**CURRICULUM VITAE**

**Keith Lindsay**
Project Scientist IV
Climate and Global Dynamics Laboratory
National Center for Atmospheric Research
P.O. Box 3000
Boulder, CO 80307
(303) 497-1722

**Citizenship:** United States of America

**Education**

- Ph.D., Mathematics, 1997, The University of Michigan, *Thesis:* A Three-Dimensional Cartesian Tree-Code and Applications to Vortex Sheet Roll-Up, (Dr. Robert Krasny, advisor)
- M.S., Mathematics, 1993, The University of Michigan
- B.S., Computer Science & Mathematics, 1991, Virginia Tech

**Employment**

- 11/2021-present: Project Scientist IV, Climate and Global Dynamics Division (CGD), National Center for Atmospheric Research (NCAR), Boulder, CO
- 10/2012-11/2021: Project Scientist III, CGD, NCAR, Boulder, CO
- 3/2008-9/2012: Project Scientist II, CGD, NCAR, Boulder, CO
- 8/2004-2/2008: Project Scientist I, CGD, NCAR, Boulder, CO
- 3/2003-7/2004: Associate Scientist III, CGD, NCAR, Boulder, CO
- 8/1998-3/2003: Associate Scientist II, CGD, NCAR, Boulder, CO
- 8/1997-8/1998: Visiting Assistant Professor, NSF Industrial Postdoctoral Fellowship, Claremont Graduate University, Claremont, CA, McDonnell Douglas Aerospace, Long Beach, CA

**Academic Honors & Awards**

- CESM Distinguished Achievement Award, 2019
- Richard C. DiPrima Prize for Best Ph.D. Thesis, Society for Industrial and Applied Mathematics, 2000
- Sumner B. Myers Prize for Best Ph.D. Thesis, Department of Mathematics, The University of Michigan, 1997
- U.S. Department of Education Fellowship, The University of Michigan, 1991-1993, 1996-1997
- Outstanding Graduating Math Major, Virginia Tech, 1991
- Phi Beta Kappa, 1991
- Hatcher Scholarship, Virginia Tech, 1989-1991

**Professional Society Membership**

- American Geophysical Union
- Society for Industrial and Applied Mathematics

**Leadership & Community Service**

- CMIP6/OMIP Biogeochemistry Scientific Steering Committee
- UCAR Leadership Academy, 2012-2013
- CARBOCHANGE International Advisory Board, 2011-2015
- CARBONES Climate User Advisory Group, 2010-2013
- CESM Biogeochemistry Working Group Co-Chair, 2010-2022

- CESM Biogeochemistry Working Group Community Liaison
- Ph.D. Committee Member: Kristen Krumhardt (CU, graduated 2018), Natalie Freeman (CU, graduated 2017)
- Co-organizer for 2009 ASP Summer Colloquium
- CGD Seminar Coordinator, 2007-2008
- UCAR Awards Committee, 2002-2004
- Reviewer for : Geophysical Research Letters, Biogeosciences, Global Biogeochemical Cycles, Journal of Climate, Journal of Geophysical Research, Ocean Modelling, Applied Numerical Mathematics
- NCAR ASP Postdocs mentored: Shanlin Wang, 2011-2014
- NCAR ASP Graduate Student Visitors hosted: Darren Pilcher, University of Wisconsin-Madison, 2014

**Research Grants Awarded**

DOE, A modular biogeochemical modeling suite for next-generation ocean models. 10/2014 - 9/2017, $1,218,749 (NCAR portion). PI: Matthew C. Long, co-PIs: Keith Lindsay, Mariana Vertenstein, Michael Levy, Todd Ringler, Mathew Maltrud.

NSF, Collaborative Research: EaSM 2: Mechanisms, Predictability, Prediction, and Regional and Society Impacts of Decadal Climate Variability. 3/2013 - 2/2018, $2,630,185 (NCAR portion). PI: Gokhan Danabasoglu, co-PIs: Joseph Tribbia, Grant Branstator, Jeffrey Anderson, Keith Lindsay.

DOE, Improving CESM efficiency to study variable C:N:P stoichiometry in the oceans. 9/2011 - 9/2014, $82,224 (NCAR portion). PI: Francois Primeau, co-PIs: J. Keith Moore, Keith Lindsay, Andrew Salinger.

NASA, Assessing the Impact of Ocean Acidification on Marine Planktonic Calcification Using Satellite Analysis and Earth System Modeling. 2/2011 - 2/2014, $75,858 (NCAR portion). PI: David M. Glover, co-PIs: Scott C. Doney, Keith Lindsay.

NSF, Collaborative Research: Improved regional and decadal predictions of the carbon cycle. 1/2011 - 12/2014, $599,338 (NCAR portion). PIs: Natalie Mahowald, Scott C. Doney, James T. Randerson, Keith Lindsay, co-PIs: Peter G. Hess, Robert M. Ross, Christine A. Shoemaker, Ivan D. Lima, J. Keith Moore, Gordon Bonan, David Lawrence.

**Publications**

*Refereed Publications*

Negrete-García, G., Luo, J. Y., Long, M. C., Lindsay, K., Levy, M., Barton, A. D. (2022). Plankton energy flows using a global size-structured and trait-based model, *Prog. Oceanogr.*, **209**, 102898, doi:10.1016/j.pocean.2022.102898.

Friedlingstein, P., O'Sullivan, M., Jones, M. W., Andrew, R. M., Gregor, L., Hauck, J., Le Quéré, C., Luijkx, I. T., Olsen, A., Peters, G. P., Peters, W., Pongratz, J., Schwingshackl, C., Sitch, S., Canadell, J. G., Ciais, P., Jackson, R. B., Alin, S. R., Alkama, R., Arneth, A., Arora, V. K., Bates, N. R., Becker, M., Bellouin, N., Bittig, H. C., Bopp, L., Chevallier, F., Chini, L. P., Cronin, M., Evans, W., Falk, S., Feely, R. A., Gasser, T., Gehlen, M., Gkritzalis, T., Gloege, L., Grassi, G., Gruber, N., Gürses, Ö., Harris, I., Hefner, M., Houghton, R. A., Hurtt, G. C., Iida, Y., Ilyina, T., Jain, A. K., Jersild, A., Kadono, K., Kato, E., Kennedy, D., Klein Goldewijk, K., Knauer, J., Korsbakken, J. I., Landschützer, P., Lefèvre, N., Lindsay, K., Liu, J., Liu, Z., Marland, G., Mayot, N., McGrath, M. J., Metzl, N., Monacci, N. M., Munro, D. R., Nakaoka, S.-I., Niwa, Y., O'Brien, K., Ono, T., Palmer, P. I., Pan, N., Pierrot, D., Pocock, K., Poulter, B., Resplandy, L., Robertson, E., Rödenbeck, C., Rodriguez, C., Rosan, T. M., Schwinger, J., Séférian, R., Shutler, J. D., Skjelvan, I., Steinhoff, T., Sun, Q., Sutton, A. J., Sweeney, C., Takao, S., Tanhua, T., Tans, P. P., Tian, X., Tian, H.,

