

DAVID W. LEA

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Education: **1990:** Ph.D. (Oceanography), MIT - WHOI Joint Program.
Thesis Advisor: Edward A. Boyle, Professor, MIT and member, NAS
1984: B.S. *Magna cum Laude* (Geology, Honors), Haverford College, PA

Academic Positions: **Professor**, Department of Earth Science and Marine Science, University of California, Santa Barbara, 1999-present
Affiliate Faculty, Bren School of Environmental Science and Management, UCSB, 2012-
Leverhulme Visiting Professor, Department of Earth Sciences, University of Cambridge, UK, 2002-2003
Associate Professor, UCSB, 1995-1999
Visiting Associate Professor, Department of Geophysical Sciences, University of Chicago, 1995-1996
Assistant Professor, UCSB, 1989-1995

Professional Organizations: AAAS, since 2003 (Fellow, 2012)
American Geophysical Union (AGU), since 1985 (Fellow 2013)

Awards/Fellowships:

Elected Senior Fellow of the Breakthrough Institute (Oakland, CA) in 2016
Fellow of Fondation IMéRA (Marseille, France), Sep, 2015 – Feb, 2016
Elected an American Geophysical Union Fellow, 2013
Elected an AAAS Fellow, 2012
Google Science Communication Fellow, 2011 (Climate Change)
Jefferson Science Fellowship, US Department of State, 2010-2011: served as science advisor to the Office of Global Change (EGC) and the Special Envoy on Climate Change (SECC), the Honorable Todd D. Stern
Aldo Leopold Leadership Fellowship, Woods Institute for the Environment, 2009
Cesare Emiliani Lecturer, AGU Fall Meeting 2007– awarded to "individuals who have made outstanding scientific contributions to our understanding of past oceans and climates"
John Simon Guggenheim Memorial Fellowship, 2002-2003
Leverhulme Visiting Professorship, University of Cambridge, UK, 2002-2003
Visiting Fellowship and Lifetime Fellow, Clare Hall, University of Cambridge, UK, 2002-2003
UCSB Academic Senate Distinguished Teaching Award, 2001
JOI - USSAC Ocean Drilling Fellowship, MIT, 1987-88
Phi Beta Kappa, Haverford College, 1984

Special Appointments (since 2000):

Faculty co-Chair, UCSB Chancellor's Sustainability Committee, 2018-
Member of the University of California Global Climate Leadership Council (GCLC), which advises the UC system on its Carbon Neutrality Initiative, 2018-
Associate Editor, *Science Advances*, 2017-
Member, Electorate Nominating Committee (ENC) of the Section on Atmospheric & Hydrospheric Sciences, AAAS, 2017-2018
Member, UCSB Chancellor's Sustainability Committee, 2016-

Member, UCSB Program Review Panel, 2016-
Chair, SENSETROP Tropical Paleoclimate International Working Group, 2012-2017
Associate Editor, AGU Journal *Paleoceanography*, 2007-2015
Vice-Chair, AGU Emiliani Lecturer Selection Committee, 2013-2014
Member, UC-wide Committee on Educational Policy (UCEP), 2012-13
Chair, Academic Senate *Ad Hoc* Committee on Online Instruction, UCSB, 2011-2013
Vice Chair, Undergraduate Council, UCSB, 2012-2013; member 2011-12
Member, NSF Ocean Sciences MG&G Panel, 2011
Co-Chair, U.S.G. Reviewing Committee, IPCC Special Report on Extreme Events (SREX), 2011
Member, Official U.S.G. Delegation, IPCC 33rd Session, May 2011, Abu Dhabi, UAE
Member, Official U.S.G. Delegation, GEO Ministerial Summit, Nov. 2010, Beijing, China
Member, Official U.S.G. Delegation, IPCC 32nd Session, Oct. 2010, Pusan, Korea
Chair, College of Letters of Science Executive Committee, UCSB, 2009-2010; member (elected) 2008-2009
Member, CIFAR Visiting Committee, Toronto, Canada, 2008
Member, NSF Post-Earth System History (ESH) Program Steering Committee, which lead to the development and implementation of the P2C2 program, NSF, 2007
Co-Chair and Organizer, Union session: "Climate Sensitivity from Modeling, Current Observations and Paleoclimate Data," Fall AGU 2007
Secretary, AGU Paleoceanography and Paleoclimatology Focus Group, 2004-2006
Associate Editor, *Geochimica et Cosmochimica Acta*, 2000 – 2006

Research Interests: 1); paleoclimate 2) geochemical proxies/records of ocean and climate change; 3) ocean carbon cycle and marine geochemistry; 4) global climate change and policy

Teaching: I teach Introduction to Oceanography, Earth's Climate Past and Present, Global Warming Science and Society, and Chemical Oceanography (Grad) in the Earth Science Department, UCSB. I teach Advanced Climate Science for Policy Makers (Grad) in the Bren School of Environmental Science and Management, UCSB.

