

Heather M. Benway

Senior Research Specialist

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Education

Ph.D., Oceanography, Oregon State University, Corvallis, OR (2005)
M.S., Earth Sciences, University of New Hampshire, Durham, NH (1997)
B.S., Environmental Sciences, University of Rochester, Rochester, NY (1994)

Skills

Program management; grant writing; research; science planning; science communication and outreach; scientific event conceptualization and planning; community building and engagement; mentoring

Interests

Oceanography, biogeochemistry, carbon cycle, climate science, science education and communication

Experience

Executive Officer, Ocean Carbon and Biogeochemistry (OCB) Program, Woods Hole Oceanographic Institution (May 2007 – present)
Comer-Steele Postdoctoral Scholar, Dept. of Geology and Geophysics, Woods Hole Oceanographic Institution (Oct. 2005 – May 2007)
Graduate Research Assistant, College of Earth, Ocean, and Atmospheric Sciences, Oregon State University (2000 – 2005)
Program Manager, Paleoclimatology Program, National Oceanic and Atmospheric Administration Office of Global Programs (currently the NOAA Climate Program Office) (1998 – 2000)
National Sea Grant Federal Fellows Program/Dean John A. Knauss Marine Policy Fellow, National Oceanic and Atmospheric Administration, Office of Global Programs (1997 – 1998)
Graduate Research Assistant, Estuarine/Coastal Chemistry Laboratory, Institute for the Study of Earth, Oceans, and Space, University of New Hampshire (1995 - 1996)
Graduate Teaching Assistant, Introductory Oceanography, Department of Earth Sciences, University of New Hampshire (1994)
Undergraduate Research Assistant, Department of Biology, University of Rochester (1993 - 1994)

Professional Service

Member, WHOI Campaign Committee

Chair, WHOI AVAST Program Oversight Committee (May 2021-Dec. 2023)
Member (2020-2022), Chair (2021), and Co-Chair (2022), WHOI Technical Staff Committee
Coordinator for WHOI Technical Staff Mentoring Program (2019-present)
Member and invited panelist, Society for Women in Marine Science (SWMS) 4th Annual
Symposium (2017)
Member of SCOR (Scientific Committee on Ocean Research) Working Group *Chemical Speciation
Modeling in Seawater to Meet 21st Century Needs* (2015-2022)
Reviewer for *Quaternary Science Reviews*, *Marine Micropaleontology*, *Geophysical Research
Letters*, *Geochemistry Geophysics Geosystems*, *Earth and Planetary Science Letters*,
Paleoceanography, *Deep-Sea Research*, *Bulletin of Marine Science*, *Journal of Geophysical
Research-Oceans*, *Frontiers in Marine Science*, *Journal of Plankton Research*, National Science
Foundation, European Research Council
Panelist, NOAA, NSF, NASA, and internal WHOI proposal review panels
Member, American Geophysical Union
Animal Volunteer Work: Cape Wildlife Center (Barnstable, MA, 2018-2021), International Fund for
Animal Welfare (Yarmouth, MA, ~2009-2011), Heartland Humane Society (Corvallis, OR, 2003-
2005)
WHOI Women's Committee (2010-2012)
WHOI Gender Equity Committee (2006-2007)
President, WHOI Postdoctoral Association (2006-2007)

Teaching and Outreach

Science content developer of Interactive Global Carbon Cycle Exhibit, Woods Hole Oceanographic
Institution Exhibit Center (Funding obtained from the Camille and Henry Dreyfus Foundation,
Inc.) - <http://www.whoi.edu/feature/carboncycle/>
Presenter of annual interactive oceanography programs for St. David's School 7th grade students at
the Cape Cod Sea Camps (2011-2019)
Presenter on ocean acidification and other ocean topics to students, local Girl Scout troops, WHOI
Ocean Science Journalism fellows, teachers, WHOI trustees and donors, and general public
Exhibitor and presenter (all age ranges) on oceanography and ocean acidification at the USA
Science and Engineering Festival (Washington, DC, October 2010)
Coordinator and convener of 2-week short course on ocean acidification in Woods Hole, MA
(November 2009)
Lecturer on paleoclimatology for the Woods Hole Partnership Education Program (June 2009,
2010)
Coordinator of summer educational programs for MS PHDS (Minorities Striving and Pursuing
Higher Degrees of Success in Earth System Science) students in Woods Hole, MA (2007-2009)
Guest lecturer for graduate marine geology and oceanography classes (WHOI, UNH, BU, 2006)
Volunteer and judge for local annual K-12 school science fairs (Falmouth, MA, 2006-present)