Tilbrook, B., Tsujino, H., Tubiello, F., van der Werf, G. R., Walker, A. P., Wanninkhof, R., Whitehead, C., Willstrand Wranne, A., Wright, R., Yuan, W., Yue, C., Yue, X., Zaehle, S., Zeng, J., and Zheng, B. (2022): Global Carbon Budget 2022, *Earth Syst. Sci. Data*, **14**, 4811-4900, doi:10.5194/essd-14-4811-2022.

Yeager, S. G., Rosenbloom, N., Glanville, A. A., Wu, X., Simpson, I., Li, H., Molina, M. J., Krumhardt, K., Mogen, S., Lindsay, K., Lombardozzi, D., Wieder, W., Kim, W. M., Richter, J. H., Long, M., Danabasoglu, G., Bailey, D., Holland, M., Lovenduski, N., Strand, W. G., and King, T. (2022). The Seasonal-to-Multiyear Large Ensemble (SMYLE) prediction system using the Community Earth System Model version 2, *Geosci. Model Dev.*, **15**, 6451-6493, doi:10.5194/gmd-15-6451-2022.

Koven, C. D., Arora, V. K., Cadule, P., Fisher, R. A., Jones, C. D., Lawrence, D. M., Lewis, J., Lindsay, K., Mathesius, S., Meinshausen, M., Mills, M., Nicholls, Z., Sanderson, B. M., Séférian, R., Swart, N. C., Wieder, W. R., and Zickfeld, K. (2022). Multi-century dynamics of the climate and carbon cycle under both high and net negative emissions scenarios, *Earth Syst. Dynam.*, **13**, 885-909, doi:10.5194/esd-13-885-2022.

Long, M. C., Moore, J. K., Lindsay, K., Levy, M., Doney, S. C., Luo, J. Y., Krumhardt, K. M., Letscher, R. T., Grover, M., Sylvester, Z. T. (2021). Simulations with the Marine Biogeochemistry Library (MARBL), *J. Adv. Model. Earth Syst.*, **13**, e2021MS002647, doi:10.1029/2021MS002647.

Gu, S., Liu, Z., Oppo, D. W., Lynch-Stieglitz, J., Jahn, A., Zhang, J., Lindsay, K., Wu, L. (2021). Remineralization dominating the $\delta^{13}C$ decrease in the mid-depth Atlantic during the last deglaciation, *Earth Planet. Sci. Lett.*, **571**, 117106, doi:10.1016/j.epsl.2021.117106.

Wieder, W. R., Butterfield, Z., Lindsay, K., Lombardozzi, D. L., Keppel-Aleks, G. (2021). Interannual and seasonal drivers of carbon cycle variability represented by the Community Earth System Model (CESM2), *Global Biogeochem. Cycles*., **35**, e2021GB007034, doi:10.1029/2021GB007034.

Misumi, K., Nishioka, J., Obata, H., Tsumune, D., Tsubono, T., Long, M. C., Lindsay, K., Moore, J. K. (2021). Slowly sinking particles underlie dissolved iron transport across the Pacific Ocean, *Global Biogeochem. Cycles*., **35**, e2020GB006823, doi:10.1029/2020GB006823.

Fu, W., Moore, J. K., Primeau, F. W., Lindsay, K., & Randerson, J. T. (2020). A growing freshwater lens in the Arctic Ocean with sustained climate warming disrupts marine ecosystem function, *J. Geophys. Res. Biogeosci.*, **125**, e2020JG005693, doi:10.1029/2020JG005693.

Krumhardt, K. M., Long, M. C., Lindsay, K., Levy, M. N. (2020). Southern Ocean calcification controls the global distribution of alkalinity, *Global Biogeochem. Cycles*., **34**, e2020GB006727, doi:10.1029/2020GB006727.

Bacmeister, J. T., Hannay, C., Medeiros, B., Gettelman, A., Neale, R., Fredriksen, H. B., Lipscomb, W. H., Simpson, I., Bailey, D. A., Holland, M., Lindsay, K., Otto-Bliesner, B. (2020). $CO_2$ increase experiments using the CESM: Relationship to climate sensitivity and comparison of CESM1 to CESM2, *J. Adv. Model. Earth Syst.*, **12**, e2020MS002120, doi:10.1029/2020MS002120.

Arora, V. K., Katavouta, A., Williams, R. G., Jones, C. D., Brovkin, V., Friedlingstein, P., Schwinger, J., Bopp, L., Boucher, O., Cadule, P., Chamberlain, M. A., Christian, J. R., Delire, C., Fisher, R. A., Hajima, T., Ilyina, T., Joetzjer, E., Kawamiya, M., Koven, C., Krasting, J., Law, R. M., Lawrence, D. M., Lenton, A., Lindsay, K., Pongratz, J., Raddatz, T., Séférian, R., Tachiiri, K., Tjiputra, J. F., Wiltshire, A., Wu, T., Ziehn, T. (2020). Carbon-concentration and

carbon-climate feedbacks in CMIP6 models, and their comparison to CMIP5 models, *Biogeosciences*, **17**, 4173-4222, doi:10.5194/bg-2019-473.

Tsujino, H., Urakawa, L. S., Griffies, S. M., Danabasoglu, G., Adcroft, A. J., Amaral, A. E., Arsouze, T., Bentsen, M., Bernardello, R., Böning, C. W., Bozec, A., Chassignet, E. P., Danilov, S., Dussin, R., Exarchou, E., Fogli, P. G., Fox-Kemper, B., Guo, C., Ilicak, M., Iovino, D., Kim, W. M., Koldunov, N., Lapin, V., Li, Y., Lin, P., Lindsay, K., Liu, H., Long, M. C., Komuro, Y., Marsland, S. J., Masina, S., Nummelin, A., Rieck, J. K., Ruprich-Robert, Y., Scheinert, M., Sicardi, V., Sidorenko, D., Suzuki, T., Tatebe, H., Wang, Q., Yeager, S. G., Yu, Z. (2020). Evaluation of global ocean–sea-ice model simulations based on the experimental protocols of the Ocean Model Intercomparison Project phase 2 (OMIP-2), *Geosci. Model Dev.*, **13**, 3643-3708, doi:10.5194/gmd-2019-363.