Synergistic Activities

In 2010-2011 I served as the climate science advisor at the US Department of State, Washington, DC, advising the Honorable Todd Stern, President Obama's Special Envoy on Climate Change (SECC), and working with the international negotiation team in Environment and Global Change (EGC). My portfolio included: (*Science*) IPCC Coordinator, IPCC Renewable Energy Coordinator (SREN), IPCC Extreme Events Report (SREX), US Climate Change Science Program, USGCRP, National Climate Assessment; (*Negotiations*) London Convention/Iron Fertilization/Geoengineering, Arctic Council, Arctic Policy Group, Long-Range Transboundary Air Pollution; (*Multilateral Initiatives*) GEO, Global Climate Observing System, World Meteorological Organization, Inter-American Institute for Global Change Research.

During Winter-Spring 2007 I developed and organized a UCSB Arts and Lectures public event series called "Global Warming – Science and Society," underwritten by a private donor, and providing lectures, workshops, panels, community-wide book-reading, etc. to educate and inform the campus and local community about climate change. Speakers included prominent NASA scientist Jim Hansen, BP Chief Scientist Steve Koonin, writer Elizabeth Kolbert, and activist Bill McKibben. Over 3600 people attended the four major lectures, which received extensive local media coverage.

Graduate Students advised (current position)

Tracy Mashiotta, Ph.D. 1998 (Senior Technical Support Specialist, Dynamic Graphics, Inc., Houston, TX, USA)

Pamela Martin, Ph.D. 2000 (private citizen)

Apurva Dave, M.S., 2000 (International Coordinator and Senior Analyst, National Coordination Office, U.S. Global Change Research Program, Washington, DC)

Petra Dekens, M.S., 2001 (Associate Professor of Oceanography, Department of Geosciences, San Francisco State University)

Peter von Langen, Ph.D., 2001 (Engineering Geologist, Central Coast Water Board, SLO, CA)

Mary Jane Coombs, M.S., 2006 (Manager, Greenhouse Gas Markets, California Air Resources Board, Sacramento, CA)

Martin Medina-Elizalde, Ph.D., 2007 (Associate Professor, Geosciences, Auburn University, Alabama)

Joseph Lalicata, M.S., 2009 (Geologist, Statoil, Stavenger, Norway)

Leah Carver, M.S., 2010 (Geologist, GIS analyst, PLS Inc., Houston, TX)

Sarah Medley, Ph.D., 2011 (Executive Assistant at The Women's Initiative, Charlotte, VA)

Samantha Gwizd, M.S., 2014 (Ph.D. student at University of Tennessee, Knoxville)

Minda Monteagudo, M.S., 2015 (Ph.D. student at Georgia Tech, Atlanta)

Post-Doctoral Scholars advised (current position)

Supriyo Chakraborty, 1995-1996. (Scientist, Indian Inst. Tropical Meteorology, Pune, India)

Dorothy Pak, 1997-2003. (Project Scientist, UCSB)

Syee Weldeab, 2005-2007: German National Science Foundation Young Scientist Award. (Assistant Professor, Department of Earth Science, UCSB)

Rajeev Saraswat, 2009-2010: IUSSTF Research Fellow (Scientist, National Institute Oceanography, Goa, India)

Collaborators (no editorial collaborations)

Dr. Edward A. Boyle, MIT, thesis advisor (no active collaboration since 1992)

Dr. Howard J. Spero, long-time collaborator

Dr. Jeremy Shakun, Harvard – collaborating on several paleoclimate projects

Dr. Charles Jackson, UTIG, Texas – collaborating on paleoclimate modeling

Dr. Tony Broccoli, Rutgers – collaborating on paleoclimate modeling

Dr. Thibault de Garidel-Thoron, CEREGE, Aix en Provence, France: collaborating on SENSETROP

Dr. Edouard Bard, Collège de France, Paris, and CEREGE, Aix en Provence, France – collaborating on SENSETROP