Honors and Awards

American Geophysical Union (AGU) Ocean Sciences Award for "outstanding leadership or service
to the ocean sciences by a senior scientist" (2023)

WHOI Marquet Senior Technical Staff Award for “extraordinary accomplishments in oceanography and mentoring” (\$50K of salary support, 2022)
WHOI Linda Morse-Porteous Award for leadership and mentoring (2022)
HERS Institute Higher Education Leadership Development Program (2020 Cohort)
Whelan Award recipient, Woods Hole Oceanographic Institution (2018)
Comer-Steele Postdoctoral Scholar, Woods Hole Oceanographic Institution (2005)
USGS Mendenhall Postdoctoral Research Fellowship (2005 – declined)
Schlanger Ocean Drilling Program Fellow (2002)
IMAGES Most Outstanding Student Poster Prize, International Conference on Paleoceanography VII, Sapporo, Japan (2001)
National Sea Grant Federal Fellows Program/Dean John A. Knauss Marine Policy Fellow (1997)

Seagoing Experience

Sedimentologist, Ocean Drilling Program Leg 202, D/V *JOIDES Resolution*, Valparaiso, Chile - Balboa, Panama (April-June 2002)
Geochemist, NEMO Expedition, Leg 3, R/V *Melville*, Manzanillo, Mexico – Puntarenas, Chile (May-June 2000)
Chief Scientist, R/V *Gulf Challenger*, three (seasonal) hydrographic surveys, Gulf of Maine (August 1994 – December 1996)

Peer-Reviewed Publications

Saito, M.A., H. Alexander, H.M. Benway, P.W. Boyd, M. Gledhill, E.B. Kujawinski, N.M. Levine, M. Maheigan, A. Marchetti, I. Obernosterer, A.E. Santoro, D. Shi, K. Suzuki, A. Tagliabue, B.S. Twining, and M.T. Maldonado. 2024. The dawn of the BioGeoSCAPES program: Ocean metabolism and nutrient cycles on a changing planet. *Oceanography*.

<https://doi.org/10.5670/oceanog.2024.417>

Palevsky HI, Clayton S, Benway H, Maheigan M, Atamanchuk D, Battisti R, Batryn J, Bourbonnais A, Briggs EM, Carvalho F, Chase AP, Eveleth R, Fatland R, Fogaren KE, Fram JP, Hartman SE, Le Bras I, Manning CCM, Needoba JA, Neely MB, Oliver H, Reed AC, Rheuban JE, Schallenberg C, Walsh I, Wingard C, Bauer K, Chen B, Cuevas J, Flecha S, Horwith M, Melendez M, Menz T, Rivero-Calle S, Roden NP, Steinhoff T, Trucco-Pignata PN, Vardaro MF and Yoder M (2024) A model for community-driven development of best practices: the Ocean Observatories Initiative Biogeochemical Sensor Data Best Practices and User Guide. *Front. Mar. Sci.* 11:1358591. doi: 10.3389/fmars.2024.1358591

Lange, N., Fiedler, B., Álvarez, M., Benoit-Cattin, A., Benway, H., Buttigieg, P. L., Coppola, L., Currie, K., Flecha, S., Gerlach, D. S., Honda, M., Huertas, I. E., Lauvset, S. K., Muller-Karger, F., Kötzinger, A., O'Brien, K. M., Ólafsdóttir, S. R., Pacheco, F. C., Rueda-Roa, D., Skjelvan, I., Wakita, M., White, A., and Tanhua, T.: Synthesis Product for Ocean Time Series (SPOTS) – a ship-based biogeochemical pilot, *Earth Syst. Sci. Data*, 16, 1901–1931, <https://doi.org/10.5194/essd-16-1901-2024>, 2024.

Clayton, S., H. Alexander, J. Graff, N. Poulton, L. R. Thompson, H. Benway, E. Boss, A. Martiny (2022). Bio-GO-SHIP: the time is right to establish global repeat sections of ocean biology. *Frontiers in Marine Science*. <https://doi.org/10.3389/fmars.2021.767443>.