Krumhardt, K. M., Lovenduski, N. S., Long, M. C., Luo, J. Y., Lindsay, K., Yeager, S., Harrison, C. (2020). Potential Predictability of Net Primary Production in the Ocean, *Global Biogeochem. Cycles*, **34**, e2020GB006531, doi:10.1029/2020GB006531.

Brady, R. X., Lovenduski, N. S., Yeager, S. G., Long, M. C., Lindsay, K. (2020). Skillful multiyear predictions of ocean acidification in the California Current System, *Nature Commun.*, **11**, 2166, doi:10.1038/s41467-020-15722-x.

Lester, J. G., Lovenduski, N. S., Graven, H. D., Long, M. C., Lindsay, K. (2020). Internal Variability Dominates Over Externally Forced Ocean Circulation Changes Seen Through CFCs, *Geophys. Res. Lett.*, **47**, e2020GL087585, doi:10.1029/2020GL087585.

Hamilton, D. S., Moore, J. K., Arneth, A., Bond, T. C., Carslaw, K. S., Hantson, S., Ito, A., Kaplan, J. O., Lindsay, K., Nieradzik, L., Rathod, S. D., Scanza, R. A., Mahowald, N. M. (2020). Impact of Changes to the Atmospheric Soluble Iron Deposition Flux on Ocean Biogeochemical Cycles in the Anthropocene, *Global Biogeochem. Cycles*, **34**, e2019GB006448, doi:10.1029/2019GB006448.

Danabasoglu, G., Lamarque, J.-F., Bacmeister, J., Bailey, D. A., DuVivier, A. K. , Edwards, J., Emmons, L. K., Fasullo, J., Garcia, R., Gettelman, A., Hannay, C., Holland, M. M., Large, W. G., Lauritzen, P. H., Lawrence, D. M., Lenaerts, J. T. M., Lindsay, K., Lipscomb, W. H., Mills, M. J., Neale, R., Oleson, K. W., Otto-Bliesner, B., Phillips, A. S., Sacks, W., Tilmes, S., van Kampenhout, L., Vertenstein, M., Bertini, A., Dennis, J., Deser, C., Fischer, C., Fox-Kemper, B., Kay, J. E., Kinnison, D., Kushner, P. J., Larson, V. E., Long, M. C., Mickelson, S., Moore, J. K., Nienhouse, E., Polvani, L., Rasch, P. J., Strand, W. G. (2020). The Community Earth System Model Version 2 (CESM2), *J. Adv. Model. Earth Syst.*, **12**, e2019MS001916, doi:10.1029/2019MS001916.

Lovenduski, N. S., Bonan, G. B., Yeager, S. G., Lindsay, K., Lombardozzi, D. L. (2019). High predictability of terrestrial carbon fluxes from an initialized decadal prediction system, *Environ. Res. Lett.*, **14**, 124074, doi:10.1088/1748-9326/ab5c55.

Gu, S., Liu, Z., Lynch-Stieglitz, J., Jahn, A., Zhang, J., Lindsay, K., Wu, L. (2019). Assessing the Ability of Zonal $\delta^{18}O$ Contrast in Benthic Foraminifera to Reconstruct Deglacial Evolution of Atlantic Meridional Overturning Circulation, *Paleoceanography and Paleoclimatology*, **34**, 800-812, doi:10.1029/2019PA003564.

Krumhardt, K. M., Lovenduski, N. S., Long, M. C., Levy, M., Lindsay, K., Moore, J. K., Nissen, C. (2019). Coccolithophore growth and calcification in an acidified ocean: Insights from Community Earth System Model simulations, *J. Adv. Model. Earth Syst.*, **11**, 1418-1437, doi:10.1029/2018MS001483.

Lovenduski, N. S., Yeager, S. G., Lindsay, K., and Long, M. C. (2019). Predicting near-term variability in ocean carbon uptake, *Earth Syst. Dynam.*, **10**, 45-57, doi:10.5194/esd-10-45-2019.

Yeager, S. G., Danabasoglu, G., Rosenbloom, N. A., Strand, W., Bates, S. C., Meehl, G. A., Karspeck, A. R., Lindsay, K., Long, M. C., Teng, H., Lovenduski, N. S. (2018). Predicting Near-Term Changes in the Earth System: A Large Ensemble of Initialized Decadal Prediction Simulations Using the Community Earth System Model, *Bull. Amer. Meteor. Soc.*, **99**, 1867–1886, doi:10.1175/BAMS-D-17-0098.1.

Kooperman, G. J., Fowler, M. D., Hoffman, F. M., Koven, C. D., Lindsay, K., Pritchard, M. S., Swann, A. L. S., Randerson, J. T. (2018). Plant physiological responses to rising $CO_2$ modify simulated daily runoff intensity with implications for global-scale flood risk assessment, *Geophys. Res. Lett.*, **45**, 12457-12466, doi:10.1029/2018GL079901.

Freeman, N. M., Lovenduski, N. S., Munro, D. R., Krumhardt, K. M., Lindsay, K., Long, M. C., Maclennan, M. (2018). The Variable and Changing Southern Ocean Silicate Front: Insights From the CESM Large Ensemble, *Global Biogeochem. Cycles*, **32**, 752-768, doi:10.1029/2017GB005816.

Fu, W., Primeau, F., Moore, J. K., Lindsay, K., Randerson, J. T. (2018). Reversal of Increasing Tropical Ocean Hypoxia Trends With Sustained Climate Warming, *Global Biogeochem. Cycles*, **32**, 551-564, doi:10.1002/2017GB005788.

Kooperman, G. J., Chen, Y., Hoffman, F. M., Koven, C. D., Lindsay, K., Pritchard, M. S., Swann, A. L. S., Randerson, J. T. (2018). Forest response to rising $CO_2$ drives zonally asymmetric rainfall change over tropical land, *Nat. Clim. Change*, **8**, 434-440, doi:10.1038/s41558-018-0144-7.

Moore, J. K., Fu, W., Primeau, F., Britten, G. L., Lindsay, K., Long, M., Doney, S. C., Mahowald, N., Hoffman, F., Randerson, J. T. (2018). Sustained climate warming drives declining marine biological productivity, *Science*, **359**, 1139-1143, doi:10.1126/science.aao6379.