Complete Publication List (* indicates multiples of 100 citations, based on Google Scholar): <http://scholar.google.com/citations?user=lto711kAAAAJ&hl=en>

1. **Shen, G. T., E. A. Boyle, and D. W. Lea, Cadmium in corals as a tracer of historical upwelling and industrial fallout. *Nature*. **328**: p. 794-796, 1987.
2. Lea, D. W., P. B. Larson, H. P. J. Taylor, and M. L. Crawford, Oxygen isotope and fluid inclusion study of the Mineral Point area, Eureka Graben, Colorado. *Econ. Geol.* **84**: p. 1656-1662, 1989.
3. **Lea, D. and E. Boyle, Barium content of benthic foraminifera controlled by bottom water composition. *Nature*. **338**: p. 751-753, 1989.
4. ***Lea, D. W., G. T. Shen, and E. A. Boyle, Coralline barium records temporal variability in equatorial Pacific upwelling. *Nature*. **340**: p. 373-376, 1989.
- 5a. Lea, D. W., Foraminiferal and coralline barium as paleoceanographic tracers, Ph.D. thesis, Joint Program in Oceanography, Mass. Inst. of Technol./Woods Hole Oceanogr. Inst.: Woods Hole, Mass. 173 p., 1990
5. *Lea, D. W. and E. A. Boyle, Foraminiferal reconstruction of barium distributions in water masses of the glacial oceans. *Paleoceanography*. **5**(5): p. 719-742, 1990.
6. Lea, D. W. and E. A. Boyle, A 210,000-year record of barium variability in the deep northwest Atlantic Ocean. *Nature*. **347**: p. 269-272, 1990.
7. Lea, D. W. and E. A. Boyle, Barium in planktonic foraminifera. *Geochim. Cosmochim. Acta*. **55**: p. 3321-3331, 1991.
8. Lea, D. W. and H. J. Spero, Experimental determination of barium uptake in shells of the planktonic foraminifera *Orbulina universa* at 22°C. *Geochim. Cosmochim. Acta*. **56**(7): p. 2673-2680, 1992.
9. *Shen, G. T., J. C. Cole, D. W. Lea, L. J. Linn, T. A. McConnaughey, and R. G. Fairbanks, Surface ocean variability at Galapagos from 1936 to 1982: Calibration of geochemical tracers in corals. *Paleoceanography*. **7**(5): p. 563-588, 1992.
10. Lea, D. W. and E. A. Boyle, Reply to the comment by N.E. Pingitore Jr. on "Barium in planktonic foraminifera". *Geochim. Cosmochim. Acta*. **57**(2): p. 471-473, 1993.
11. Lea, D. W. and E. A. Boyle, Determination of carbonate-bound barium in corals and foraminifera by isotope dilution plasma mass spectrometry. *Chem. Geol.* **103**(1/4): p. 73-84, 1993.
12. **Spero, H. J. and D. W. Lea, Intraspecific stable isotope variability in the planktonic foraminifera *Globigerinoides sacculifer*. Results from laboratory experiments. *Mar. Micropaleontol.* **22**: p. 221-234, 1993.
13. Lea, D. W., Constraints on the alkalinity and circulation of glacial Circumpolar Deep Water from benthic foraminiferal barium. *Global Biogeochem. Cycles*. **7**(3): p. 695-710, 1993.
14. Lea, D. W. and H. J. Spero, Assessing the reliability of paleochemical tracers: barium uptake in the shells of planktonic foraminifera. *Paleoceanography*. **9**(3): p. 445-452, 1994.
15. *Russell, A. D., S. Emerson, B. K. Nelson, J. Erez, and D. W. Lea, Uranium in foraminiferal calcite as a recorder of seawater uranium concentrations. *Geochim. Cosmochim. Acta*. **58**(2): p. 671-681, 1994.
16. Lea, D. W., A trace metal perspective on the evolution of Antarctic Circumpolar Deepwater chemistry. *Paleoceanography*. **10**(4): p. 733-747, 1995.
17. Lea, D. W., P. A. Martin, D. A. Chan, and H. J. Spero, Calcium uptake and calcification rate in the planktonic foraminifer *Orbulina universa*. *J. Foram. Res.* **25**(1): p. 14-23, 1995.
18. **McCorkle, D. C., P. A. Martin, D. W. Lea, and G. P. Klinkhammer, Evidence of a dissolution effect on benthic shell chemistry: $d^{13}C$, Cd/Ca, Ba/Ca, and Sr/Ca from the Ontong Java Plateau. *Paleoceanography*. **10**(4): p. 699-714, 1995.

