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CURRICULUM VITAE

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Mailing Address

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Education

B.S.	Worcester Polytechnic Institute (Physics, with distinction)	1992
Ph. D.	College of Oceanic and Atmospheric Science, Oregon State University (Oceanography). Thesis Advisor: Dudley B. Chelton Thesis title: <i>The Cross-Equatorial Structure of Tropical Instability Waves</i>	2002

Professional Experience

Peace Corps Volunteers, teaching mathematics in Zimbabwe, Africa	1992-1995
Graduate Research Assistant, Oregon State University	1995-2002
National Research Council Research Associate, NOAA/Pacific Marine Environmental Laboratory	2002-2005
Pacific Marine Environmental Laboratory/Joint Institute for Marine and Atmospheric Research, Assistant Researcher	2005-present

Honors and Awards

Tau Beta Pi, Worcester Polytechnic Institute	1992
Dr. Robert H. Goddard Award, Department of Physics W.P.I	1992

Invited Talks

Invited Speaker, American Geophysical Union Ocean Science Meeting	2004
Invited Speaker, XBT workshop Hamburg Germany	2010
Invited ISSI workshop "Observing and modeling Earth's energy flows" in Bern, Switzerland	2011

Professional Societies

American Geophysical Union
Sigma Pi Sigma

Areas of Expertise

The physical oceanography of the Equatorial Pacific; descriptive, statistical and dynamical analyses of mesoscale variability; satellite microwave remote sensing of the ocean (primarily radar altimetry); linearized modeling of instabilities; interpretation of global circulation model output; analysis of moored time series (primarily temperature and velocity); analysis of profiling drifters; analysis of global heat and fresh water content; quality control of data; machine learning.

Present Research Interests

Investigation of mesoscale variability from satellite altimeter data and moored buoys in the Eastern Equatorial Pacific; development of linearized models to explain instabilities in the equatorial oceans; estimating global heat and fresh water content from in situ observation and satellite altimeter data. Geographical areas of interest include Equatorial Pacific Ocean, Bering Sea, Equatorial Indian Ocean, and Equatorial Atlantic Ocean.

Refereed Publications

- 2023 Lyman, J.M., and G.C. Johnson (2023): **Global high-resolution random forest regression maps of ocean heat content anomalies using in situ and satellite data.** *J. Atmos. Oceanic Tech.*, 40(5), 575–586, doi: 10.1175/JTECH-D-22-0058.1.