Zhang, J., Liu, Z., Brady, E. C., Oppo, D. W., Clark, P. U., Jahn, A., Marcott, S. A., Lindsay, K. (2017). Asynchronous warming and $\delta^{18}O$ evolution of deep Atlantic water masses during the last deglaciation, *Proc. Natl. Acad. Sci. USA*, **114**, 11075-11080, doi:10.1073/pnas.1704512114.

Orr, J. C., Najjar, R. G., Aumont, O., Bopp, L., Bullister, J. L., Danabasoglu, G., Doney, S. C., Dunne, J. P., Dutay, J.-C., Graven, H., Griffies, S. M., John, J. G., Joos, F., Levin, I., Lindsay, K., Matear, R. J., McKinley, G. A., Mouchet, A., Oschlies, A., Romanou, A., Schlitzer, R., Tagliabue, A., Tanhua, T., Yool, A. (2017). Biogeochemical protocols and diagnostics for the CMIP6 Ocean Model Intercomparison Project (OMIP), *Geosci. Model Dev.*, **10**, 2169-2199, doi:10.5194/gmd-10-2169-2017.

Rohr, T., Long, M. C., Kavanaugh, M. T., Lindsay, K., Doney, S. C. (2017). Variability in the mechanisms controlling Southern Ocean phytoplankton bloom phenology in an ocean model and satellite observations, *Global Biogeochem. Cycles*, **31**, 922-940, doi:10.1002/2016GB005615.

Liptak, J., Keppel-Aleks, G., Lindsay, K. (2017). Drivers of Multicentury Trends in the Atmospheric $CO_2$ Mean Annual Cycle in a Prognostic ESM, *Biogeosciences*, **14**, 1383-1401, doi:10.5194/bg-14-1383-2017.

Krumhardt, K. M., Lovenduski, N. S., Long, M. C., Lindsay, K. (2017). Avoidable impacts of ocean warming on marine primary production: Insights from the CESM ensembles, *Global Biogeochem. Cycles*, **31**, 114-133, doi:10.1002/2016GB005528.

Mahowald, N. M., Randerson, J. T., Lindsay, K., Munoz, E., Doney, S. C., Lawrence, P., Schlunegger, S., Ward, D. S., Lawrence, D., Hoffman, F. M. (2017). Interactions between land use change and carbon cycle feedbacks, *Global Biogeochem. Cycles*, **31**, 96-113, doi:10.1002/2016GB005374.

Lindsay, K. (2017). A Newton-Krylov solver for fast spin-up of online ocean tracers, *Ocean Model.*, **109**, 33-43, doi:10.1016/j.ocemod.2016.12.001.

Lovenduski, N. S., McKinley, G. A., Fay, A. R., Lindsay, K., Long, M. C. (2016). Partitioning uncertainty in ocean carbon uptake projections: Internal variability, emission scenario, and model structure, *Global Biogeochem. Cycles*, **30**, 1276-1287, doi:10.1002/2016GB005426.

Bardin, A., Primeau, F., Lindsay, K., Bradley, A. (2016). Evaluation of the accuracy of an offline seasonally-varying matrix transport model for simulating ideal age, *Ocean Model.*, **105**, 25-33, doi:10.1016/j.ocemod.2016.07.003.

Séférian, R., Gehlen, M., Bopp, L., Resplandy, L., Orr, J. C., Marti, O., Dunne, J. P., Christian, J. R., Doney, S. C., Ilyina, T., Lindsay, K., Halloran, P. R., Heinze, C., Segschneider, J., Tjiputra, J., Aumont, O., Romanou, A. (2016). Inconsistent strategies to spin up models in CMIP5: implications for ocean biogeochemical model performance assessment, *Geosci. Model Dev.*, **9**, 1827-1851, doi:10.5194/gmd-9-1827-2016.

McKinley, G. A., Pilcher, D. J., Fay, A. R., Lindsay, K., Long, M. C., Lovenduski, N. S. (2016). Timescales for detection of trends in the ocean carbon sink, *Nature*, **530**, 469-472, doi:10.1038/nature16958.

Lovenduski, N. S., Long, M. C., Lindsay, K. (2015). Natural variability in the surface ocean carbonate ion concentration, *Biogeosciences*, **12**, 6321-6335, doi:10.5194/bg-12-6321-2015.

Jahn, A., Lindsay, K., Giraud, X., Gruber, N., Otto-Bliesner, B. L., Liu, Z., Brady, E. C. (2015). Carbon isotopes in the ocean model of the Community Earth System Model (CESM1), *Geosci. Model Dev.*, **8**, 2419-2434, doi:10.5194/gmd-8-2419-2015.

Long, M. C., Lindsay, K., Holland, M. M. (2015). Modeling photosynthesis in sea ice-covered waters, *J. Adv. Model. Earth Syst.*, **7**, 1189-1206, doi:10.1002/2015MS000436.

Randerson, J. T., Lindsay, K., Munoz, E., Fu, W., Moore, J. K., Hoffman, F. M., Mahowald, N. M., Doney, S. C. (2015). Multi-century changes in ocean and land contributions to climate-carbon feedbacks, *Global Biogeochem. Cycles*, **29**, 744-759, doi:10.1002/2014GB005079.

Kay, J. E., Deser, C., Phillips, A., Mai, A., Hannay, C., Strand, G., Arblaster, J. M., Bates, S. C., Danabasoglu, G., Edwards, J., Holland, M., Kushner, P., Lamarque, J.-F., Lawrence, D., Lindsay, K., Middleton, A., Munoz, E., Neale, R., Oleson, K., Polvani, L., Vertenstein, M. (2014). The Community Earth System Model (CESM) Large Ensemble Project: A Community Resource for Studying Climate Change in the Presence of Internal Climate Variability, *Bull. Amer. Meteor. Soc.*, **96**, 1333–1349, doi:10.1175/BAMS-D-13-00255.1.

Lindsay, K., Bonan, G. B., Doney, S. C., Hoffman, F. M., Lawrence, D. M., Long, M. C., Mahowald, N. M., Moore, J. K., Randerson, J. T., Thornton, P. E. (2014). Preindustrial-Control and Twentieth-Century Carbon Cycle Experiments with the Earth System Model CESM1(BGC), *J. Climate*, **27**, 8981-9005, doi:10.1175/JCLI-D-12-00565.1.