19. Lea, D. W. and P. A. Martin, A rapid mass spectrometric method for the simultaneous analysis of barium, cadmium and strontium in foraminifera shells. *Geochim. Cosmochim. Acta.* **60**(16): p. 3143-3149, 1996.
20. **Sanyal, A., N. G. Hemming, W. S. Broecker, D. W. Lea, H. J. Spero, and G. N. Hanson, Oceanic pH control on the boron isotopic composition of foraminifera: Evidence from culture experiments. *Paleoceanography.* **11**(5): p. 513-517, 1996.
21. **Spero, H. J. and D. W. Lea, Experimental determination of stable isotopic variability in *Globigerina bulloides*: implications for paleoceanographic reconstructions. *Mar. Micropaleontol.* **28**: p. 231-246, 1996.
22. *Tudhope, A. W., D. W. Lea, G. B. Shimmield, C. P. Chilcott, and S. Head, Monsoon climate and Arabian Sea coastal upwelling recorded in massive corals from Southern Oman. *Palaeos.* **11**(4): p. 347-361, 1996.
23. Mashiotta, T. A., D. W. Lea, and H. J. Spero, Experimental determination of Cd uptake in shells of the planktonic foraminifera *Orbulina universa* and *Globigerina bulloides*: Implications for surface water paleoreconstructions. *Geochim. Cosmochim. Acta.* **61**(19): p. 4053-4065, 1997.
24. *****Spero, H. J., J. Bijma, D. W. Lea, and B. Bemis, Effect of seawater carbonate chemistry on planktonic foraminiferal carbon and oxygen isotope values. *Nature.* **390**: p. 497-500, 1997.
25. Tudhope, A. W., D. W. Lea, G. B. Shimmield, C. P. Chilcott, C. Scoffin, A. Fallick, and M. Jebb. Climatic records from massive Porites corals in Papua New Guinea; a comparison of skeletal Ba/Ca, skeletal $d^{18}O$ and coastal rainfall. in *Proc. 8th Int. Coral Reef Symposium*, Panama, vol. 2, p. 1719-1724, 1997.
26. Uhle, M. E., S. A. Macko, H. J. Spero, M. H. Engel, and D. W. Lea, Sources of carbon and nitrogen in modern planktonic foraminifera: the role of algal symbionts as determined by bulk and compound specific stable isotopic analyses. *Org. Geochem.* **27**(3-4): p. 103-113, 1997.
27. *****Bemis, B. E., H. J. Spero, J. Bijma, and D. W. Lea, Reevaluation of the oxygen isotopic composition of planktonic foraminifera: experimental results and revised paleotemperature equations. *Paleoceanography.* **13**(2): p. 150-160, 1998.
28. Martin, P. A. and D. W. Lea, Comparison of water mass changes derived from Cd/Ca and carbon isotope records: implications for changing Ba composition of Deep Atlantic Water Masses. *Paleoceanography.* **13**(6): p. 572-585, 1998.
29. Uhle, M. E., S. A. Macko, H. J. Spero, D. W. Lea, W. F. Ruddiman, and M. H. Engel, The fate of nitrogen in the *Orbulina universa* foraminifera-symbiont system determined by nitrogen isotope analyses of shell-bound organic matter. *Limnology and Oceanography.* **44**(8): p. 95-106, 1999.
30. Lea, D. W., J. Bijma, H. J. Spero, and D. Archer, Implications of a carbonate ion effect on shell carbon and oxygen isotopes for glacial ocean conditions, in *Use of Proxies in Paleoceanography: Examples from the South Atlantic*, G. Fischer and G. Wefer, Editors., Springer-Verlag: Berlin, Heidelberg. p. 513-522, 1999.
31. **Bijma, J., H. J. Spero, D. W. Lea, and B. E. Bemis, Reassessing foraminiferal stable isotope geochemistry: impact of the oceanic carbonate system (experimental results), in *Use of Proxies in Paleoceanography: Examples from the South Atlantic*, G. Fischer and G. Wefer, Editors., Springer-Verlag: Berlin, Heidelberg. p. 489-512, 1999.
32. Lea, D. W., Trace elements in foraminiferal calcite, in *Modern Foraminifera*, B. Sen Gupta, Editor., Kluwer: Dordrecht. p. 259-277, 1999.
33. ***Mashiotta, T. A., D. W. Lea, and H. J. Spero, Glacial-interglacial changes in Subantarctic sea surface temperature and $\delta^{18}O$ -water using foraminiferal Mg. *Earth Planet. Sci. Lett.* **170**(4): p. 417-432, 1999.