- 2023 Schmidt, G.A., T. Andrews, S.E. Bauer, P.J. Durack, N.G. Loeb, V. Ramaswamy, N.P. Arnold, M.G. Bosilovich, J. Cole, L.W. Horowitz, G.C. Johnson, J.M. Lyman, B. Medeiros, T. Michibata, D. Olonscheck, D. Paynter, S. Priyam Raghuraman, M. Schulz, D. Takasuka, V. Tallapragada, P.C. Taylor, and T. Ziehn (2023): **CERESMIP: A climate modeling protocol to investigate recent trends in the Earth’s Energy Imbalance.** *Front. Clim.*, 5, 1202161, doi: 10.3389/fclim.2023.1202161.
- 2023 von Schuckmann, K., A. Minière, F. Gues, F.J. Cuesta Valero, G. Kirchengast, S. Adusumilli, F. Straneo, M. Ablain, R.P. Allan, P.M. Barker, H. Beltrami, A. Blazquez, T. Boyer, L. Cheng, J.A. Church, D. Desbruyeres, H. Dolman, C.M. Domingues, A. García-García, D. Giglio, J.E. Gilson, M. Gorfer, L. Haimberger, M.Z. Hakuba, S. Hendricks, S. Hosoda, G.C. Johnson, R. Killick, B. King, N. Kolodziejczyk, A. Korosov, G. Krinner, M. Kuusela, F.W. Landerer, M. Langer, T. Lavergne, I. Lawrence, Y. Li, J. Lyman, F. Marti, B. Marzeion, M. Mayer, A.H. MacDougall, T. McDougall, D.P. Monselesan, J. Nitzbon, I. Otosaka, J. Peng, S. Purkey, D. Roemmich, K. Sato, K. Sato, A. Savita, A. Schweiger, A. Shepherd, S.I. Seneviratne, L. Simons, D.A. Slater, T. Slater, A. Steiner, T. Suga, T. Szekely, W. Thiery, M.-L. Timmermans, I. Vanderkelen, S.E. Wijffels, T. Wu, and M. Zemp (2023): **Heat stored in the Earth system 1960–2020: Where does the energy go?** *Earth Syst. Sci. Data*, 15(4), 1675–1709, doi: 10.5194/essd-15-1675-2023.
- 2022 Savita, A., C.M. Domingues, T. Boyer, V. Gouretski, M. Ishii, G.C. Johnson, J.M. Lyman, J.K. Willis, S.J. Marsland, W. Hobbs, J.A. Church, D.P. Monselesan, P. Dobrohotoff, R. Cowley, and S.E. Wijffels (2022): **Quantifying spread in spatio-temporal changes of upper-ocean heat content estimates: An internationally coordinated comparison.** *J. Climate*, 35(2), 851–875, doi: 10.1175/JCLI-D-20-0603.1.
- 2022 Johnson, G.C., and J.M. Lyman (2022): **A global ocean surface mixed layer monthly climatology: Means, percentiles, skewness, and kurtosis.** *J. Geophys. Res.*, 127, e2021JC018219, doi: 10.1029/2021JC018219.
- 2022 Johnson, G.C., J. Reagan, J.M. Lyman, T. Boyer, C. Schmid, and R. Locarnini (2022): **Salinity. In State of the Climate in 2021, Global Oceans.** *Bull. Am. Meteorol. Soc.*, 103(8), S157-S162.
- 2022 Loeb, N.G., M. Mayer, S. Kato, J.T. Fasullo, H. Zuo, R. Senan, J.M. Lyman, G.C. Johnson, and M. Balmaseda (2022): **Evaluating twenty-year trends in Earth’s energy flows from observations and reanalyses.** *J. Geophys. Res.*, 127(12), e2022JD036686, doi: 10.1029/2022JD036686.
- 2022 Johnson, G.C., J.M. Lyman, T. Boyer, L. Cheng, J. Gilson, M. Ishii, R.E. Killick, and S.G. Purkey (2022): **Ocean heat content. In State of the Climate in 2021, Global Oceans.** *Bull. Am. Meteorol. Soc.*, 103(8), S153-S157.

