research Institute, Incheon, South Korea

2019 Chungnam National University, Dept. of Ocean Environmental Sciences, Daejeon, South Korea
2019 University of Delaware, School of Marine Science and Policy, Newark, DE
2019 Woods Hole Oceanographic Institution, Marine Chemistry and Geochemistry, Woods Hole, MA
2017 University of Virginia, Dept. of Environmental Sciences, Charlottesville, VA
2016 Princeton University, Atmospheric and Oceanic Sciences, Princeton, NJ
2015 Seoul National University, Dept. of Earth and Environmental Sciences, Seoul, South Korea

Supervision

Postdoctoral Researchers

Dr. Onur Karakus	WHOI Interdisciplinary Postdoctoral Investigator	July 2023 -
Dr. Jens Terhaar	WHOI Postdoctoral Scholar	2022-Present
Dr. Ashley Dinauer	NSF OCE Postdoctoral Fellow	2021-2022

Students

Linus Vogt	Guest Student (University of Bern, Switzerland)	March 2023-Present
Gus McGuire	Falmouth Academy High School Intern	December 2022
Rhegan Thomason	NSF C-CoMP B2P Fellow	2022-Present
Annabella Amato	WHOI Summer Student Fellow (UC Los Angeles)	2022
Theodore Calianos	Volunteer (University of Massachusetts Amherst)	2022-Present
Elizabeth Connors	Guest Student (Scripps Institution of Oceanography, UC San Diego)	2022
Emelia Chamberlain	Guest Student (Scripps Institution of Oceanography, UC San Diego)	2022
Oreoluwa Solanke	WHOI Summer Student Fellow (Columbia University)	2020
Kira Baugh	Undergraduate Researcher (University of Virginia)	2018

Technical Staff

Dr. Ivan Lima	WHOI Guest Investigator	2022-Present

Participation in Education

MIT-WHOI Joint Program

2022 Co-instructor, MIT-WHOI 12.757 Geodynamics Seminar: Climate Solutions
2020 Co-Instructor, MIT-WHOI 12.747 Modeling, Data Analysis, and Numerical Techniques for Geochemistry

Columbia University

2016 Teaching assistant, UN1030 Oceanography
2015-2016 Teaching Assistant, UN2100 Earth's Environmental System: Climate System
2015 Guest Instructor, Double Discovery Center

University of Rhode Island

2012 Teaching Assistant, OCG301 General Oceanography
2010-2012 Outreach Scientist, Office of Marine Programs

Abstracts and Presentations (*asterisk denotes student advisee)

Cimino, M., J. Conroy, E. Connors, J. Bowman, A. Corso, H. Ducklow, W. Fraser, A. Friedlaender, **H. H. Kim**, G. Larsen, C. Moffat, R. Nichols, L. Pallin, D. Patterson-Fraser, D. Roberts, M. Roberts, D. Steinberg, P. Thibodeau, R. Trinh, R., O. Schofield, and S. Stammerjohn (2022). Long-term patterns in ecosystem phenology near Palmer Station (PAL), Antarctica. LTER All Scientists Meeting, Pacific Grove, CA

Turner, J. S., H. Dierssen, O. Schofield, **H. H. Kim**, S. Stammerjohn, and D. Munro (2022). Shifts in the timing of the phytoplankton growing season west of the Antarctic Peninsula. Ocean Optics 2022 XXV, Quy Nhon, Binh Dinh, Vietnam.

Mete, O. Z., A. G. Dunlea, **H. H. Kim**, A. V. Subhas, and T. J. Horner (2022). Dissolved distribution of barium in seawater and its relationship to silicon. Northeast Geobiology Symposium, Virtual.

Mete, O. Z., **H. H. Kim**, A. G. Dunlea, L. Whitmore, A. Shiller, and T. J. Horner (2022). Dissolved distribution of barium in seawater and its relationship to silicon. Ocean Sciences Meeting, Virtual.

Turner, J. S., H. M. Dierssen, O. M. Schofield, S. E. Stammerjohn, **H. H. Kim**, and D. Munroe (2022). Interannual variability of satellite derived phytoplankton indices west of the Antarctic Peninsula 1997-2001. Ocean Sciences Meeting, Virtual.

