Maureen E. Raymo

G. UNGER VETLESEN PROFESSOR OF EARTH AND CLIMATE SCIENCE, DEPT. OF EARTH AND ENVIRONMENTAL SCIENCES, COLUMBIA UNIVERSITY

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Maureen "Mo" Raymo is a marine geologist and climate scientist who works at Columbia University's Lamont-Doherty Earth Observatory where she is the G. Unger Vetlesen Professor of Earth and Climate Sciences as well as the Director of LDEO, the first climate scientist to lead the Observatory. Prof. Raymo's research focuses on the history and causes of climate change in the past, including understanding the consequences of climate change for future sea level and ice sheet stability. Her research has been profiled in numerous publications including *The New York Times, The Washington Post, The Atlantic, The New Yorker, U.S. News and World Report, Discover Magazine* as well as featured on the History Channel, BBC World Service, BBC's *Planet Earth*, and PBS *Newshour*. Her Uplift-Weathering Hypothesis that addresses why climate changes on geologic timescales was the subject of both a PBS *Nova* and BBC *Horizon* documentary.

Prof. Raymo has spent months at sea and in the field, planning, leading and participating in numerous scientific expeditions. She has authored or co-authored over 100 peer-reviewed scientific articles, including 12 in *Science* or *Nature*. Her book, *Written In Stone - A Geological History of the Northeastern United States* has been continuously in print since 1989. Maureen has given hundreds of invited presentations about climate change to both scientific and public audiences.

Prof. Raymo is an elected fellow of the National Academy of Sciences, the American Association for the Advancement of Science, the American Geophysical Union, The Geological Society of America, The Geological Society of London, and The Explorers Club. In 2014 she became the first woman to be awarded the Wollaston Medal, The Geological Society of London's most prestigious medal previously award to Charles Lyell, Louis Agassiz and Charles Darwin. She was awarded the Maurice Ewing Medal by the AGU and U. S. Navy "for significant original contributions to the ocean sciences" and the European Geosciences Union, upon recognizing her accomplishments with the Milankovic Medal, wrote "Maureen E. Raymo's work has given names to critical, foundational ideas: the 'uplift-weathering hypothesis', the '41-thousand-year problem', 'Pliocene sea level paradox', and 'the Lisiecki-Raymo $\delta^{18}O$ Stack' are all central themes in palaeoceanography that appear in textbooks and have their roots in Raymo's research and intellectual contributions." Maureen's work, firmly based on observations and data, has shaped our understanding of Earth's natural climate variability and her many landmark papers have influenced a generation of climate scientists.

In addition to being one of the Co-Founding Deans of the Columbia Climate School, Prof. Raymo leads the Lamont-Doherty Earth Observatory where she manages more than 500 employees and an annual budget of $77 million. The Observatory supports the research and educational mission of nearly 100 Columbia University faculty, ~50 post-doctoral scholars, as well as ~100 graduate students enrolled in a doctoral program that is consistently ranked one of the top in the nation.

MAUREEN ELIZABETH RAYMO

Curriculum vitae

G. Unger Vetlesen Professor of Earth and Climate Science,
Director, Lamont-Doherty Earth Observatory
Co-Founding Dean, Columbia Climate School
Dept. Earth and Environmental Sciences, Lamont Doherty Earth Observatory
P.O. Box 1000, 61 Route 9W, Palisades, NY 10964

PERSONAL Born 1959, in Los Angeles, CA.
Two children, Citizenship: USA

EDUCATION

1989	Ph.D. Geology, Columbia University, New York, NY
1988	M. Phil. Geology, Columbia University, New York, NY
1985	M.A. Geology, Columbia University, New York, NY
1982	Sc.B. Geology, Brown University, Providence, RI

PROFESSIONAL POSITIONS

- Co-Founding Dean, Columbia Climate School, April 2021-present
- Director, Lamont-Doherty Earth Observatory, April 2021-present
- G. Unger Vetlesen Professor of Earth and Climate Science, Dept. of Earth and Environmental Sciences, July 1, 2020 - present
- Interim Director, Lamont-Doherty Earth Observatory, July 1, 2020 - 2021
- Bruce C. Heezen Lamont Research Professor, Lamont Doherty Earth Observatory, 2015-2020
- Founding Director, Lamont-Doherty Earth Observatory Hudson River Field Station, 2018-present
- Director, Lamont-Doherty Core Repository, Lamont-Doherty Earth Observatory, 2011-present
- Adjunct Professor, Dept. Earth and Environmental Sciences, Columbia University, 2015-2020
- Lamont Research Professor, Lamont-Doherty Earth Observatory, 2011-2015
- Research Professor, Dept. of Earth Sciences, Boston University, 2003-2011
- Research Associate Professor, Dept. of Earth Sciences, Boston University, 2000-2003
- Adjunct Scientist, Woods Hole Oceanographic Institute, 2001-2007
- Associate Professor, Dept. Earth, Atmospheric, and Planetary Sciences, MIT, 1997-2000
- Assistant Professor, Dept. Earth, Atmospheric, and Planetary Sciences, MIT, 1992-1997
- Assistant Professor, Dept. Geology and Geophysics, University of California, Berkeley, 1991-1992
- Adjunct Associate Research Scientist, Lamont-Doherty Geological Observatory, 1989-1994
- Associate Scientist, Geology Dept., University of Melbourne, Australia, 1989-1990