- Wilson, S. T., Al-Haj, A. N., Bourbonnais, A., Frey, C., Fulweiler, R. W., Kessler, J. D., Marchant, H. K., Milucka, J., Ray, N. E., Suntharalingam, P., Thornton, B. F., Upstill-Goddard, R. C., Weber, T. S., Arévalo-Martínez, D. L., Bange, H. W., Benway, H. M., Bianchi, D., Borges, A. V., Chang, B. X., Crill, P. M., del Valle, D. A., Farías, L., Joye, S. B., Kock, A., Labidi, J., Manning, C. C., Pohlman, J. W., Rehder, G., Sparrow, K. J., Tortell, P. D., Treude, T., Valentine, D. L., Ward, B. B., Yang, S., and Yurganov, L. N. (2020). Ideas and perspectives: A strategic assessment of methane and nitrous oxide measurements in the marine environment, *Biogeosciences*, 17, 5809–5828, <https://doi.org/10.5194/bg-17-5809-2020>.
- Benway, H. M., L. Lorenzoni, A. E. White, B. Fiedler, N. M. Levine, D. P. Nicholson, M. D. DeGrandpre, H. M. Sosik, M. J. Church, T. D. O'Brien, M. Leinen, R. A. Weller, D. M. Karl, S. A. Henson, R. M. Letelier, 2019. Ocean time series observations of changing marine ecosystems: An era of integration, synthesis, and societal applications. *Frontiers in Marine Science*, <https://doi.org/10.3389/fmars.2019.00393>.
- Hamilton, T. S., R. J. Enkin, M. Reidel, G. C. Rogers, J. W. Pohlman, H. M. Benway, 2015. Paleoseismicity of the Cascadia accretionary wedge off western Canada: Slipstream; an early Holocene slump and turbidite record from the frontal ridge. *Canadian Journal of Earth Sciences* 52: 1–26, dx.doi.org/10.1139/cjes-2014-0131.
- Pfister, C. A., A. J. Esbaugh, C. A. Frieder, H. Baumann, E. E. Bockmon, M. M. White, B. R. Carter, H. M. Benway, C. A. Blanchette, E. Carrington, J. B. McClintock, D. C. McCorkle, W. R. McGillis, T. A. Mooney, P. Ziveri, 2014. Detecting the unexpected: A research framework for ocean acidification. *Environmental Science & Technology* 48, 9982–9994, dx.doi.org/10.1021/es501936p.
- St. John, M.A., M. Barange, A. Mitra, H. Benway, K.J. Flynn, J. Holt, G. Merino, A. Martin, W. Melle, R. Sanders, V.M Trenkel, I. Grigorov and E. Hofmann, 2014. Introduction to BASIN Special Issue on *North Atlantic Ecosystems, the role of climate and anthropogenic forcing on their structure and function*: State of art, past, present, a view to the future. *Progress in Oceanography*, 129, 171–175.
- Benway, H. M., J. F. McManus, D. W. Oppo, and J. L. Cullen, 2010. Hydrographic changes in the eastern subpolar North Atlantic during the last deglaciation. *Quaternary Science Reviews* 29, 3336–3345.
- Waelbroeck, C. and MARGO Project Members, 2009. Constraints on the magnitude and patterns of ocean cooling at the Last Glacial Maximum. *Nature Geoscience* 2, 127–132, 10.1038/NGEO411.
- Benway, H. M., A. C. Mix, B. A. Haley, and G. P. Klinkhammer, 2006. Eastern Pacific Warm Pool paleosalinity and global climate variability: 0–30 kyr. *Paleoceanography*, 21, PA3008, doi: 10.1029/2005PA001208.
- Benway, H. M., 2005. Modern and past climate variability in the Eastern Pacific Warm Pool. Ph.D. Dissertation: Oregon State University, Corvallis, OR. 116 pp.
- Barker, S., I. Cacho, H. M. Benway, and K. Tachikawa, 2005. Planktonic foraminiferal Mg/Ca as a proxy for past oceanic temperatures: A methodological overview and data compilation for the Last Glacial Maximum. MARGO (Multiproxy Approach for the Reconstruction of the Glacial Ocean surface) Special Volume, *Quaternary Science Reviews*, 24: 821–834.
- Klinkhammer, G. P., B. A. Haley, A. C. Mix, H. M. Benway, M. Cheseby, 2004. Evaluation of automated flow-through time-resolved analysis of foraminifera for Mg/Ca paleothermometry. *Paleoceanography*, 19, PA4030, doi:10.1029/2004PA001050.