- 2021 Loeb, N.G., G.C. Johnson, T.J. Thorsen, J.M. Lyman, F.G. Rose, and S. Kato (2021): **Satellite and ocean data reveal marked increase in Earth's heating rate.** *Geophys. Res. Lett.*, 48(13), e2021GL093047, doi: 10.1029/2021GL093047.
- 2021 Johnson, G.C., J. Reagan, J.M. Lyman, T. Boyer, C. Schmid, and R. Locarnini (2021): **Salinity. In State of the Climate in 2020, Global Oceans.** *Bull. Am. Meteorol. Soc.*, 102(8), S159–S164, doi: 10.1175/BAMS-D-21-0083.1.
- 2021 Johnson, G.C., J.M. Lyman, T. Boyer, L. Cheng, J. Gilson, M. Ishii, R.E. Killick, and S.G. Purkey (2021): **Ocean heat content. In State of the Climate in 2020, Global Oceans.** *Bull. Am. Meteorol. Soc.*, 102(8), S156–S159, doi: 10.1175/BAMS-D-21-0083.1.
- 2020 Von Shuckmann, K., L. Cheng, M.D. Palmer, J. Hansen, C. Tassone, V. Aich, S. Adusumilli, H. Beltrami, T. Boyer, F.J. Cuesta-Valero, D. Desbruyères, C. Domingues, A. García-García, P. Gentine, J. Gilson, M. Gorfer, L. Haimberger, M. Ishii, G.C. Johnson, R. Killick, B.A. King, G. Kirchengast, N. Kolodziejczyk, J. Lyman, B. Marzeion, M. Mayer, M. Monier, D.P. Monselesan, S. Purkey, D. Roemmich, A. Schweiger, S.I. Seneviratne, A. Shepherd, D.A. Slater, A.K. Steiner, F. Straneo, M.L. Timmermanns, and S.E. Wijffels (2020): **Heat stored in the Earth system: Where does the energy go?** *Earth Syst. Sci. Data*, 12, 2013–2041, doi: 10.5194/essd-12-2013-2020.
- 2020 Johnson, G.C., J. Reagan, J.M. Lyman, T. Boyer, C. Schmid, and R. Locarnini (2020): **Salinity. In State of the Climate in 2019, Global Oceans.** *Bull. Am. Meteorol. Soc.*, 101(8), S144–S149, doi: 10.1175/BAMS-D-20-0105.1.
- 2020 Johnson, G.C., J.M. Lyman, T. Boyer, L. Cheng, C.M. Domingues, J. Gilson, M. Ishii, R.E. Killick, D. Monselesan, S.G. Purkey, and S.E. Wijffels (2020): **Ocean heat content. In State of the Climate in 2019, Global Oceans.** *Bull. Am. Meteorol. Soc.*, 101(8), S140–S144, doi: 10.1175/BAMS-D-20-0105.1.
- 2020 Johnson, G.C., and J.M. Lyman (2020): **Warming trends increasingly dominate Global Ocean.** *Nature Clim. Change*, 10, 757–761, doi: 10.1038/s41558-020-0822-0.
- 2020 Scannell, H.A., G.C. Johnson, L. Thompson, J.M. Lyman, and S.C. Riser (2020): **Subsurface evolution and persistence of marine heatwaves in the northeast Pacific.** *Geophys. Res. Lett.*, 47(23), e2020GL090548, doi: 10.1029/2020GL090548.
- 2020 Johnson, G.C., C. Cadot, J.M. Lyman, K.E. McTaggart, and E.L. Steffen (2020): **Antarctic Bottom Water Warming in the Brazil Basin: 1990s through 2020, from WOCE to Deep Argo.** *Geophys. Res. Lett.*, 47(18), e2020GL089191, doi: 10.1029/2020GL089191.
- 2019 Johnson, G.C., J.M. Lyman, T. Boyer, L. Cheng, C.M. Domingues, J. Gilson, M. Ishii, R.E. Killick, D. Monselesan, S.G. Purkey, and S.E. Wijffels (2019): **Ocean heat content. In State of the Climate in 2018, Global Oceans.** *Bull. Am. Meteorol. Soc.*, 100(9), S74–S77, doi: 10.1175/2019BAMSSStateoftheClimate.1.
- 2019 Johnson, G.C., J. Reagan, J.M. Lyman, T. Boyer, C. Schmid, and R. Locarnini (2019): **Salinity. In State of the Climate in 2018, Global Oceans.** *Bull. Am. Meteorol. Soc.*, 100(9), S77–S81, doi: 10.1175/2019BAMSSStateoftheClimate.1.
- 2019 Meyssignac, B., T. Boyer, Z. Zhao, M.Z. Hakuba, F. Landerer, D. Stammer, A. Köhl, S. Kato, T. L'Ecuyer, M. Ablain, J.P. Abraham, A. Blazquez, A. Cazenave, J. Church, R. Cowley, L.G. Cheng, C. Domingues, D. Giglio, V. Gouretski, M. Ishii, G.C. Johnson, R. Killick, D. Legler, W. Llovel, J. Lyman, M. Palmer, S. Piotrowicz, S.G. Purkey, D. Roemmich, R. Roca, A. Savita, K. von Schuckmann, S. Speich, G. Stephens, G.J. Wang, S. Wijffels, and N. Zilberman (2019): **Measuring**