Kim, H. H., C. Laufkötter, T. Lovato, S. C. Doney, and H. W. Ducklow (2022). Projected 21st-century changes in marine heterotrophic bacteria under climate change, Ocean Sciences Meeting, Virtual.

Mete, O. Z., A. G. Dunlea, **H. H. Kim**, and T. J. Horner (2021). Distribution of dissolved barium in seawater: a machine learning approach. WHOI Summer Student Fellow Presentation, Virtual.

Subhas, A. V., **H. H. Kim**, and K. O. Buesseler (2021). Navigating the ocean's role in carbon dioxide removal. Ocean Decade: U.S. Launch Meeting (Ocean Shots), Virtual.

Kim, **H. H.**, J. S. Bowman, Y.-W. Luo, H. W. Ducklow, O. M. Schofield, D. K. Steinberg, and S. C. Doney (2021). Combining microbial observations and biogeochemical modeling: variational data assimilation models. Ocean Carbon and Biogeochemistry Meeting, Virtual.

Kim, **H. 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. AGU Fall Meeting, Virtual.

*Solanke, O. and **H. H. Kim** (2020). Quantifying the biogeochemical role of microbial communities at the Bermuda Atlantic Time-series Study site. AGU Fall Meeting, Virtual.

*Solanke, O. and **H. H. Kim** (2020). Quantifying the biogeochemical role of microbial communities at the Bermuda Atlantic Time-series Study site. WHOI Summer Student Fellow Presentation, Virtual.

*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.

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. 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. ASLO 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. University of Virginia, Charlottesville, VA.

*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.

*Baugh, K. R., **H. Kim**, and S. C. Doney (2019). The effects of hurricanes of the monthly anomalies of pH and dissolved inorganic carbon at the Bermuda Atlantic Time-series Study site. Undergraduate Research Symposium, University of Virginia, Charlottesville, VA.

*Baugh, K. R., **H. Kim**, and S. C. Doney (2019). The effects of hurricanes of the monthly anomalies of pH and dissolved inorganic carbon at the Bermuda Atlantic Time-series Study site. 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. 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. Ocean Carbon and Biogeochemistry Meeting, 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. 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. Ocean Sciences Meeting, Portland, OR.

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. AGU Fall Meeting, San Francisco, CA.

Kim, H. (2016). Palmer LTER: Revealing ecological interactions in the coupled climate-biogeochemical system based on observations and data-driven modeling. Palmer Long-Term Ecological Research (LTER) 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. Ocean Carbon and Biogeochemistry Meeting, 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. Ocean Sciences Meeting, New Orleans, LA.

Kim, **H.** and H. W. Ducklow (2015). Physical forcing of bacterial dynamics at Palmer Station, Antarctica. LTER All Scientists Meeting, Estes Park. CO.

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. Burrel, 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. ASLO Aquatic Sciences Meeting, Granada, Spain.

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. AGU 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). Palmer LTER 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*. Ocean Sciences Meeting, Honolulu, HI.

Kim, **H.** and S. Menden-Deuer (2012). Future-ocean pCO_2 condition alters the movement behaviors of the toxic *Heterosigma akashiwo*: implications for harmful algal bloom formation in an acidifying ocean. 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. U.S. Symposium on Harmful Algae, Austin, TX.

Proceedings and Book Chapters

Nam, S. H., **H. Kim**, and C. Y. Hwang (2015). Blue Planet Earth Series: 4. Polar Research, Approaching with Science. eBook, Books I and I, KSI

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

Kim, H. and Y. H. Kim (2013). Review of environmental risk assessment, regulations, standards on Carbon Capture and Storage. Development of Technology for CO_2 Marine Geological Storage Research and Development Report

Academic Service

Editorial and Advisory Board

2022-Present	Topical Editor, Geoscientific Model Development
2022-Present	Review Editor, Frontiers in Aquatic Microbiology
2022-Present	Advisor, Ocean Visions Launchpad, $100M XPRIZE Carbon Removal (Elon Musk)