- Benway, H. M. and A. C. Mix, 2004. Oxygen isotopes, upper-ocean salinity, and precipitation sources in the eastern tropical Pacific. *Earth and Planetary Science Letters* 224(3-4): 493-507.
- ODP Leg 202 Shipboard Scientific Party, 2003. Leg 202 Summary. In Mix, A. C., Tiedemann, R., Blum P., et al., *Proceedings of the Ocean Drilling Program, Initial Reports 202*: College Station TX (Ocean Drilling Program), 145 pp.
- Benway, H. M., B. A. Haley, G. P. Klinkhammer, and A. C. Mix, 2003. Adaptation of a flow- through leaching procedure for Mg/Ca paleothermometry. *Geochemistry Geophysics Geosystems* 4(2), 8403, doi: 10.1029/2002GC000312.
- Benway, H. M., 1997. An investigation of the nutrient dynamics of Jeffreys Basin: A seasonal nutrient trap. M.S. Thesis: University of New Hampshire, Durham, NH. 137 pp.
- Ballabeni, P., H. M. Benway, and J. Jaenike, 1995. Lack of behavioral fever in nematode-parasitized *Drosophila*. *Journal of Parasitology*. 81: 670-674.
- Jaenike, J., H. M. Benway, and G. Stevens, 1995. Parasite-induced mortality in mycophagous *Drosophila*. *Ecology*. 76: 383-391.

Other Scientific Publications and Products

- Osborne, E., J. Y. Luo, I. Cetinić, H. Benway, and S. Menden-Deuer (2023), Our evolving understanding of biological carbon export, *Eos*, 104, <https://doi.org/10.1029/2023EO230346>. Published on 12 September 2023.
- Palter, J. B., J. Cross, M. C. Long, P. A. Rafter, and C. E. Reimers (2023), The science we need to assess marine carbon dioxide removal, *Eos*, 104, <https://doi.org/10.1029/2023EO230214>. Published on 1 June 2023. (*Eos limits to 5 authors, so my input in writing this piece and organizing mCDR workshop is listed in acknowledgments*)
- Benway, H., K. Bisson et al. (2022). Carbon as Currency for Extreme Events in a Changing Climate. Summary of outcomes from the OCB C-saw Workshop Time domain controls on carbon storage, release, and transformation in coastal and estuarine waters following extreme events submitted as input to the Ocean Climate Action Plan.
- Stanley, R, T Bell, Y Gao, C Gaston, D Ho, D Kieber, K Mackey, N Meskhidze, B Miller, H Potter, P Vlahos, P Yager, B Alexander, S Beaupre, S Craig, G Cutter, S Emerson, A Frossard, S Gasso, B Haus, W Keene, W Landing, R Moore, D Ortiz-Suslow, J Palter, F Paulot, E Saltzman, D Thornton, A Wozniak, L Zamora, H Benway. 2021. US SOLAS Science Report. 62pp. DOI 10.1575/1912/27821
- Benway, H., J. Buck, L. Fujieki, D. Kinkade, L. Lorenzoni, M. Schildhauer, A. Shepherd, A. White, 2020. [NSF EarthCube Workshop for Shipboard Ocean Time Series Data Meeting Report](#). 59 pp. DOI 10.1575/1912/25480, <https://darchive.mblwholibrary.org/handle/1912/25480>.
- Bingham, F., L. Juranek, M. Mazloff, G. McKinley, N. Nelson, S. Wijffels, 2019. [Review of US GO-SHIP \(Global Ocean Shipboard Hydrographic Investigations Program\) An OCB and US CLIVAR Report](#). Report 2019 (OCB) and 2019-6 (US CLIVAR), Benway, H., M. Patterson, M. Maheigan, J. Zhui (eds.), 112pp. doi:10.1575/1912/24897.
- Dunne, John P., Romanou, Anastasia, McKinley, Galen A., Long, Matthew, Doney, Scott C., 2019. [Synthesis and Intercomparison of Ocean Carbon Uptake in CMIP6 Models workshop report](#), H. M. Benway, M. Maheigan (eds.), December 8-9, 2018 Washington, DC", 2019-04, doi:10.1575/1912/24038, <https://hdl.handle.net/1912/24038>.