HONORS & DISTINCTIONS

Maurice Ewing Medal, American Geophysical Union and U.S. Navy, 2019 • Co-Chief Scientist, IODP Expedition 382 “Iceberg Alley”, International Ocean Discovery Program • Fellow, Geological Society of America, 2018 • One of 35 geologists in history profiled in book “Great Geologists” by M.D. Simmons, 2018 • Doctor of Science *Honoris Causa*, The University of Lancaster, Great Britain, 2017 • Fellow, The Explorers Club, 2017 • Elected, National Academy of Sciences, 2016 • Honorary Fellow, The Geological Society (of London), 2014 • Wollaston Medal of the Geological Society of London (first woman), 2014 • Milutin Milankovic Medal of the European Geosciences Union, 2014 • Fulbright-Nehru Fellowship, National Institute of Oceanography, India, 2011 • Fellow, American Geophysical Union, 2011 • Fellow, American Association Advancement of Science, 2007 • Emiliani Lecturer, American Geophysical Union, 2005 (first woman) • John Simon Guggenheim Fellow, 2003 • Robert L. and Bettie P. Cody Award in Ocean

Sciences, Scripps Institution of Oceanography (first woman), 2002 • *Discover* Magazine, 50 Most Important Women in Science, 2002 • Co-chief Scientist, Leg 162, R/V *Resolution*, Ocean Drilling Program • National Young Investigator Award, National Science Foundation, 1992 • Bausch and Lomb Science Award, 1978

INVITED LECTURES, PUBLIC PRESENTATIONS and KEYNOTE TALKS (last 5 years)

- Invited Speaker, Sea Legacy and Only One Retreat, Virgin Gorda, Dec. 3, 2021
- Public Lecture, Reid Hall, Columbia Global Center, Institute for Ideas and Imagination, Oct. 28th, 2021
- Sci Foo talk, Oct. 23rd, 2021
- The Climate Imperative: Meeting the Moment, Earth Day, April 21, 2021
- Invited talk, DE Shaw, March 23, 2021
- Invited talk, 2021 Regional Symposium of the Waterfront Alliance, January 11th, 2021
- Speaker and Panelist, 26-27 May, Climate Change Symposium, The Geological Society, London, 2021
- Northrup Distinguished Lecture, Univ. New Mexico, April 4th, 2021
- Moderator: "State of the Planet" Address by UN Secretary General Antonio Guterres, Columbia University, Dec. 2nd, 2020.
- Presentation, Science Philanthropy Alliance, Nov. 18th, 2020
- Public Talk, Chappaqua Library, Nov. 12, 2020
- Panel moderator and Host, various events @ Lamont Open House, November, 2020
- Panelist, EarthXWomen Resilience Forum, April 25, 2020.
- Earth Day Forum with Evelyn Farkas, Running for Congress in NY-17, April 22, 2020.
- Earth Day 50/50 Live Interview Event, Earth Institute, Columbia University, April 22nd, 2020.
- Public Climate Lecture, LDEO, Feb. 20th, 2020.
- Screening and Panel Discussant, NOVA "Polar Extremes" premier, Smithsonian National Museum of Natural History, Jan. 29th, 2020.
- Sci Café Lecture, American Museum of Natural History, Nov. 6th, 2019
- PBS Press Tour, Panel Discussant, Beverly Hills, July 30th, 2019
- Panel Discussant with Kim Stanley Robinson, CU Journalism School, Feb. 18, 2020
- H. H. Woodard Lecture, Beloit College, Feb. 7th, 2020
- Bolin Lecture (to ~600 high school students), University of Stockholm, Sweden, Nov. 19th, 2019
- Crafoord Academy Lecture (Public), Univ. of Lund, Sweden, Dec. 3rd, 2019
- Invited Speaker, American Geophysical Union, Dec. 2019
- Condon Lecture (Public), Oregon State U., Oct 30th, 2019
- Moore Lecture, Oregon State U., Oct. 31, 2019
- Invited Speaker, Broecker Symposium, LDEO, Columbia U., Oct. 25th, 2019
- Keynote Speaker, Pardee Symposium, *"Extreme Impacts of Global Climate Change: Effective Communication for Geoscientists, Educators, Policy Makers, and the Press"*, GSA, Sept. 24th, 2019
- Invited Speaker, *"Scientific Ocean Drilling's Impact on Geoscience: Past, Present, and Future"*, GSA, Sept. 25th, 2019
- UK-IODP Distinguished Lecture, 50th Anniversary of Scientific Ocean Drilling meeting, London, September 27-28th, 2018.
- Rockland Riverfront Communities Council, Oct. 4, 2018.
- The Nature Conservancy, Long Island Chapter, East Hampton, July 14th, 2018.
- Speaker, Taste of Science Festival, NYC, April 26, 2018.
- Lecture to the Bonefish Bonnies, Ocean Reef Club, Key Largo, March 14, 2018.
- Frontiers in climate research and Implications for investment, UBS Headquarters, NYC, Jan 31st, 2018
- Sea Secrets Lecture (Public), U. of Miami, April 3, 2018
- Invited Speaker, "Fifty Years of Scientific Ocean Drilling", AGU annual Meeting, Dec. 10, 2018.
- The Richard G. Osgood, Jr., Memorial Lectureship in Geology, Wooster College, April 11, 2018
- Invited Speaker, PALSEA international workshop, Cancun, Mexico, Nov. 6-9th, 2017.
- Earth-2-Class Lecture to 30 high school professionals, Nov. 18th, 2017.
- Salon lecture to young women professionals in NYC organized by P. Ashford, Oct. 25th, 2017.