Wang, S., Bailey, D., Lindsay, K., Moore, J. K., Holland, M. (2014). Impacts of sea ice on the marine iron cycle and phytoplankton productivity, *Biogeosciences*, **11**, 4713-4731, doi:10.5194/bg-11-4713-2014.

Misumi, K., Lindsay, K., Moore, J. K., Doney, S. C., Bryan, F. O., Tsumune, D., Yoshida, Y. (2014). The iron budget in ocean surface waters in the 20th and 21st centuries: projections by the Community Earth System Model version 1, *Biogeosciences*, **11**, 33-55, doi:10.5194/bg-11-33-2014.

Hoffman, F. M., Randerson, J. T., Arora, V. K., Bao, Q., Cadule, P., Ji, D., Jones, C. D., Kawamiya, M., Khatiwala, S., Lindsay, K., Obata, A., Shevliakova, E., Six, K. D., Tjiputra, J. F., Volodin, E. M., Wu, T. (2014). Causes and Implications of Persistent Atmospheric Carbon Dioxide Biases in Earth System Models, *J. Geophys. Res. Biogeosci.*, **119**, 141-162, doi:10.1002/2013JG002381.

Bardin, A., Primeau, F., Lindsay, K. (2014). An offline implicit solver for simulating prebomb radiocarbon, *Ocean Model.*, **73**, 45-58, doi:10.1016/j.ocemod.2013.09.008.

Moore, J. K., Lindsay, K., Doney, S. C., Long, M. C., Misumi, K. (2013). Marine Ecosystem Dynamics and Biogeochemical Cycling in the Community Earth System Model [CESM1(BGC)]: Comparison of the 1990s with the 2090s under the RCP4.5 and RCP8.5 Scenarios, *J. Climate*, **26**, 9291-9312, doi:10.1175/JCLI-D-12-00566.1.

Marinov, I., Doney, S. C., Lima, I. D., Lindsay, K., Moore, J. K., Mahowald, N. (2013). North-South asymmetry in the modeled phytoplankton community response to climate change over the 21st century, *Global Biogeochem. Cycles*, **27**, 1274-1290, doi:10.1002/2013GB004599.

Misumi, K., Lindsay, K., Moore, J. K., Doney, S. C., Tsumune, D., Yoshida, Y. (2013). Humic substances may control dissolved iron distributions in the global ocean: Implications from numerical simulations, *Global Biogeochem. Cycles*, **27**, 450-462, doi:10.1002/gbc.20039.

Long, M. C., Lindsay, K., Peacock, S., Moore, J. K., Doney, S. C. (2013). Twentieth-Century Oceanic Carbon Uptake and Storage in CESM1(BGC), *J. Climate*, **26**, 6775-6800, doi:10.1175/JCLI-D-12-00184.1.

Arora, V. K., Boer, G. J., Friedlingstein, P., Eby, M., Jones, C. D., Christian, J. R., Bonan, G., Bopp, L., Brovkin, V., Cadule, P., Hajima, T., Ilyina, T., Lindsay, K., Tjiputra, J. F., Wu, T. (2013). Carbon-concentration and carbon-climate feedbacks in CMIP5 Earth system models, *J. Climate*, **26**, 5289–5314, doi:10.1175/JCLI-D-12-00494.1.

Jones, C., Robertson, E., Arora, V., Friedlingstein, P., Shevliakova, E., Bopp, L., Brovkin, V., Hajima, T., Kato, E., Kawamiya, M., Liddicoat, S., Lindsay, K., Reick, C. H., Roelandt, C., Segschneider, J., Tjiputra, J. (2013). 21st Century compatible $CO_2$ emissions and airborne fraction simulated by CMIP5 Earth System models under 4 Representative Concentration Pathways, *J. Climate*, **26**, 4398–4413, doi:10.1175/JCLI-D-12-00554.1.

Keppel-Aleks, G., Randerson, J. T., Lindsay, K., Stephens, B. B., Moore, J. K., Doney, S. C., Thornton, P. E., Mahowald, N. M., Hoffman, F. M., Sweeney, C., Tans, P. P., Wennberg, P. O., Wofsy, S. C. (2013). Atmospheric carbon di- oxide variability in the Community Earth System Model: Evaluation and transient dynamics during the twentieth and twenty-first centuries, *J. Climate*, **26**, 4447–4475, doi:10.1175/JCLI-D-12-00589.1.

Hurrell, J. W., Holland, M. M., Gent, P. R., Ghan, S., Kay, Jennifer E., Kushner, P. J., Lamarque, J.-F., Large, W. G., Lawrence, D., Lindsay, K., Lipscomb, W. H., Long, M. C., Mahowald, N., Marsh, D. R., Neale, R. B., Rasch, P., Vavrus, S., Vertenstein, M., Bader, D., Collins, W. D., Hack, J. J., Kiehl, J., Marshall, S. (2013). The Community Earth System Model: A Framework for Collaborative Research, *Bull. Amer. Meteor. Soc.*, **94**, 1339–1360, doi:10.1175/BAMS-D-12-00121.1.

Lovenduski, N. S., Long, M. C., Gent, P. R., Lindsay, K. (2013). Multi-decadal trends in the advection and mixing of natural carbon in the Southern Ocean, *Geophys. Res. Lett.*, **40**, 139-142, doi:10.1029/2012GL054483.

Rothenberg, D., Mahowald, N., Lindsay, K., Doney, S. C., Moore, J. K., Thornton, P. (2012). Volcano impacts on climate and biogeochemistry in a coupled carbon-climate model, *Earth Syst. Dynam.*, **3**, 121-136, doi:10.5194/esd-3-121-2012.

Lawrence, P. J., Feddema, J. J., Bonan, G. B., Meehl, G. A., O'Neill, B. C., Oleson, K. W., Levis, S., Lawrence, D. M., Kluzek, E., Lindsay, K., Thornton, P. E. (2012). Simulating the Biogeochemical and Biogeophysical Impacts of Transient Land Cover Change and Wood Harvest in the Community Climate System Model (CCSM4) from 1850 to 2100, *J. Climate*, **25**, 3071-3095, doi:10.1175/JCLI-D-11-u00256.1.

Misumi, K., Tsumune, D., Yoshida, Y., Uchimoto, K., Nakamura, T., Nishioka, J., Mitsudera, H., Bryan, F. O., Lindsay, K., Moore, J. K., Doney, S. C. (2011). Mechanisms controlling dissolved iron distribution in the North Pacific: A model study, *J. Geophys. Res. Biogeosci.*, **116**, G03005, doi:10.1029/2010JG001541.