- Fassbender, A. J., J. B. Palter, M. C. Long, T. Ito, S. P. Bishop, and M. F. Cronin, 2018: Ocean Carbon Hot Spots. A Joint US CLIVAR and OCB Workshop Report, Uhlenbrock, K., M. Patterson, H. Benway, M. Maheigan (eds.), 2018-3, 34pp., doi:10.5065/D6Z036ZS.
- Hood, R. R., L. Beal, H. M. Benway, C. Chandler, V. Coles, G. Cutter, H. Dick, A. Gangopadhyay, J. Goes, S. Humphris, M. R. Landry, K. G. Lloyd, M. J. McPhaden, R. Murtugudde, B. Subrahmanyam, R. D. Susanto, L. Talley, J. D. Wiggert, C. Zhang, 2018. United States contributions to the Second International Indian Ocean Expedition (US IIOE-2), 2018-08-02, DOI:10.1575/1912/10510, 65 pp.
- Lorenzoni, L., M. Telszewski, H. Benway, A. P. Palacz (Eds.), 2017. A user's guide for selected autonomous biogeochemical sensors. An outcome from the 1st IOCCP International Sensors Summer Course. IOCCP Report No. 2/2017, 83 pp.
- Lorenzoni, L., T. D. O'Brien, K. Isensee, H. Benway, F. E. Muller-Karger, P. A. Thompson, M. Lomas, et al., 2017. Global Overview. In What are Marine Ecological Time Series telling us about the ocean? A status report, pp. 171-190. Ed. By T. D. O'Brien, L. Lorenzoni, K. Isensee, and L. Valdés. IOC-UNESCO, IOC Technical Series, No. 129. 297 pp.
- Neuer, S., H. Benway, N. Bates, C. Carlson, M. Church, M. DeGrandpre, J. Dunne, R. Letelier, M. Lomas, L. Lorenzoni, F. Muller-Karger, M. J. Perry, P. Quay, 2017. Monitoring ocean change in the 21st Century. *Eos* 98, <https://doi.org/10.1029/2017EO080045>. Published on 08 September 2017.
- Neuer, S., H. Benway, N. Bates, C. Carlson, M. Church, M. DeGrandpre, J. Dunne, R. Letelier, M. Lomas, L. Lorenzoni, F. Muller-Karger, M. J. Perry, P. Quay, 2016. The importance of monitoring Earth's largest ecosystem. *Science* eLetter 354 (published October 28, 2016), <http://science.sciencemag.org/content/354/6310/326.e-letters>.
- Burd, A.B., A. Buchan, M. Church, M. Landry, A. McDonnell, U. Passow, D. Steinberg, H. Benway, 2016. Towards a transformative understanding of the biology of the ocean's biological pump: Priorities for future research. Report of the NSF Biology of the Biological Pump Workshop, February 19–20, 2016 (Hyatt Place New Orleans, New Orleans, LA), 67 pp., DOI:10.1575/1912/8263.
- Benway, H., Alin, S., Boyer, E., Cai, W.-J., Coble, P., Cross, J., Friedrichs, M., Goñi, M., Griffith, P., Herrmann, M., Lohrenz, S., Mathis, J., McKinley, G., Najjar, R., Pilskaln, C., Siedlecki, S., Smith, R., 2016. A Science Plan for Carbon Cycle Research in North American Coastal Waters. Report of the Coastal CARbon Synthesis (CCARS) community workshop, August 19-21, 2014, Ocean Carbon and Biogeochemistry Program and North American Carbon Program, 84 pp., DOI 10.1575/1912/7777.
- Ocean Carbon and Biogeochemistry Program, 2015. Temporal and Spatial Perspectives on the Fate of Anthropogenic Carbon: A Carbon Cycle Slide Deck for Broad Audiences with explanatory notes. Contributors: S. Khatiwala, T. DeVries, J. Cook, G. McKinley, C. Carlson, H. Benway. doi:10.1575/1912/7670.
- Russell, J., H. Benway, A. Bracco, C. Deutsch, T. Ito, I. Kamenkovich, and M. Patterson, 2015. Ocean's Carbon and Heat Uptake: Uncertainties and Metrics. US CLIVAR Report 2015-3, 33pp.
- Hofmann, E., St. John, M., Benway, H. M. (Editors), 2015. A science plan for a collaborative international research program on the coupled North Atlantic-Arctic system, a report of a Planning Workshop for an International Research Program on the Coupled North Atlantic-