• Invited Thought-Leader, North Pole Summit, Quark Expeditions, Russia-North Pole, July 20-Aug. 2, 2017
• Open House Lecture, LDEO, Oct. 7, 2017
• Adventure Science Podcast Interview, May 28, 2017
• Convocation Address, University of Lancaster, July 2017
• Invited Opening Session speaker, *International WCRP/IOC Conference on Regional Sea Level Changes and Coastal Impacts*, July 10-14, Columbia U., NY, 2017.
• Flint Lecturer, Yale University (first woman), November 2017, three lectures.
• Invited Speaker and panelist, Climate, CO_2 and Sea Level: Past is Prologue, in "*From Sea to Changing Sea: A Science Symposium about Oceans*, Radcliffe Institute for Advanced Study, Oct. 28, 2016.
• Invited Speaker, Sprigg Symposium, Australian Earth Science Convention, June 26th, 2016.
• Invited speaker and panelist, The Plate Tectonics Revolution at Lamont, 50 years of Discovery, May 24, 2016.
• Audience Q+A with Baba Brinkman and his show *Rap Guide to Climate Chaos*, Off-Broadway, 2016.

DEPARTMENTAL SEMINARS & COLLOQUIA: Central Connecticut State University, April 8th, 2021 • Cambridge University Geographical Society, Feb. 9th, 2021 • Bolin Days Lecture, Bolin Centre, Stockholm, Nov. 26th, 2020 • Boston College, Nov. 24th, 2020 • Lamont Summer Intern Lecture, June 9, 2020 • Physics Dept., Fordham University, Feb. 12th, 2020 • Stockholm University, Nov. 19th, 2019 • Lamont Summer Intern Lecture, June 4, 2019 • University of Miami, three seminars and colloquia, November 2018 • Wooster College, April 12, 2018 • Webinar, Chevron Fellows Program, June 28, 2017 • Lamont Summer Intern Lecture, June 8, 2017 • Dept. of Marine and Coastal Sciences, Rutgers, April 3, 2017 • Nicholas School of the Environment, Duke University, November 11, 2016 • Lamont Summer Intern Lecture, June 21, 2016 • Weeks Lecture, University of Wisconsin, Madison, March 11, 2016 • Scripps Institution of Oceanography, March 9, 2016

SCIENTIFIC PUBLICATIONS

H-index = 62 on Google Scholar with total citations >29,000 for 104 published peer-reviewed papers
Most cited publications: *** (n > 1000) = 5 papers, ** (n > 100) = 45 papers

TEN FAVORITE PAPERS OF LAST TEN YEARS
(student/post-doc coauthors in bold)

Li, S., M. E. Raymo, and S. L. Goldstein, 2021, Neogene continental denudation and the Beryllium conundrum, Proceedings of the National Academy of Sciences 118(42), DOI:10.1073/pnas.2026456118. *Shows how Neogene beryllium record is consistent with enhanced chemical weathering and the uplift-weathering hypothesis.*