Tsumune, D., Aoyama, M., Hirose, K., Bryan, F. O., Lindsay, K., Danabasoglu, G. (2011). Transport of $^{137}$Cs to the Southern Hemisphere in an ocean general circulation model, *Prog. Oceanogr.*, **89**, 38-48, doi:10.1016/j.pocean.2010.12.006.

Mahowald, N., Lindsay, K., Rothenberg, D., Doney, S. C., Moore, J. K., Thornton, P., Randerson, J. T., Jones, C. D. (2011). Desert dust and anthropogenic aerosol interactions in the Community Climate System Model coupled-carbon-climate model, *Biogeosciences*, **8**, 387-414, doi:10.5194/bg-8-387-2011.

Mahowald, N. M., Kloster, S., Engelstaedter, S., Moore, J. K., Mukhopadhyay, S., McConnell, J. R., Albani, S., Doney, S. C., Bhattacharya, A., Curran, M. A. J., Flanner, M. G., Hoffman, F. M., Lawrence, D. M., Lindsay, K., Mayewski, P. A., Neff, J., Rothenberg, D., Thomas, E., Thornton, P. E., Zender, C. S. (2010). Observed 20th Century Desert Dust Variability: Impact on Climate and Biogeochemistry, *Atmos. Chem. Phys.*, **10**, 10875-10893, doi:10.5194/acp-10-10875-2010.

Jochum, M., Peacock, S., Moore, K., and Lindsay, K. (2010). Response of carbon fluxes and climate to orbital forcing changes in the Community Climate System Model, *Paleoceanography*, **25**, PA3201, doi:10.1029/2009PA001856.

Jochum, M., Yeager, S., Lindsay, K., Moore, K., Murtuggudde, R. (2010). Quantification of the feedback between phytoplankton and ENSO in the Community Climate System Model, *J. Climate*, **23**, 2916-2925, doi:10.1175/2010JCLI3254.1.

Steinacher, M., Joos, F., Frölicher, T. L., Bopp, L., Cadule, P., Cocco, V., Doney, S. C., Gehlen, M., Lindsay, K., Moore, J. K., Schneider, B., Segschneider, J. (2010). Projected 21st century decrease in marine productivity: a multi-model analysis, *Biogeosciences*, **7**, 979-1005, doi:10.5194/bg-7-979-2010.

Thornton, P. E., Doney, S. C., Lindsay, K., Moore, J. K., Mahowald, N., Randerson, J. T., Fung, I., Lamarque, J.-F., Feddema, J. J., Lee, Y.-H. (2009). Carbon-nitrogen interactions regulate climate-carbon cycle feedbacks: results from an atmosphere-ocean general circulation model, *Biogeosciences*, **6**, 2099-2120, doi:10.5194/bg-6-2099-2009.

Randerson, J. T., Hoffman, F. M., Thornton, P. E., Mahowald, N. M., Lindsay, K., Lee, Y.-H., Nevison, C. D., Doney, S. C., Bonan, G., Stöckli, R., Covey, C., Running, S. W., Fung, I. Y. (2009). Systematic assessment of terrestrial biogeochemistry in coupled climate-carbon models, *Global Change Biol.*, **15**, 2462-2484, doi:10.1111/j.1365-2486.2009.01912.x.

Danabasoglu, G., Peacock, S., Lindsay, K., Tsumune, D. (2009). Sensitivity of CFC-11 uptake to physical initial conditions and interannually varying surface forcing in a global ocean model, *Ocean Model.*, **29**, 58-65, doi:10.1016/j.ocemod.2009.02.011.

Krishnamurthy, A., Moore, J. K., Mahowald, N., Luo, C., Doney, S. C., Lindsay, K., Zender, C. S. (2009). Impacts of Increasing Anthropogenic Soluble Iron and Nitrogen Deposition on Ocean Biogeochemistry, *Global Biogeochem. Cycles*, **23**, GB3016, doi:10.1029/2008GB003440.

Doney, S. C., Lima, I., Feely, R. A., Glover, D. M., Lindsay, K., Mahowald, N., Moore, J. K., Wanninkhof, R. (2009). Mechanisms governing interannual variability in upper-ocean inorganic carbon system and air–sea $CO_2$ fluxes: Physical climate and atmospheric dust, *Deep-Sea Res. II*, **56**, 640-655, doi:10.1016/j.dsr2.2008.12.006.

Gruber, N., Gloor, M., Mikaloff Fletcher, S. E., Doney, S. C., Dutkiewicz, S., Follows, M. J., Gerber, M., Jacobson, A. R., Joos, F., Lindsay, K., Menemenlis, D., Mouchet, A., Müller, S. A., Sarmiento, J. L., Takahashi, T. (2009). Oceanic sources, sinks, and transport of atmospheric $CO_2$, *Global Biogeochem. Cycles*, **23**, GB1005, doi:10.1029/2008GB003349.

Doney, S. C., Lima, I., Moore, J. K., Lindsay, K., Behrenfeld, M. J., Westberry, T. K., Mahowald, N., Glover, D. M., Takahashi, T. (2009). Skill metrics for confronting global upper ocean ecosystem-biogeochemistry models against field and remote sensing data, *J. Mar. Syst.,* **76**, 95-112, doi:10.1016/j.jmarsys.2008.05.015.

Boyd, P. W., Doney, S. C., Strzepek, R., Dusenberry, J., Lindsay, K., Fung, I. (2008). Climate-mediated changes to mixed-layer properties in the Southern Ocean: assessing the phytoplankton response, *Biogeosciences*, **5**, 847-864, doi:10.5194/bg-5-847-2008.

Levine, N. M., Doney, S. C., Wanninkhof, R., Lindsay, K., Fung, I. Y. (2008). Impact of Ocean Carbon System Variability on the Detection of Temporal Increases in Anthropogenic $CO_2$, *J. Geophys. Res.*, **113**, C03019, doi:10.1029/2007JC004153.

Najjar, R. G., Jin, X., Louanchi, F., Aumont, O., Caldeira, K., Doney, S. C., Dutay, J.-C., Follows, M., Gruber, N., Joos, F., Lindsay, K., Maier-Reimer, E., Matear, R. J., Matsumoto, K., Monfray, P., Mouchet, A., Orr, J. C., Plattner, G.-K., Sarmiento, J. L., Schlitzer, R., Slater, R. D., Weirig, M.-F., Yamanaka, Y., Yool, A. (2007). Impact of circulation on export production, dissolved organic matter, and dissolved oxygen in the ocean: Results from Phase II of the Ocean Carbon-cycle Model Intercomparison Project (OCMIP-2), *Global Biogeochem. Cycles*, **21**, GB3007, doi:10.1029/2006GB002857.