34. *****Lea, D. W., T. A. Mashiotta, and H. J. Spero, Controls on magnesium and strontium uptake in planktonic foraminifera determined by live culturing. *Geochim. Cosmochim. Acta.* **63**(16): p. 2369-2379, 1999.
35. Lea, D. W., Innovations in Monitoring Ocean History. An Introduction to Paleooceanographic Proxies, in *Reconstructing Ocean History: A Window into the Future*, F. Abrantes and A. Mix, Editors., Plenum: New York. p. 321-326, 1999.
36. Spero, H., J. Bijma, D. Lea, and A. Russell, Deconvolving glacial ocean carbonate chemistry from the planktonic foraminifera isotope record, in *Reconstructing Ocean History: A Window into the Future*, F. Abrantes and A. Mix, Editors., Plenum: New York. p. 329-342, 1999.
37. *****Swearer, S. E., J. E. Caselle, D. W. Lea, and R. R. Warner, Larval retention and recruitment in an island population of a coral-reef fish. *Nature.* **402**: p. 799-802, 1999.
38. Martin, P. A., D. W. Lea, T. A. Mashiotta, T. Papenfuss, and M. Sarnthein, Variation of foraminiferal Sr/Ca over Quaternary glacial-interglacial cycles: evidence for changes in mean ocean Sr/Ca? *Geochem. Geophys. Geosyst.* **1**, doi:10.1029/1999GC000006, 1999.
39. *****Archer D., A. Winguth, D. Lea, and N. Mahowald, What caused the glacial/interglacial atmospheric PCO₂ cycles? *Revs. Geophys.* **38**(2), 159-189, 2000.
40. Bemis, B. E., H. J. Spero, D. W. Lea, and J. Bijma, Temperature influence on the carbon isotopic composition of *Globigerina bulloides* and *Orbulina universa* (planktonic foraminifera). *Marine Micropaleontology.* **38**: p. 213-228, 2000.
41. *****Lea D. W., D. K. Pak, and H. J. Spero, Climate impact of late Quaternary equatorial Pacific sea surface temperature variations. *Science* **289**, 1719-1724, 2000.
42. *****Tudhope, A. W., C. P. Chilcott, M. T. McCulloch, E. Cook, R. Chappell, R. Ellam, D. W. Lea, J. M. Lough and G. B. Shimmield, Variability in El Niño Southern Oscillation through a glacial-interglacial cycle. *Science* **291**, 1511-1517, 2001.
43. Lea, D. W. Paleoclimate - Ice ages, the California Current and Devils Hole. *Science* **293**, 59-60, 2001.
44. Sanyal, A., J. Bijma, H. Spero and D. W. Lea, Empirical relationship between pH and the boron isotopic composition of *G. sacculifer*: Implications for boron isotopes paleo-pH proxy. *Paleoceanography* **16**(5), 515-519, 2001.
45. Goldstein, S. J., D. W. Lea, S. Chakraborty, M. Kashgarian and M. T. Murrell, Uranium-series and radiocarbon geochronology of deep-sea corals: Implications for Southern Ocean ventilation rates and the oceanic carbon cycle. *Earth Planet. Sci. Lett.* **193**, 167-182, 2001.
46. **Lea, D. W. D. K. Pak, P. A. Martin and H. J. Spero, Reconstructing a 350 ky history of sea level using planktonic Mg/Ca and oxygen isotope records from a Cocos Ridge core. *Quaternary Science Reviews* **21/1-3**, 283-293, 2002.
47. ****Dekens, P. S., D. W. Lea, D. K. Pak and H. J. Spero, Core top calibration of Mg/Ca in tropical foraminifera: Refining paleo-temperature estimation. *Geochem. Geophys. Geosyst.* **3**(4), 1022, doi:10.1029/2001GC000200, 2002.
48. **Spero, H. J. and D. W. Lea, The cause of carbon isotope minimum events on glacial terminations. *Science* **296**, 522-525, 2002.
49. **Martin, P.A., D. W. Lea, Y. Rosenthal, N. J. Shackleton, T. P. Papenfuss and M. Sarnthein, Quaternary deep sea temperature histories derived from benthic foraminiferal Mg/Ca. *Earth. Planet. Sci. Lett.* **198**(1-2), 193-209, 2002.
50. Lea, D. W. Paleoclimate (Enhanced): The Glacial Tropical Pacific--not just a West Side Story. *Science* **297**, 202-203, 2002.
51. *Martin, P. A. and D. W. Lea, A simple evaluation of cleaning procedures on fossil benthic foraminiferal Mg/Ca. *Geochem. Geophys. Geosyst.* **3**(10), 8401, doi:10.1029/2001GC000280, 2002.
52. Lea D. W. Book Review: El Niño in History: Storming through the Ages. César N. Caviedes. *Geoarchaeology* **17**(8), 877-879, 2002.