global ocean heat content to estimate the Earth energy imbalance. *Front. Mar. Sci.*, 6, 432, Oceanobs19: An Ocean of Opportunity, doi: 10.3389/fmars.2019.00432.

- 2019 Zanowski, H., G.C. Johnson, and J.M. Lyman (2019): **Equatorial Pacific 1000-dbar velocity and isotherm displacements from Argo data: Beyond the mean and seasonal cycle.** *J. Geophys. Res.*, 124, doi: 10.1029/2019JC015032.
- 2019 Wong, A.P.S., S. Wijffels, S.C. Riser, S. Pouliquen, S. Hosoda, D. Roemmich, J. Gilson, G.C. Johnson, K. Martini, D. Murphy, M. Scanderbeg, T.V.S. Uday Bhaskar, J.J.H. Buck, F. Merceur, T. Carval, G. Maze, C. Cabanes, X. André, N. Poffa, P. Barker, S. Guinehut, M. Belbeoch, M. Ignaszewski, M. Baringer, C. Schmid, J.M. Lyman, K.E. McTaggart, M.B. Alkire, D. Swift, C. Hersh, S. Jayne, W.B. Owens, P. Robbins, P. Sutton, R. Cancouët, C. Coatanoan, D. Dobbler, A. Garcia Juan, J. Gourrion, N. Kolodziejczyk, V. Bernard, B. Bourles, H. Claustre, S. Le Reste, P.-Y. Le Traon, J.-P. Rannou, C. Saout-Grit, S. Speich, V. Thierry, N. Verbrugge, I. Angel, B. Klein, G. Notarstefano, P.-M. Poulain, P. Velez, T. Suga, K. Ando, N. Iwasaka, T. Kobayashi, S. Masuda, E. Oka, K. Sato, T. Nakamura, K. Sato, Y. Takatsuki, T. Yoshida, R. Cowley, J.L. Lovell, P.R. Oke, E.M. van Wijk, F. Carse, M. Donnelly, J.W. Gould, K. Gowers, B.A. King, S. Loch, M. Mowatt, J. Turton, E.P.R. Rao, M. Ravichandran, H.J. Freeland, I. Gaboury, D. Gilbert, B.J.W. Greenan, M. Ouellet, T. Ross, A. Tran, M. Dong, Z. Liu, J. Xu, K.-R. Kang, H.-J. Jo, S.-D. Kim, and H.-M. Park (2020): **Argo 1999-2019: Two million temperature-salinity profiles and subsurface velocity observations from a global array of profiling floats.** *Front. Mar. Sci.*, 7, 700, doi:10.3389/fmars.2020.00700.
- 2018 Durack, P.J., P.J. Gleckler, S.G. Purkey, G.C. Johnson, and J.M. Lyman (2018): Ocean warming: From the surface to the deep in observations and models. *Oceanography*, 31(2), 41–51, doi: 10.5670/oceanog.2018.227, View online.
- 2018 Johnson, G.C., J.M. Lyman, T. Boyer, C.M. Domingues, J. Gilson, M. Ishii, R. Killick, D. Monselan, and S. Wijffels (2018): Ocean heat content. In *State of the Climate in 2017, Global Oceans. Bull. Am. Meteorol. Soc.*, 99(8), S72–S77, doi: 10.1175/2018BAMSStateoftheClimate.1.
- 2018 Johnson, G.C., J. Reagan, J.M. Lyman, T. Boyer, C. Schmid, and R. Locarnini (2018): Salinity. In *State of the Climate in 2017, Global Oceans. Bull. Am. Meteorol. Soc.*, 99(8), S77–S81, doi: 10.1175/2018BAMSStateoftheClimate.1.
- 2017 Johnson, G.C., J.M. Lyman, T. Boyer, C.M. Domingues, J. Gilson, M. Ishii, R. Killick, D. Monselan, and S. Wijffels (2017): **Ocean heat content.** In *State of the Climate in 2016, Global Oceans. Bull. Am. Meteorol. Soc.*, 98(8), S66–S69, doi: 10.1175/2017BAMSStateoftheClimate.1.
- 2017 Johnson, G.C., J. Reagan, J.M. Lyman, T. Boyer, C. Schmid, and R. Locarnini (2017): **Salinity.** In *State of the Climate in 2016, Global Oceans. Bull. Am. Meteorol. Soc.*, 98(8), S69–S75, doi: 10.1175/2017BAMSStateoftheClimate.1.
- 2016 Boyer, T., C.M. Domingues, S.A. Good, G.C. Johnson, J.M. Lyman, M. Ishii, V. Gouretski, J.K. Willis, J. Antonov, S. Wijffels, J.A. Church, R. Cowley, and N.L. Bindoff (2016): Sensitivity of global upper-ocean heat content estimates to mapping methods, XBT bias corrections, and baseline climatologies. *J. Climate*, 29(13), doi: 10.1175/JCLI-D-15-0801.1, Published online.
- 2016 Johnson, G.C., J.M. Lyman, and N.G. Loeb (2016): Improving estimates of Earth’s energy imbalance. *Nature Clim. Change*, 6, 639–640, doi: 10.1038/nclimate3043, Published online.
- 2016 Johnson, G.C., J.M. Lyman, and S.G. Purkey (2015): Informing Deep Argo array design using Argo and full-depth hydrographic section data. *J. Atmos. Oceanic Tech.*, 32(11), 2187–2198, doi: 10.1175/JTECH-D-15-0139.1.