Mikaloff Fletcher, S. E., Gruber, N., Jacobson, A. R., Gloor, M., Doney, S. C., Dutkiewicz, S., Gerber, M., Follows, M., Joos, F., Lindsay, K., Menemenlis, D., Mouchet, A., Müller, S. A., Sarmiento, J. L. (2007). Inverse estimates of the

oceanic sources and sinks of natural $CO_2$ and the implied oceanic carbon transport, *Global Biogeochem. Cycles*, **21**, GB1010, doi:10.1029/2006GB002751.

Bryan, F. O., Danabasoglu, G., Gent, P. R., Lindsay, K. (2006). Changes in Ocean Ventilation during the 21st Century in the CCSM3, *Ocean Model.*, **15**, 141-156, doi:10.1016/j.ocemod.2006.01.002.

Moore, J. K., Doney, S. C., Lindsay, K., Mahowald, N., Michaels, A. F. (2006). Nitrogen fixation amplifies the ocean biogeochemical response to decadal timescale variations in mineral dust deposition, *Tellus*, **58B**, 560-572, doi:10.1111/j.1600-0889.2006.00209.x.

Friedlingstein, P., Cox, P., Betts, R., Bopp, L., von Bloh, W., Brovkin, V., Cadule, P., Doney, S., Eby, M., Fung, I., Bala, G., John, J., Jones, C., Joos, F., Kato, T., Kawamiya, M., Knorr, W., Lindsay, K., Matthews, H. D., Raddatz, T., Rayner, P., Reick, C., Roeckner, E., Schnitzler, K.-G., Schnur, R., Strassmann, K., Weaver, A. J., Yoshikawa, C., Zeng, N. (2006). Climate-Carbon Cycle Feedback Analysis: Results from the $C^4$MIP Model Intercomparison, *J. Climate*, **19**, 3337-3353, doi:10.1175/JCLI3800.1.

McKinley, G. A., Takahashi, T., Buitenhuis, E., Chai, F., Christian, J. R., Doney, S. C., Jiang, M.-S., Lindsay, K., Moore, J. K., Le Quéré, C., Lima, I., Murtugudde, R., Shi, L., Wetzel, P. (2006). North Pacific carbon cycle response to climate variability on seasonal to decadal timescales, *J. Geophys. Res.*, **111**, C07S06, doi:10.1029/2005JC003173.

Doney, S. C., Lindsay, K., Fung, I., John, J. (2006). Natural Variability in a Stable, 1000-Yr Global Coupled Climate-Carbon Cycle Simulation, *J. Climate*, **19**, 3033-3054, doi:10.1175/JCLI3783.1.

Gent, P. R., Bryan, F. O., Danabasoglu, G., Lindsay, K., Tsumune, D., Hecht, M. W., Doney, S. C. (2006). Ocean chlorofluorocarbon and heat uptake during the 20th Century in the CCSM3, *J. Climate*, **19**, 2366-2381, doi:10.1175/JCLI3758.1.

Mikaloff Fletcher, S. E., Gruber, N., Jacobson, A. R., Doney, S. C., Dutkiewicz, S., Gerber, M., Follows, M., Joos, F., Lindsay, K., Menemenlis, D., Mouchet, A., Müller, S. A., Sarmiento, J. L. (2006). Inverse estimates of anthropogenic $CO_2$ uptake, transport, and storage by the ocean, *Global Biogeochem. Cycles*, **20**, GB2002, doi:10.1029/2005GB002530.

Orr, J. C., Fabry, V. J., Aumont, O., Bopp, L., Doney, S. C., Feely, R. A., Gnanadesikan, A., Gruber, N., Ishida, A., Joos, F., Key, R. M., Lindsay, K., Maier-Reimer, E., Matear, R., Monfray, P., Mouchet, A., Najjar, R. G., Plattner, G.-K., Rodgers, K. B., Sabine, C. L., Sarmiento, J. L., Schlitzer, R., Slater, R. D., Totterdell, I. J., Weirig, M.-F., Yamanaka, Y., Yool, A. (2005). Anthropogenic ocean acidification over the twenty-first century and its impact on calcifying organisms, *Nature*, **437**, 681-686, doi:10.1038/nature04095.

Fung, I., Doney, S. C., Lindsay, K., John, J. (2005). Evolution of carbon sinks in a changing climate, *Proc. Natl. Acad. Sci. USA*, **102**, 11201-11206, doi:10.1073/pnas.0504949102.

Moore, J. K., Doney, S. C., Lindsay, K. (2004). Upper ocean ecosystems dynamics and iron cycling in a global 3D model, *Global Biogeochem. Cycles*, **18**, GB4028, doi:10.1029/2004GB002220.

Doney, S. C., Lindsay, K., Caldeira, K., Campin, J.-M., Drange, H., Dutay, J.-C., Follows, M., Gao, Y., Gnanadesikan, A., Gruber, N., Ishida, A., Joos, F., Madec, G., Maier-Reimer, E., Marshall, J. C., Matear, R. J., Monfray, P., Mouchet, A., Najjar, R., Orr, J. C., Plattner, G.-K., Sarmiento, J., Schlitzer, R., Slater, R., Totterdell, I. J., Weirig, M.-F.,

Yamanaka, Y., Yool, A. (2004). Evaluating global ocean carbon models: The importance of realistic physics, *Global Biogeochem. Cycles*, **18**, GB3017, doi:10.1029/2003GB002150.

Matsumoto, K., Sarmiento, J. L., Key, R. M., Aumont, O., Bullister, J. L., Caldeira, K., Campin, J.-M., Doney, S. C., Drange, H., Dutay, J.-C., Follows, M., Gao, Y., Gnanadesikan, A., Gruber, N., Ishida, A., Joos, F., Lindsay, K., Maier-Reimer, E., Marshall, J. C., Matear, R. J., Monfray, P., Mouchet, A., Najjar, R., Plattner, G.-K., Schlitzer, R., Slater, R., Swathi, P. S., Totterdell, I. J., Weirig, M.-F., Yamanaka, Y., Yool, A., Orr, J. C. (2004). Evaluation of ocean carbon cycle models with data-based metrics, *Geophys. Res. Lett.*, **31**, L07303, doi:10.1029/2003GL018970.

