Klaus Keller

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EDUCATION

Princeton University: Ph.D. in Civil and Environmental Engineering, 2000.

Princeton University: M.A. in Civil Engineering and Operations Research, 1998.

Technische Universität Berlin: Engineer's Degree in Environmental Engineering, 1995.

Massachusetts Institute of Technology: M.S. in Civil and Environmental Engineering, 1994.

Technische Universität Berlin: B.S. (Vordiplom) in Environmental Engineering, 1991.

PROFESSIONAL EXPERIENCE

Penn State University, Associate Professor of Geosciences, July 2008 – present.

Penn State University, Assistant Professor of Geosciences, January 2002 – June 2008.

Princeton University, research scientist, July 2001 – December 2001.

Princeton University, lecturer, spring term, 2001.

Princeton University, postdoctoral research associate, July 2000 – July 2001.

Gesellschaft für Umwelttechnik, Berlin, engineer, 1995.

HONORS

Nominated by the Intergovernmental Panel on Climate Change (IPCC) as a contributing author to the Fourth Assessment Report (chapter on "Assessing Key Vulnerabilities and the Risk from Climate Change"). The IPCC shared the 2007 Nobel Peace Prize.

Invited talks at the U.S. National Research Council "Forum on Developing an Abrupt Climate Change Early Warning System" and "Workshop on Economic and Ecological Impacts of Abrupt Climate Change".

Panelist at the National Oceanic and Atmospheric Administration Climate Observation Program Annual System Review.

Invited talks at workshops at the National Science Foundation, the Energy Modeling Forum, the Environmental Protection Agency, the American Association for the Advancement of Science and the National Oceanic and Atmospheric Administration.

I.N.S. national interest waiver ("advanced degree professional or alien of exceptional ability whose immigration is in the national interest").

Princeton Environmental Institute student and postdoctoral fellow.

German National Science Foundation undergraduate and graduate student fellow (approximately top 1 % of German students).

TU Berlin-M.I.T. exchange-program fellow.

SELECTED PUBLICATIONS

1. Dorin, J., B. Tuttle, and K. Keller: Detecting ENSO period changes in a proxy record spanning the last millennium. *Journal of Climate*, in revision (2008).
2. Miltich, L. I., D. M. Ricciuto, and K. Keller: A probabilistic assessment of historic land use CO_2 emissions based on atmospheric, oceanic, and ice-core observations. *Environmental Research Letters*, in revision (2008).
3. Keller, K., L. Miltich, A. Robinson, and R. S. J. Tol: How overconfident are current projections of carbon dioxide emissions? *Energy Journal*, 37 pages, in revision (2008).
4. Budescu, D. V., R. Lempert, S. Broomell, and K. Keller: Aided and unaided decision making with imprecise probabilities. *Risk Analysis*, 48 pages, in revision (2008).

5. Ricciuto, D. M., K. J. Davis, and K. Keller. A Bayesian synthesis inversion of carbon cycle observations: How do observations reduce uncertainties about future sinks? *Global Biogeochemical Cycles*, 22, GB2030, doi:10.1029/2006GB002908, (2008).
6. Keller, K., D. McInerney, and D. F. Bradford: Carbon dioxide sequestration: When and how much? *Climate Change*, 88:267–291, doi:10.1007/s10584-008-9417-x (2008).
7. Baehr, J., D. McInerney, K. Keller, and J. Marotzke: Optimization of an observing system design for the North Atlantic meridional overturning circulation, *Journal of Atmospheric and Oceanic Technology*, 25, 625-634 (2008).
8. Brennan, K., R. Matear, and K. Keller: Measuring oxygen concentrations improves the detection capabilities of an ocean circulation observation array, *Journal of Geophysical Research – Oceans*, 113, C02019, doi:10.1029/2007JC004113, (2008).
9. Keller, K. and D. McInerney, The dynamics of learning about a climate threshold. *Climate Dynamics*, 30, 321-332 (2008).
10. Keller, K., A. Robinson, M. Oppenheimer, and D.F. Bradford: The regrets of procrastination in climate policy. *Environmental Research Letters*, 2 024004 (4pp) http://dx.doi.org/10.1088/1748-9326/2/2/024004 (This paper is part of the "Best of 2007" selection.) (2007).
11. Keller, K., C. Deutsch, M. G. Hall, and D. F. Bradford: Early detection of changes in the North Atlantic meridional overturning circulation: Implications for the design of ocean observation systems. *Journal of Climate*, 20, 145-157 (2007).
12. Baehr, J., K. Keller, and J. Marotzke: Detecting potential changes in the meridional overturning circulation at 26 ^{o}N in the Atlantic. *Climatic Change*, published online, http://dx.doi.org/10.1007/s10584-006-9153-z (2007).
13. McInerney, D. and K. Keller: Economically optimal risk reduction strategies in the face of uncertain climate thresholds. *Climatic Change*, published online, http://dx.doi.org/10.1007/s10584-006-9137-z (2007).
14. Keller, K., G. Yohe, and M. Schlesinger: Managing the risks of climate thresholds: Uncertainties and needed information. *Climatic Change*, published online, http://dx.doi.org/10.1007/s10584-006-9114-6 (2007).
15. Patwardhan, A., S. Semenov, S. Schneider, I. Burton, C. Magadza, M. Oppenheimer, B. Pittock, A. Rahman, J. Smith, A. Suarez, F. Yamin, K. Keller, A Todorov, A. Finkel, D. MacMynowski, M. Mastrandrea, M. Fuessel, J. Corfee-Morlot, R. Sukumar, J.-P. van Ypersele, and J. Zillman: Assessing key vulnerabilities and the risk from climate change, Chapter 19 in the *Intergovernmental Panel on Climate Change Fourth Assessment Report, Working group II: Impacts, Adaptation and Vulnerability*, Cambridge University Press (2007).
16. Keller, K., S.-R. Kim, J. Baehr, D. F. Bradford, and M. Oppenheimer: What is the economic value of information about climate thresholds? Book chapter in: *Integrated Assessment of Human Induced Climate Change*, Chief Editor: Michael Schlesinger, Cambridge University Press, (2007).
17. O'Neill, B. C., P. Crutzen, A. Grübler, M. Ha Duong, K. Keller, C. Kolstad, J. Koomey, A. Lange, M. Obersteiner, M. Oppenheimer, W. Pepper, W. Sanderson, M. Schlesinger, N. Treich, A. Ulph, M. Webster, and C. Wilson: Learning and climate change. *Climate Policy*, 6, 585-589 (2006).
18. Min, D.-H. and K. Keller: Errors in estimated temporal tracer trends due to changes in the historical observation network: A case study of oxygen trends in the Southern Ocean. *Ocean and Polar Research*, 27, 189-195 (2005).
19. Keller, K., M. G. Hall, S.-R. Kim, D. F. Bradford, and M. Oppenheimer: Avoiding dangerous anthropogenic interference with the climate system. *Climatic Change*, 73, 227-238 (2005).
20. Keller, K., B. M. Bolker, and D. F. Bradford: Uncertain climate thresholds and economic optimal growth. *Journal of Environmental Economics and Management*, 48, 723-741 (2004).
21. Moles, C. M., J. R. Banga, and K. Keller: Solving nonconvex climate control problems: Pitfalls and algorithm approaches. *Applied Soft Computing*, 5 (1), 35-44 (2004).

