

Curriculum Vitae for
Ken Caldeira

PRESENT POSITION

Senior Scientist
Department of Global Ecology
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Department of Earth System Science
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EDUCATION

Ph.D.,1991, New York University, Atmospheric Sciences, Department of Applied Science M.S.,1988, New York University, Atmospheric Sciences, Department of Applied Science B.A.,1978, Rutgers College, Philosophy

PRIOR RESEARCH EXPERIENCE

Physicist/Environmental Scientist (Lawrence Livermore National Laboratory, 1995 to 2005) Research ocean carbon cycle, atmospheric CO₂, ocean/sea-ice physics, climate, and energy systems
Post-Doctoral Researcher (Lawrence Livermore National Laboratory; 1993 to 1995) Research the ocean carbon cycle, atmospheric CO₂ and climate
NSF Earth Sciences Postdoctoral Fellow (Earth Systems Science Center & Dept. of Geosciences, The Pennsylvania State University; 1991 to 1993) Role of the carbonate-silicate cycle in long-term atmospheric CO₂ content and climate

GENERAL RESEARCH INTERESTS

Ocean acidification; climate/carbon-cycle interactions; numerical simulation of climate and biogeochemistry; marine biogeochemical cycles; global carbon cycle; long-term evolution of climate and geochemical cycles; intentional intervention in the climate system; energy technology and policy

ADVISORY PANELS / DISSERTATION COMMITTEES / ETC

National Academy of Sciences, Geoengineering Climate Panel Member (2014)
IPCC AR5 Report Climate Change 2013: The Physical Science Basis, Contributing Author (2013)
Fellow of the American Geophysical Union (2010)
National Academy of Sciences, America's Climate Choices Panel Member (2009)
UK Royal Society Geoengineering Report Panel Member (2009)
Global Carbon Project, Scientific Steering Committee Member (2009-2013)
European Project on Ocean Acidification (EPOCA), Advisory Board Member (2008-2012)
Intergovernmental Oceanographic Commission, Rep. at International Maritime Union Negotiations (2008, 2009)
UK Royal Society Ocean Acidification Report Panel Member (2007)
IPCC Special Report on CO₂ Capture and Storage, Oceans Chapter, Coordinating Lead Author (2005)
US Delegation to climate-related negotiations leading up to G8 Summit, Technical Support (2005)
UNESCO International Oceanography Commission CO₂ Panel of Experts (2002-2004)
US Global Carbon Cycle Scientific Steering Group (2001-2004)
Dissertation Committees of students at Stanford, MIT, and University of Illinois

PRINCIPAL PUBLICATIONS

Shearer, C., M. West, K. Caldeira, and S. J. Davis (2016) *Quantifying expert consensus against the existence of a secret, large-scale atmospheric spraying program*. **Environmental Research Letters**, **11**, 084011, doi:10.1088/1748-9326/11/8/084011

Devaraju, N., G. Bala, K. Caldeira, and R. Nemani (2016) *A model based investigation of the relative importance of CO₂-fertilization, climate warming, nitrogen deposition and land use change on the global terrestrial carbon uptake in the historical period*. **Climate Dynamics**, **47**, 173–190, doi:10.1007/s00382-015-2830-8