53. *Spero H. J., K. M. Mielke, E. M. Kalve, D. W. Lea and D. K. Pak, Multispecies approach to reconstructing eastern equatorial Pacific thermocline hydrography during the past 360 ky. *Paleoceanography* **18**(1), 1022, 2003.
54. *Swearer S. E., G. E. Forrester, M. A. Steele, A. J. Brooks and D. W. Lea, Spatio-temporal and interspecific variation in otolith trace-elemental fingerprints in a temperate estuarine fish assemblage. *Estuar. Coast Shelf Sci.* **56**(5-6), 1111-1123, 2003.
55. *Gussone N., A. Eisenhauer, A. Heuser, M. Dietzel, B. Bock, F. Böhm, H. J. Spero, D. W. Lea, J. Bijma, and T. F. Nägler, Model for kinetic effects on calcium isotope fractionation ($\delta^{44}\text{Ca}$) in inorganic aragonite and cultured planktonic foraminifera. *Geochim. Cosmochim. Acta* **67**(7), 1375-1382, 2003.
56. Lea D. W., D. K. Pak, and H. J. Spero, Sea surface temperatures in the western equatorial Pacific during marine isotope stage 11. In *Earth's Climate and Orbital Eccentricity: The Marine Isotope Stage 11 Question*, Vol. 137 (ed. A. Droxler, R. Poore, and L. Burckle). American Geophysical Union, 2003.
57. Zacherl D. C., P. H. Manríquez, G. Paradis, R. W. Day, J. C. Castilla, R. R. Warner, D. W. Lea, and S. D. Gaines, Trace elemental fingerprinting of gastropod statoliths to study larval dispersal trajectories. *Mar. Ecol. Prog. Ser.* **248**, 297-303, 2003.
58. ***Lea D. W., D. K. Pak, L. C. Peterson, and K. A. Hughen, Synchronicity of tropical and high-latitude Atlantic temperatures over the last glacial termination. *Science* **301**, 1361-1364, 2003.
59. Zacherl D. C., G. Paradis, and D. W. Lea, Barium and strontium uptake into larval protoconchs and statoliths of the marine neogastropod *Kelletia kelletii*. *Geochim. Cosmochim. Acta* **67**(21), 4091-4099, 2003.
60. Lea D. W., Elemental and Isotopic Proxies of Past Ocean Temperatures, pp. 365-390. In *The Oceans and Marine Geochemistry* (ed. H. Elderfield), Vol. 6 *Treatise on Geochemistry* (ed. H. D. Holland and K.K. Turekian), Elsevier-Pergamon, Oxford, 2003.
61. **Schmidt, M. W., H. J. Spero, and D. W. Lea, Links between salinity variation in the Caribbean and North Atlantic thermohaline circulation, *Nature*, **428**, 160-163, 2004.
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63. *Lea, D. W., The 100 000-Yr cycle in tropical SST, greenhouse forcing, and climate sensitivity, *J. Climate*, **17**, 2170-2179, 2004.
64. ****Shevenell, A. E., J. P. Kennett, and D. W. Lea, Middle Miocene Southern Ocean cooling and Antarctic cryosphere expansion, *Science*, **305**, 1766-1770, 2004.
65. ***Russell, A. D., B. Hönisch, H. J. Spero, and D. W. Lea, Effects of seawater carbonate ion concentration and temperature on shell U, Mg, and Sr in cultured planktonic foraminifera, *Geochim. Cosmochim. Acta*, **68** (21), 4347-4361, 2004.
66. Pak, D. K., D. W. Lea, and J. P. Kennett, Seasonal and interannual variation in Santa Barbara Basin water temperatures observed in sediment trap foraminiferal Mg/Ca, *Geochem. Geophys. Geosyst.*, **5** (12), Q12008, doi:10.1029/2004GC000760, 2004.
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