- 2016 Johnson, G.C., J. Reagan, J.M. Lyman, T. Boyer, C. Schmid, and R. Locarnini (2016): Salinity. In *State of the Climate in 2015, Global Oceans*. Bull. Am. Meteorol. Soc., 97(8), S70–S74.
- 2016 Johnson, G.C., J.M. Lyman, T. Boyer, C.M. Domingues, M. Ishii, R. Killick, and D. Monselan (2016): Ocean heat content. In *State of the Climate in 2015, Global Oceans*. Bull. Am. Meteorol. Soc., 97(8), S66–S70.
- 2015 Johnson, G.C., and J.M. Lyman (2014): Where's the heat? *Nature Climate Change*, 4, 956–957, doi: 10.1038/nclimate2409.
- 2015 Johnson, G.C., J.M. Lyman, J. Antonov, N. Bindoff, T. Boyer, C.M. Domingues, S.A. Good, M. Ishii, and J.K. Willis (2015): Ocean heat content. In *State of the Climate in 2014, Global Oceans*. Bull. Am. Meteorol. Soc., 96(7), S64–S66, S68.
- 2015 Johnson, G.C., J.M. Lyman, G.S.E. Lagerloef, and H.-Y. Kao (2015): Sea surface salinity. In *State of the Climate in 2014, Global Oceans*. Bull. Am. Meteorol. Soc., 96(7), S71–S74.
- 2015 Lyman, J.M., and G.C. Johnson (2015): Anomalous eddy heat and freshwater transport in the Gulf of Alaska. *J. Geophys. Res.*, 120(2), 1397–1408, doi: 10.1002/2014JC010252.
- 2014 Kelly, K. K., L. Thompson, and J. Lyman. The Coherence and Impact of Meridional Heat Transport Anomalies in the Atlantic Ocean Inferred from Observations *Journal of Climate* Volume 27, Issue 4 (February 2014) pp. 1469-1487 doi:10.1175/JCLI-D-12-00131.1.
- 2014 Lyman, J. M. and G. C. Johnson. Estimating global ocean heat content changes in the upper 1800 m since 1950 and the influence of climatology choice. *Journal of Climate*, 27, 1946-1958, doi:10.1175/ JCLI-D-12-00752.1.
- 2014 Johnson, G.C., and J.M. Lyman 2014: Where's the heat? *Nature Climate Change*, doi: 10.1038/nclimate2409.
- 2014 Johnson, G. C., J. M. Lyman, G. S. E. Lagerloef, and H.-Y. Kao. 2014. Global Oceans: Sea Surface Salinity. In *State of the Climate in 2013*, Blunden, J., and D. S. Arndt, Eds., *Bulletin of the American Meteorological Society*, 95, 7, S60-S62, doi:10.1175/2014BAMSStateoftheClimate.1.
- 2014 Johnson, G. C., J. M. Lyman, J. K. Willis, T. Boyer, J. Antonov, S. A. Good, C. M. Domingues, and N. Bindoff. 2014. Global Oceans: Ocean Heat Content. In *State of the Climate in 2013*, Blunden, J., and D. S. Arndt, Eds., *Bulletin of the American Meteorological Society*, 95, 7, S54-S57, doi:10.1175/2014BAMSStateoftheClimate.1.
- 2013 Abraham, J. P., M. Baringer, N. L. Bindoff, T. Boyer, L. J. Cheng, J. A. Church, J. L. Conroy, C. M. Domingues, J. T. Fasullo, J. Gilson, G. Goni, S. A. Good, J. M. Gorman, V. Gouretski, M. Ishii, G. C. Johnson, S. Kizu, J. M. Lyman, A. M. Macdonald, W.J. Minkowycz, S. E. Moffitt, M. D. Palmer, A. R. Piola, F. Reseghetti, K. Schuckmann, K. E. Trenberth, I. Velicogna, and J. K. Willis., 2013. A review of global ocean temperature observations: Implications for ocean heat content estimates and climate change. *Reviews of Geophysics*, 51, 450-483, doi:10.1002/rog20022.
- 2013 Johnson, G. C., J. M. Lyman, G. S. E. Lagerloef, and H.-Y. Kao. Global Oceans: Sea Surface Salinity. In *State of the Climate in 2012*, Blunden, J., and D. S. Arndt, Eds., *Bulletin of the American Meteorological Society*, 94, 8, S57-S60, doi:10.1175/2013BAMSStateoftheClimate.1.
- 2013 Johnson, G. C., J. M. Lyman, J. K. Willis, S. Levitus, T. Boyer, J. Antonov, S. A. Good, C. M. Domingues, S. Wijffels, and N. Bindoff.. Global Oceans: Ocean Heat Content. In *State of the Climate in 2012*, Blunden, J., and D. S. Arndt, Eds., *Bulletin of the American Meteorological Society*, 94, 8, S50-S53, doi:10.1175/2013BAMSStateoftheClimate.1.