Dyer, B., J. Austermann, W. J. D'Andrea, R. C. Creel, **M. R. Sandstrom**, M. Cashman, A. Rovere, and M. E. Raymo, 2021, Sea level trends across the Bahamas constrain peak Last Interglacial ice melt, *PNAS*, Vol. 118, https://doi.org/10.1073/pnas.2026839118. *Challenges accepted Eemian maximum sea level of 6-9m relative to today and proposes more modest sea level rise at that time.*

Sandstrom, M. R., M. J. O'Leary, M. Barham, Y. Cai, T. Rasbury, K. Wooton, and M. E. Raymo, 2020, Age constraints on surface deformation recorded by fossil shorelines at Cape Range National Park, Australia, *GSA Bulletin,* https://doi.org/10.1130/B35564.1. *Unravels the history of uplifted fossil coral terraces in Western Australia.*

Campbell, S. M., R. Moucha, L. A. Derry, and M.E. Raymo, 2018, Dynamic topography and the Cenozoic carbonate compensation depth, *G-cubed*, 19, DOI:10.1002/2017GC007386. *Demonstrates that CCD reconstructions need to take into account dynamic topography of sea floor through time.*

Rovere, A., E. Casella, **D. Harris, T. Lorscheid**, N. Nanadasena, **B. Dyer, M. Sandstrom**, P. Stocchi, W. D'Andrea, and M. Raymo, 2017, Giant boulders and Last Interglacial storm intensity in the North Atlantic. *PNAS,* v. 114, 12144-12149. ***Sea level rise or superstorms?—secrets of Cow and Bull.***

Eshel, G., A. Shepon, **S. Gilutz, D. Giddings**, M. Raymo, and R. Milo, 2017, How much "sustainable" beef can the U.S. produce? *Nature Ecology and Evolution,* v. 2, p. 81-85. ***This paper arose from a directed study I lead with MA students in the School of International and Public Affairs at Columbia University.***

Raymo, M.E., R. Kozdon, D. Evans, L. Lisiecki, and **H. Ford**, 2018, The accuracy of mid-Pliocene $\delta^{18}O$ based ice volume and sea level reconstructions*, Earth Science Reviews,* v. 177, p. 291-302. ***An unvarnished look at paleo reconstructions using oxygen isotopes.***

Shakun, **J. D.,** M. E. Raymo, and D. W. Lea, 2016, An early Pleistocene Mg/Ca-$\delta^{18}O$ record from the Gulf of Mexico: Evaluating ice sheet size and pacing in the 41-kyr world, *Paleoceanography,* v. 31, p. 1011-1027, DOI: 10.1002/2016PA002956. *Will someone please go re-core ODP Site 625? It is an amazing site.*

Ford, H., S. Sosdian, Y. Rosenthal, and M. E. Raymo, 2016, Gradual and abrupt changes during the Mid-Pleistocene Transition, *Quat. Sci. Revs*., v. 148, p. 222-233; doi:10.1016/j.quascirev.2016.07.005. *Insight into ocean dynamics and climate change across the MPT.*

Rovere, A., M.E. Raymo, J.X. Mitrovica, P.J. Hearty, M.J. O'Leary, and J.D. Inglis, 2014, The Mid-Pliocene sea-level conundrum: glacial isostasy, eustasy and dynamic topography, *EPSL*, v. 387, p. 27-33. *Observational constraints on the magnitude of dynamic topographic movements through time.*

EARLIER SIGNIFICANT PAPERS

** Abe-Ouchi, A., F. Saito, K. Kawamura, M. E. Raymo, J. Okuno, K. Takahashi, and H. Blatter, 2013, 100-kyr glacial cycles from ice sheet-climate system with hysteresis driven by insolation, *Nature*, v. 500, p. 190-193.

** Raymo, M. E. and J. X. Mitrovica, 2012, Collapse of polar ice sheets during the stage 11 interglacial, *Nature*, v. 483, p. 453-456, doi:10.1038/nature10891.

** Raymo, M. E., J. X. Mitrovica, M. J. O'Leary, R. M. DeConto, and P. J. Hearty, 2011, Departures from eustasy in Pliocene sea-level records, *Nature Geoscience*, v. 4, p. 328-332, doi:10.1038/NGEO1118. (see accompanying News and Views).

** Raymo, M. E., **L. Lisiecki**, and **K. Nisancioglu**, 2006, Plio-Pleistocene ice volume, Antarctic climate, and the global $\delta^{18}O$ record, *Science*, v. 313, p. 492, doi: 10.1126/science.1123296.