22. Kraepiel, M. L., K. Keller, H. B. Chin, E. G. Malcolm, and F. M. M. Morel, Sources and variations of mercury in tuna, *Environmental Science and Technology*, 37, 5551-5558 (2003).
23. Keller, K., R. Slater, M. Bender, and R. M. Key: Decadal scale trends in North Pacific nutrient and oxygen concentrations: Biological or physical explanation? *Deep-Sea Research*, 49, 345-362 (2002).
24. Gruber, N., K. Keller, and R. M. Key: What story is told by oceanic tracer concentrations? *Science*, 290, 455 (2000).
25. Keller, K., K. Tan, F. M. M. Morel, and D. F. Bradford: Preserving the ocean circulation: Implications for climate policy. *Climatic Change*, 47,17-43 (2000).
26. Keller, K. and F. M. M. Morel: A model of carbon isotopic fractionation and active carbon uptake in phytoplankton. *Marine Ecology Progress Series*, 182, 295-298 (1999).
27. Kraepiel, M., K. Keller, and F. M. M. Morel: A model for metal adsorption on Montmorillonite. *Journal of Colloid and Interface Science*, 210, 43-54 (1999).
28. Kraepiel, M., K. Keller, and F. M. M. Morel: On the acid-base chemistry of permanently charged minerals. *Environmental Science and Technology*, 32, 2829-2838 (1998).
29. Gessler, G. and K. Keller: Vergleich verschiedener Verfahren zur Vergärung von Bioabfällen, Abfallwirtschaftsjournal, (7) 377-383 (1995).

EXTERNAL FUNDING

Lead or Co-Principal Investigator on grants (*e.g.*, from NSF, DOE, NOAA, EPA, and NASA) with a total research budget exceeding 5.8 million U.S.$.

SYNERGISTIC ACTIVITIES

Director of the Climate Risk Management Initiative in the Penn State Earth and Environmental Systems Institute.

Member of the Editorial Board of Environmental Research Letters.

Co-organizer and session chair on “Detection of early warning signs and probabilistic predictions” at the Aspen Global Change Institute Workshop on Abrupt Climate Change: Mechanisms, Early Warning Signs, Impacts, and Economic Analyses (July, 2005) as well as an U.S. Environmental Protection Agency Workshop on “Uncertainty and Learning in IAMs of Climate Change - The State-of-the-Art and Research Needs”, Washington, D.C., May 4-5, 2006.

Teaching and curriculum development for "The global carbon cycle", “Data analysis in the Earth sciences” and “Climate change”.

Member of the Energy and Climate Change Committee of the Pennsylvania Consortium for Interdisciplinary Environmental Policy.

NON-PSU COLLABORATORS IN THE PAST 48 MONTHS (EXCLUDING WORKSHOP AND IPCC REPORTS)

M. Bender, J. Baehr, C. Brennan, D. Budescu, D. F. Bradford, C. Deutsch, J. Dorin,. M. G. Hall, S.-R. Kim, D. McInerney, R. Lempert, J. Marotzke, L. Miltich, F. M. M. Morel, M. Oppenheimer, D. Ricciuto, M. Schlesinger, R. Tol, and G. Yohe.

GRADUATE AND POSTGRADUATE ADVISOR

F. M. M. Morel, graduate advisor, Blake Professor of Geosciences, Princeton University.

D. F. Bradford, postgraduate advisor, Professor of Economics and Public Affairs, Princeton University (deceased).

POSTDOCTORAL ASSOCIATES OF THE PAST FIVE YEARS

D-H. Min, D. McInerney, M. Goes, and N. Urban

GRADUATE STUDENTS OF THE PAST FIVE YEARS

C. Brennan (M.S., 2006), L. Miltich (M.S., 2007), J Dorin (M.S., 2008, now Ph.D. student), D. Serino (M.Ed. 2008), and Roman Tonkonojenkov (M.S./Ph.D., ongoing).