WHOI Institutional Service

2022-Present	Information Services Advisory Committee
2022	Ph.D. Thesis Defense Chair for Rebecca Chmiel (advisor: Dr. Mak Saito)
2022	Ph.D. Thesis Proposal Defense Chair for Ellen Park (advisor: Dr. David Nicholson)
2022	Department of Marine Chemistry and Geochemistry Faculty Search Committee
2022	MIT-WHOI Joint Program General Exam Committee
2022-Present	Women's Committee
2021-Present	First Year Student Academic Advising Committee
2021-Present	Thesis Committee Member of Shavonna Bent (advisor: Dr. Benjamin Van Mooy)
2020-Present	Thesis Committee Member of Noah Germolus (advisor: Dr. Elizabeth Kujawinski)
2020-2021	Department of Marine Chemistry and Geochemistry Seminar Organizer

Service at Academic Conferences

2024 (submitted)	Session co-organizer, Modeling approaches for ocean-based Carbon Dioxide Removal (CDR) research, Ocean Sciences Meeting
2023 (submitted)	Session co-organizer, Modeling approaches for ocean-based Carbon Dioxide Removal (CDR) research, AGU Fall Meeting
2022	Student Presentation Evaluator, Ocean Sciences Meeting (virtual)
2020	Student Presentation Evaluator, AGU Fall Meeting (virtual)
2020	Student Presentation Evaluator, Ocean Sciences Meeting, San Diego, CA
2019	Session co-organizer, Changing biogeochemistry and ecology across polar aquatic systems in the 21st century, Aquatic Sciences Meeting, San Juan, PR
2019	Mentor, ASLO Multicultural Program, Aquatic Sciences Meeting, San Juan, PR
2018	Student Presentation Evaluator, Ocean Sciences Meeting, Portland, OR
2018	Organizer, Postdoctoral Symposium, University of Virginia, Charlottesville, VA
2015	Student Presentation Evaluator, LTER All Scientists Meeting, Estes Park, CO

External Meetings and Workshops

2023	Invited Panelist, Department of Energy ARPA-E, Marine Carbon Sensing Workshop, Washington D.C.
2022	Invited Panelist, Schmidt Futures Ocean Biogeochemistry Strategic Planning Workshop, New York, NY (virtual)

2021	Invited Panelist, Open Ocean Blue Carbon Workshop, Environmental Defense Fund (EDF), Boston, MA
2017	Invited Panelist, Polar-ICE Student Polar Research Symposium, Rutgers University, New Brunswick, NJ
2016	Invited Panelist, Antarctic Edge: 80 degrees South, Columbia University Alumni Associations STEM Day, Columbia University, New York, NY

Manuscript Reviewer for Remote Sensing of Environment; Journal of Experimental Marine Biology and Ecology; Geoscientific Model Development; Biogeosciences; Journal of Geophysical Research: Biogeosciences; Scientific Reports; Limnology and Oceanography; Ecosystems; Global Change Biology; Terrestrial, Atmospheric and Oceanic Sciences; Philosophical Transactions of the Royal Society A; PLoS ONE; Frontiers in Marine Science; Aquatic Microbial Ecology

Outreach Activities

2022	Panelist, New York Signature Event, University Club of New York, New York, NY
2016-2017	Vice President, Columbia University Korean-American Scientists and Engineers Association, Columbia University, New York, NY
2013	Environmental consultant (part-time), RPS-ASA, South Kingstown, RI
2012	Volunteer, Environmental Protection Agency, Narraganset, RI
2012	Volunteer, Science Fair, America's Cup World Series, Newport, RI
2011	Volunteer, Science Saturday, University of Rhode Island, Narragansett, RI

Research Cruises

2015-2016	ARSV Laurence M. Gould, Palmer LTER research cruise, West Antarctic Peninsula
2014	R/V Kilo Moana, C-MORE Microbial Oceanography: Genomes to Biomes research cruise, North Pacific
2011	R/V Endeavor, North Atlantic Spring Bloom research cruise, Gulf of Maine
2010	R/V Tamyang, Shipboard Training course, East/Japan Sea