- Arctic System (14-16 April 2014, Arlington, VA), 37 pp.,
http://www.whoi.edu/website/NAtl_Arctic/
- Benway, H., 2014. Autobiographical sketch, Women in Oceanography: A Decade Later
Oceanography 27 (4).
- Benway, H. M., E. Hofmann, M. St. John, 2014. Building international research partnerships in the North Atlantic-Arctic System: An international planning workshop for a North Atlantic-Arctic science program. *Eos Trans. AGU* 95(35), 317, DOI: 10.1002/2014EO350007.
- Benway, H. M., Coble, P. G. (Eds.), 2014. Report of the U.S. Gulf of Mexico carbon cycle synthesis workshop, March 27-28, 2013, Ocean Carbon and Biogeochemistry Program and North American Carbon Program, 67 pp.
- Benway, H. M., S. C. Doney, 2014. Scientific outcomes and future challenges of the Ocean Carbon and Biogeochemistry (OCB) Program. *Oceanography*. 27(1): 106-107.
- Lorenzoni, L., Benway, H. M. (Editors), 2013. Report of Global intercomparability in a changing ocean: An international time-series methods workshop, November 28-30, 2012, Ocean Carbon and Biogeochemistry (OCB) Program and International Ocean Carbon Coordination Project (IOCCP), 61 pp. DOI: <http://dx.doi.org/10.25607/OPB-12>.
- Benway, H. M., Doney, S. C., 2013. Addressing biogeochemical knowledge gaps. *International Innovation*, 12-14.
- Benway, H. M., M. Telszewski, and L. Lorenzoni, 2013, Improving intercomparability of marine biogeochemical time series, *Eos Trans. AGU* 94(17), 160.
- Benway, H. M., 2011. Quantifying the coastal contribution to the North American carbon budget: A Coastal Interim Synthesis Workshop, San Francisco, California, 11-12 December 2010. *Eos Trans. AGU* 92 (23).
- Cooley, S. R., J. Kleypas, H. Benway, 2011. U.S. ocean acidification researchers: First national meeting: Ocean Carbon and Biogeochemistry Program Ocean Acidification Principal Investigators' Meeting; Woods Hole, Massachusetts, 22–24 March 2011. *Eos Trans. AGU* 92 (36).
- Cooley, S. R., H. M. Benway, 2010. Linking introductory chemistry and the geosciences through ocean acidification. *The Earth Scientist* (quarterly publication of the National Earth Science Teachers Association) 26(1), 39-42.
- Benway, H. M., S. C. Doney, 2010. Ecosystems and biogeochemical cycling in a changing ocean: Fifth annual Ocean Carbon and Biogeochemistry (OCB) Summer Science Workshop. *Eos Trans. AGU* 91 (44).
- Benway, H. M., S. R. Cooley, S. C. Doney, 2010. A catalyst for ocean acidification research and collaboration: Ocean Carbon and Biogeochemistry Short Course on Ocean Acidification; Woods Hole, Massachusetts, 2–13 November 2009. *Eos Trans. AGU* 91 (12).
- Benway, H. M., S. C. Doney, 2009. Multidisciplinary perspectives in marine biogeochemistry and ecology: Fourth annual Ocean Carbon and Biogeochemistry (OCB) summer science workshop. *Eos Trans. AGU* 90 (45).
- Benway, H. M. and S. C. Doney, 2008. Ocean carbon cycling and climate impacts on marine ecosystems: Third annual Ocean Carbon and Biogeochemistry summer science workshop. *Eos Trans. AGU* 89 (47).
- Benway, H. M. (Editor), 2008-2016. *OCB News*, Ocean Carbon & Biogeochemistry newsletter.

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