Doney, S. C., Lindsay, K., Moore, J. K. (2003). Global ocean carbon cycle modeling, *Ocean Biogeochemistry*, ed. M. Fasham, Springer-Verlag, doi:10.1007/978-3-642-55844-3_10.

Dutay, J.-C., Bullister, J. L., Doney, S. C., Orr, J. C., Najjar, R., Caldeira, K., Campin, J.-M., Drange, H., Follows, M., Gao, Y., Gruber, N., Hecht, M. W., Ishida, A., Joos, F., Lindsay, K., Madec, G., Maier-Reimer, E., Marshall, J. C., Matear, R. J., Monfray, P., Mouchet, A., Plattner, G.-K., Sarmiento, J., Schlitzer, R., Slater, R., Totterdell, I. J., Weirig, M.-F., Yamanaka, Y., Yool, A. (2002). Evaluation of ocean model ventilation with CFC-11: comparison of 13 global ocean models, *Ocean Model.*, **4**, 89-120, doi:10.1016/S1463-5003(01)00013-0.

Doney, S. C., Lima, I., Lindsay, K., Moore, J. K., Dutkiewicz, S., Friedrichs, M. A. M., Matear, R. J. (2001). Marine biogeochemical modeling, *Oceanography*, **14-4**, 93-107, doi:10.5670/oceanog.2001.10.

Lindsay, K., Krasny, R. (2001). A particle method and adaptive treecode for vortex sheet motion in three-dimensional flow, *J. Comput. Phys.*, **172**, 879-907, doi:10.1006/jcph.2001.6862.

*Other Publications*

Krasny, R., Lindsay, K., Nitsche, M. (2002). Simulation of vortex sheet roll-up: chaos, azimuthal waves, ring merger, Proceedings of the *NATO ARW and IUTAM Symposium on Tubes, Sheets and Singularities in Fluid Dynamics*, Zakopane, Poland, *Fluid Mechanics and its Applications* 71, 3-12, Kluwer.

**Selected Presentations**

2020 Invited Talk, Newton-Krylov Methods for Tracer Spinup, CESM OMWG MOM6 Webinar

2020 Talk, Carbon Cycle in CESM1 & CESM2, CESM BGCWG Meeting, Boulder, Colorado

2019 Lecture, Intro to Biogeochemical Modeling: Ocean & Coupled, 2019 CESM Tutorial, Boulder, Colorado

2019 Invited Talk, Coupled Climate-Carbon Cycle Modeling And Spinning Up the Ocean Model: A Journey, CESM Distinguished Achievement Award Talk

2018 Poster, Application Of A Newton-Krylov Solver To Spin Up Biogeochemical Tracers, AGU Ocean Sciences Meeting, Portland, Oregon

2018 Talk, Simulating Helium Isotopes in the CESM Ocean Component, CESM OMWG Meeting, Boulder, Colorado

2017 Lecture, Introduction to (a corner of) Marine Ecosystem Modeling, CU ATOC Lecture, Boulder, Colorado

2017 Talk, A Newton-Krylov Solver for Fast Spin-up of Onine Ocean Tracers, CU APPM Seminar, Boulder, Colorado

2017 Lecture, Intro to Biogeochemical Modeling: Ocean & Coupled, 2017 CESM Tutorial, Boulder, Colorado

2016 Lecture, Intro to Biogeochemical Modeling: Ocean & Coupled, 2016 CESM Tutorial, Boulder, Colorado

2016 Talk, Ocean BGC in CESM2, June 2016, CESM OMWG Meeting, Breckenridge, Colorado

2016 Poster, Application Of A Newton-Krylov Solver To Spin Up Biogeochemical Tracers, AGU Ocean Sciences Meeting, New Orleans, Louisiana

2016 Invited Talk, BGC Results from CESM 1.5 Experiments, CESM Joint Meeting, Boulder, Colorado

2016 Talk, Results from CESM 1.2+ Coupled Carbon Cycle Experiments, CESM BGCWG Meeting, Boulder, Colorado

2015 Lecture, Introduction to (a corner of) Marine Ecosystem Modeling, CU ATOC Lecture, Boulder, Colorado

2015 Lecture, Intro to Biogeochemical Modeling: Ocean & Coupled, 2015 CESM Tutorial, Boulder, Colorado

2015 Invited Talk, Challenges for the Next Generation of Ocean Carbon Cycle Models, CarboChange Annual Meeting, Bergen, Norway

2014 Poster, Application of a Newton-Krylov Solver to Spinup Biogeochemical Tracers, AGU Ocean Sciences Meeting, Honolulu, Hawaii

2014 Lecture, Intro to Biogeochemical Modeling: Ocean & Coupled, 2014 CESM Tutorial, Boulder, Colorado

2014 Talk, Spinning Up Tracers in the Ocean, CESM OMWG Meeting, Boulder, Colorado

2013 Lecture, Introduction to Marine Ecosystem Modeling, CU ATOC Lecture, Boulder, Colorado

2013 Lecture, Intro to Biogeochemical Modeling: Ocean & Coupled, 2013 CESM Tutorial, Boulder, Colorado

2012 Lecture, Intro to Biogeochemical Modeling: Ocean & Coupled, 2012 CESM Tutorial, Boulder, Colorado

2012 Talk, Coupled Carbon Simulations with CESM-(BGC), Land/Biogeo WG Meeting, Boulder, Colorado

2012 Poster, The Impact of Climate Change on the Southern Ocean Carbon Cycle in CESM1-(BGC) CMIP5 Experiments, 2012 Ocean Sciences Meeting, Salt Lake City, Utah

2011 Poster, The Community Earth System Model: Evaluation and CMIP5 Simulations & Activities of the Biogeochemistry Working Group, 2011 WCRP Open Science Conference, Denver, Colorado

2011 Lecture, Intro to Biogeochemical Modeling: Ocean & Coupled, 2011 CESM Tutorial, Boulder, Colorado

2011 Invited Talk, Simulating Ocean Ecosystems in a Changing Climate with CESM-(BGC): Potential Intersections with Math, Mathematical Biosciences Institute (MBI) Workshop, Columbus, Ohio

2011 Talk, Coupled Carbon Simulations with CESM-(BGC), BGCWG Meeting, Breckenridge, Colorado

2011 Invited Talk, Introduction to (a corner of) Marine Ecosystem Modeling, CU-ATOC Lecture, Boulder, Colorado

2010 Lecture, Intro to Biogeochemical Modeling: Ocean & Coupled, 2010 CESM Tutorial, Boulder, Colorado