*** **Lisiecki, L.E.** and M.E. Raymo, 2005, A Plio-Pleistocene stack of 57 globally distributed benthic d180 records, *Paleoceanography*, 20, PA1003, doi:10.1029/2004PA001071. DATA

** Raymo, M.E., D.W. Oppo, B.P. Flower, D.A. Hodell, J. McManus, **K.A. Venz**, K.F. Kleiven, and K. McIntyre, 2004, Stability of North Atlantic water masses in face of pronounced climate variability during the Pleistocene, *Paleoceanography*, v. 19, PA2008, doi:10.1029/2003PA000921.

** Raymo, M.E. and **K.H. Nisancioglu, 2003**, The 41 Kyr world: Milankovitch's other unsolved mystery, *Paleoceanography*, v. 18, 10.1029/2002PA000791.

** Raymo, M.E., K. Ganley, **S. Carter**, D. W. Oppo, J. McManus, 1998, Millennial-scale climate instability during the early Pleistocene epoch. *Nature*, v. 392, p. 699-702.

** Raymo, M.E., D.W. Oppo, and W. Curry, 1997, The mid-Pleistocene climate transition: a deep sea carbon isotope perspective. *Paleoceanography*, v. 12, p. 546-559.

** Raymo, M.E., 1997, The timing of major climate terminations. *Paleoceanography*, v. 12, p. 577-585.

** Raymo, M.E., B. Grant, **M. Horowitz**, and G. H. Rau, 1996, Mid Pliocene warmth: stronger greenhouse and stronger conveyor. *Marine Micropaleontology*, v. 27, p. 313-326 (One of the top ten most highly cited papers in *Marine Micropaleontology* on the occasion of its 100th published volume).

** Raymo, M.E., 1994, The initiation of Northern Hemisphere glaciation. *Annual Reviews of Earth and Planetary Science*, v. 22, p. 353-383.

*** Raymo, M.E. and W.F. Ruddiman, 1992, Tectonic forcing of late Cenozoic climate. *Nature*, v. 359, p. 117-122.

** Raymo, M.E., W.F. Ruddiman, N.J. Shackleton, and D. Oppo, 1990, Evolution of Atlantic-Pacific $\delta^{13}C$ gradients over the last 2.5 m.y., *Earth and Planetary Science Letters*, v. 97, p. 353-368.

** Raymo, M.E., W.F. Ruddiman, and P.N. Froelich, 1988, Influence of late Cenozoic mountain building on ocean geochemical cycles. *Geology*, v. 16, p. 649-653.

BOOKS & EDITED VOLUMES

Raymo, C. and M. E. Raymo, 1989, *Written In Stone - a Geological History of the Northeastern United States.* The Globe Pequot Press, Chester, CT, 163 pp (a geology book for non-specialists*",* coauthored with my father Chet Raymo and currently released in a revised 3rd edition by Black Dome Press, has been continuously in print since 1989. WIS is used in high school and college curriculums across the Northeast and was recently on the Bates College summer reading list.) "Compresses billions of years into a slim, lively narrative" *Yankee Magazine*; "Hard to put down….truly an adventure" *Bookpage (New England Edition)*

Jansen, E., M.E. Raymo, and P. Blum, editors, 1996, *Proceedings of the Ocean Drilling Program, Initial Reports, Vol. 162*: College Station, TX (Ocean Drilling Program), 1182 pp.

Raymo, M. E., E. Jansen, P. Blum, and T. Herbert, editors, 1999, *Proceedings of the Ocean Drilling Program, Scientific Results, Vol. 162*: College Station, TX (Ocean Drilling Program).

Weber, M.E., Raymo, M.E., Peck, V.L., and Williams, T., 2018. *Expedition 382 Scientific Prospectus: Iceberg Alley and South Falkland Slope Ice and Ocean Dynamics.* International Ocean Discovery Program. https://doi.org/10.14379/iodp.sp.382.2018

Weber, M.E., Raymo, M.E., Peck, V.L., and Williams, T., 2019. *Expedition 382 Preliminary Report: Iceberg Alley and Subantarctic Ice and Ocean Dynamics*. International Ocean Discovery Program. https://doi.org/10.14379/iodp.pr.382.2019

Weber, M.E., Raymo, M.E., Peck, V.L., Williams, T., and the Expedition 382 Scientists, 2021, Iceberg Alley and Subantarc1c Ice and Ocean Dynamics. Proceedings of the International Ocean Discovery Program, 382: College Station, TX (International Ocean Discovery Program), https://doi.org/ 10.14379/ iodp.proc.382.2021