- Modak, A., G. Bala, L. Cao, and K. Caldeira (2016) *Why must a solar forcing be larger than a CO₂ forcing to cause the same global mean surface temperature change?* **Environmental Research Letters**, **11**, 044013, doi:10.1088/1748-9326/11/4/044013
- Kwiatkowski, L., B. Gaylord, T. Hill, J. Hoffelt, K. J. Kroeker, Y. Nebuchina, A. Ninokawa, A. Russell, E. B. Rivest, M. Sesboué & K. Caldeira (2016) *Nighttime dissolution in a temperate coastal ocean ecosystem increases under acidification.* **Scientific Reports**, **6**, 22984, doi:10.1038/srep22984
- Cao, L., L. Duan, G. Bala, and K. Caldeira (2016) *Simulated long-term climate response to idealized solar geoengineering: Effect of Long-term solar Geoengineering.* **Geophysical Research Letters**, doi:10.1002/2016GL068079
- Albright, R., L. Caldeira, J. Hoffelt, L. Kwiatkowski, J. Maclaren, B. Mason, Y. Nebuchina, A. Ninokawa, J. Pongratz, K. Ricke, T. Rivlin, K. Schneider, M. Sesboué, K. Shamberger, J. Silverman, K. Wolfe, K. Zhu, & K. Caldeira, 2016: *Reversal of ocean acidification enhances net coral reef calcification.* **Nature**, **531**, 362–365, doi:10.1038/nature17155
- Ricke, K. L., J. B. Moreno-Cruz, J. Schewe, A. Levermann, and K. Caldeira (2015) *Policy thresholds in mitigation.* **Nature Geoscience**, **9**, 5–6, doi:10.1038/ngeo2607
- Zhang, X., N. P. Myhrvold, Z. Hausfather, and K. Caldeira (2016) *Climate benefits of natural gas as a bridge fuel and potential delay of near-zero energy systems.* **Applied Energy**, **167**, 317–322, doi:10.1016/j.apenergy.2015.10.016
- Winkelmann, R., A. Levermann, A. Ridgwell, and K. Caldeira (2015) *Combustion of available fossil fuel resources sufficient to eliminate the Antarctic Ice Sheet.* **Science Advances**, Vol. 1, no. 8, e1500589 doi: 10.1126/sciadv.1500589
- Petri, Y., and K. Caldeira (2015) *Impacts of global warming on residential heating and cooling degree-days in the United States.* **Scientific Reports**, **5**, doi:10.1038/srep12427
- Mathesius, S., M. Hofmann, K. Caldeira, and H. J. Schellnhuber (2015) *Long-term response of oceans to CO₂ removal from the atmosphere.* **Nature Climate Change**, doi:10.1038/nclimate2729
- Albright, R., J. Benthuisen, N. Cantin, K. Caldeira, and K. Anthony (2015) *Coral reef metabolism and carbon chemistry dynamics of a coral reef flat.* **Geophysical Research Letters**, doi:10.1002/2015GL063488
- Cvijanovic, I., K. Caldeira, and D. G. MacMartin (2015) *Impacts of ocean albedo alteration on Arctic sea ice restoration and Northern Hemisphere climate.* **Environmental Research Letters**, **10**, 044020, doi:10.1088/1748-9326/10/4/044020
- Cvijanovic, I., and K. Caldeira (2015) *Atmospheric impacts of sea ice decline in CO₂ induced global warming.* **Climate Dynamics**, 1–14, doi:10.1007/s00382-015-2489-1
- Kline, D. I., and Coauthors (2015) *Six Month In Situ High-Resolution Carbonate Chemistry and Temperature Study on a Coral Reef Flat Reveals Asynchronous pH and Temperature Anomalies.* **PLOS ONE**, **10**, e0127648, doi:10.1371/journal.pone.0127648
- Kwiatkowski, L., K. L. Ricke, and K. Caldeira (2015) *Atmospheric consequences of disruption of the ocean thermocline.* **Environmental Research Letters**, **10**, 034016, doi:10.1088/1748-9326/10/3/034016
- Zhang, X., and K. Caldeira (2015) *Time scales and ratios of climate forcing due to thermal versus carbon dioxide emissions from fossil fuels.* **Geophysical Research Letters**, 2015GL063514, doi:10.1002/2015GL063514
- Ricke, K., and K. Caldeira (2014) *Maximum warming occurs about one decade after a carbon dioxide emission.* **Environmental Research Letters**, **9**, 124002. doi:10.1088/1748-9326/9/12/124002
- Zhang, X., N.P. Myhrvold, and K. Caldeira (2014) *Key factors for assessing climate benefits of natural gas versus coal electricity generation.* **Environmental Research Letters**, **9**, 114022. doi:10.1088/1748-9326/9/11/114022
- MacMartin, D. G., K. Caldeira, and D. W. Keith (2014) *Solar geoengineering to limit the rate of temperature change.* **Philosophical Transactions of the Royal Society A**, **372**, 20140134. doi:10.1098/rsta.2014.0134
- Caro, D., A. LoPresti, S. J. Davis, S. Bastianoni, and K. Caldeira (2014) *CH₄ and N₂O emissions embodied in international trade of meat.* **Environmental Research Letters**, **9**, 114005. doi:10.1088/1748-9326/9/11/114005
- Caldeira, K., and I. Cvijanovic (2014) *Estimating the Contribution of Sea Ice Response to Climate Sensitivity in a Climate Model.* **Journal of Climate**, **27**, 8597–8607. doi:10.1175/JCLI-D-14-00042.1
- Caro, D., S. J. Davis, S. Bastianoni, and K. Caldeira (2014) *Global and regional trends in greenhouse gas emissions from livestock.* **Climatic Change**, **126**, 203–216. doi:10.1007/s10584-014-1197-x
- Davis, S. J., J. A. Burney, J. Pongratz, and K. Caldeira (2014) *Methods for attributing land-use emissions to products.* **Carbon Management**, **5**, 233–245. doi:10.1080/17583004.2014.913867
- Intergovernmental Panel on Climate Change (2014) *Clouds and Aerosols in Climate Change 2013 - The Physical Science Basis*, Cambridge University Press, Cambridge, 571–658. doi: CBO9781107415324A024
- Intergovernmental Panel on Climate Change (2014) *Carbon and Other Biogeochemical Cycles in Climate Change 2013 - The Physical Science Basis*, Cambridge University Press, Cambridge, 465–570. doi: CBO9781107415324A023

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- Ricke, K. L., and K. Caldeira (2014) *Natural climate variability and future climate policy*. **Nature Climate Change**, 4, 333–338. doi:10.1038/nclimate2186
- Silverman, J., and Coauthors (2014) *Community calcification in Lizard Island, Great Barrier Reef: A 33 year perspective*. **Geochimica et Cosmochimica Acta**. doi:10.1016/j.gca.2014.09.011
- Bala, G., N Devaraju, RK Chaturvedi, K Caldeira, R Nemani (2013) *Nitrogen deposition: how important is it for global terrestrial carbon uptake?* **Biogeosciences Discussions**, 10, 11077-11109. doi: 10.5194/bgd-10-11077-2013
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- Ricke, K.L., JB Moreno-Cruz, K Caldeira (2013) *Strategic incentives for climate geoengineering coalitions to exclude broad participation*. **Environmental Research Letters**, 8, 014021. doi: 10.1088/1748-9326/8/1/014021
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- Cao, L., G Bala, K Caldeira (2011) *Why is there a short-term increase in global precipitation in response to diminished CO₂ forcing?* **Geophysical Research Letters**, 38.
- Davis, S.J., GP Peters, K Caldeira (2011) *The supply chain of CO₂ emissions*. **Proceedings of the National Academy of Sciences**, 108, 18554-18559. doi: 10.1073/pnas.1107409108108.
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