- 2013 Schmidtko, S., G. C. Johnson, and J. M. Lyman. 2013. MIMOC: A global monthly isopycnal upper-ocean climatology with mixed layers, *Journal of Geophysical Research*, **118**, 1658-1672, doi:10.1002/jgrc.20122.
- 2012 Loeb, N. G., J. M. Lyman, G. C. Johnson, D. R. Doelling, T. Wong, R. P. Allan, B. J. Soden, and G. L. Stephens. 2012. Observed changes in top-of-the-atmosphere radiation and upper-ocean heating consistent within uncertainty. *Nature Geoscience*, **5**, 110-113, doi:10.1038/ngeo1375.
- 2012 Johnson, G. C., S. Schmidtko, and J. M. Lyman. 2012. Relative contributions of temperature and salinity to seasonal mixed layer density changes and horizontal density gradients. *Journal of Geophysical Research*, in press, doi:10.1029/2011JC007651.
- 2012 Johnson, G. C., and J. M. Lyman. 2012. Global Oceans: Sea Surface Salinity. In *State of the Climate in 2011*, Blunden, J., and D. S. Arndt, Eds., *Bulletin of the American Meteorological Society*, **93**, 7, S68-S69, S72, doi:10.1175/2012BAMSStateoftheClimate.1.
- 2012 Johnson, G. C., J. M. Lyman, J. K. Willis, S. Levitus, T. Boyer, J. Antonov, and S. A. Good. 2012. Global Oceans: Ocean Heat Content. In *State of the Climate in 2011*, Blunden, J., and D. S. Arndt, Eds., *Bulletin of the American Meteorological Society*, **93**, 7, S62-S65, doi:10.1175/2012BAMSStateoftheClimate.1.
- 2012 Lagerloef, G., F. Wentz, S. Yueh, H-Y. Kao, G. C. Johnson, and J. M. Lyman. 2012. Aquarius Satellite Mission Provides New, Detailed View of Sea Surface Salinity. In *State of the Climate in 2011*, Blunden, J., and D. S. Arndt, Eds., *Bulletin of the American Meteorological Society*, **93**, 7, S70-S71, doi:10.1175/2012BAMSStateoftheClimate.1.
- 2011 Johnson, G. C., and J. M. Lyman. 2011. Global Oceans: Sea Surface Salinity. In *State of the Climate in 2010*, Blunden, J., D. S. Arndt, and M. O. Baringer, Eds., *Bulletin of the American Meteorological Society*, **92**, 6, S86-S88, doi:10.1175/1520-0477-92.6.S1.
- 2011 Johnson, G. C., J. M. Lyman, J. K. Willis, S. Levitus, T. Boyer, J. Antonov, M. D. Palmer, and S. A. Good. 2011. Global Oceans: Ocean Heat Content. In *State of the Climate in 2010*, Blunden, J., D. S. Arndt, and M. O. Baringer, Eds., *Bulletin of the American Meteorological Society*, **92**, 6, S81-S84, doi:10.1175/1520-0477-92.6.S1.
- 2011 Lyman, J. M., 2011: Estimating global energy flow from the global upper ocean. *Surv. Geophys.*, doi:10.1007/s10712-011-9167-6.
- 2010 Johnson, G. C., and J. M. Lyman. 2010. Global Oceans: Sea Surface Salinity. In *State of the Climate in 2009*, D. S. Arndt, M. O. Baringer, and M. R. Johnson, Eds., *Bulletin of the American Meteorological Society*, **91**, 7, S63-S64, doi:10.1175/BAMS-91-7-StateoftheClimate.
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- 2010 Palmer, M.D., K. Haines and J. M. Lyman. 2010. Global Oceans: Recent advances in our understanding of Global ocean heat. In *State of the Climate in 2009*, D. S. Arndt, M. O. Baringer, and M. R. Johnson, Eds., *Bulletin of the American Meteorological Society*, **91**, 7, S59-S60, doi:10.1175/BAMS-91-7-StateoftheClimate.

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