

Research Interests

I am an earth system scientist who works through scientific research and discovery to provide a clearer understanding of how nearly 50 years of deforestation in the rainforest and savanna biomes of South America alter climate and affect the environment. I use a diverse set of tools including field research campaigns, remotely sensed data, and numerical modeling tools to understand these changes and to search for mitigation and avoidance options.

Education

- Ph.D. *Atmospheric and Oceanic Sciences*, University of Wisconsin-Madison, 1997; Advisor, John Kutzbach
- M.S. *Atmospheric and Oceanic Sciences*, University of Wisconsin-Madison, 1992; Advisor, John Kutzbach
- B.A. *Geology*, Miami University, Oxford, OH, 1985
- NASA Earth Science Summer School: *Processes of Global Change*; Jet Propulsion Laboratory, Pasadena, CA; July 1995
- Field Study: *Geology of the Wind River Range*, Dubois, WY; July-August 1984

Professional Experience

- Woods Hole Research Center, Falmouth, MA, Senior Scientist; 2011-present, Associate Scientist; 2005-2011
- Center for Sustainability and the Global Environment-Institute for Environmental Studies, University of Wisconsin-Madison, Associate Scientist, 2003-2004, Assistant Scientist, 1999-2003
- Climate, People, and Environment Program-Institute for Environmental Studies, University of Wisconsin-Madison, Postdoctoral Fellow; 1997-1999; Advisor, Jonathan Foley

Additional Appointments

- Visiting Scientist, Max-Planck Institute for Biogeochemistry, Jena, Germany; 2000
- Visiting Scientist, Dynamic Palaeoclimatology Unit, Lund University, Sweden; 1997
- Graduate Research Assistant, Center for Climatic Research-Institute for Environmental Studies, University of Wisconsin-Madison; 1990-1997
- Affiliate, Department of Ecology, Evolution, and Environmental Biology, Columbia University, New York; 2012-present
- Affiliate, The Gund Institute for Ecological Economics, University of Vermont, Burlington VT; 2013-present

Teaching Experience

- Instructor, Feedbacks between water, energy, and land cover change — Topics in remote sensing of the environment, Graduate seminar, Federal University of Goiás, Goiânia, Brazil; March-June 2014
- Instructor, Numerical modeling of continental scale surface hydrology, Short course, São Paulo Summer School on Global Climate Modeling, Brazilian National Space Agency, Ubatuba, Brazil; October 10-13 2012
- Adjunct Instructor, Madison Area Technical College, Madison, WI, 1998-1999
- Teaching Assistant, Global change: Atmospheric issues and problems, University of Wisconsin-Madison; 1991-96

Professional Activities

- Awarded J William Fulbright Brazil Scientific Mobility Program Distinguished Chair Scholarship, 2014
- Awarded Brazilian National Science Foundation, Sciences without Borders, Special Visiting Scientist Scholarship, 2015-2017
- Editor, *Journal of Climate*
- Member of Science Advisory Committee, Tanguro Ranch Research Program, 2014-present
- Host Brazilian students and post-doctoral fellows at Woods Hole Research Center as part of educational program; 2 currently, 12 since 2009
- Serve on PhD and master's committees of students at Columbia University, University of British Columbia, Federal University of Minas Gerais
- Mentor Master's and Doctoral level students and post-doctoral fellows at The University of Wisconsin-Madison, Columbia University, The University of Minnesota, Duke University, Boston University, The University of British Columbia, The Federal University of Viçosa, Brazil, The Federal University of Minas Gerais, Brazil, The Federal University of Brasilia, Brazil, and The University of Florida
- Member of the American Geophysical Union and American Meteorological Society
- Member of Science Advisory board of The Nature Conservancy Upper Mississippi River group (2003-2004)
- Elected member of Sigma Xi Scientific Research Society, 1997

Publications

2016

Brando, P.M., C. Oliveria-Santos, W. Rocha, R. Cury, and M. Coe, 2016: Effects of experimental fuel additions on fire intensity and severity: unexpected carbon resilience of a neotropical forest, *Glob. Change Bio.*, doi: 10.1111/gcb.13172.

Castanho, A.D.A, D. Galbraith, K. Zhang, M.T. Coe, M.H Costa, and P. Moorcroft, 2016: Changing Amazon biomass and the role of atmospheric CO₂ concentration, climate, and land use, *Glob. Biogeochem. Cycles*, doi: 10.1002/2015GB005135.

Arantes, A.E., L.G. Ferreira, and M.T. Coe, The seasonal carbon and water balances of the Cerrado environment of Brazil: Past, present, and future influences of land cover and land use, *J. Photogram. Remote Sens.*, *accepted*.

Coe, M.T., M.N. Macedo, P.M. Brando, P. Lefebvre, P. Panday, and D Silvério, Hydrology and energy balance of the Amazon, L. Nagy, B. Forsberg, and P. Artaxo (eds.), *The Large-scale Biosphere-Atmosphere Programme in Amazonia*, Springer, Ecological Studies, *accepted*.

Lathuillière, M.J., M.T. Coe and M.S. Johnson, What could irrigated agriculture mean for Amazonia? A review of green and blue water resources and their trade-offs for future agricultural production in the Amazon Basin, *Hydrol. Earth Sys. Sciences*, *in review*.

Neill, C., S.E. Spitzer, M.N. Macedo, and S.H. Riskin, A.V. Krusche, D. Nunes Costa, and M.T. Coe, Land use and impoundment effects on temperature and water chemistry of lowland Amazonian headwater streams, *Biotropica*, *in prep*.

O'Connell, C., P. Brando, C.E. Cerri, M.T. Coe, E. Davidson, G. Galford, M.N. Macedo, C. Neill, and R. Venterea, N₂O emissions in southeastern Amazonia: The effect of agricultural intensification, *in prep.*

Soares-Filho, B.S., R. Rajão, F. Merry, H. Rodrigues, J. Leroy, L. Lima, M. Macedo, M.T. Coe, A. Carneiro, and L. Santiago, Brazil's forest certificates open the door to payments for ecosystem services, *PLOS ONE*, *accepted*.

Spera, S. G.L. Galford, M.T. Coe, M.N. Macedo, and J.F. Mustard, Land-Use Change Affects Water Recycling in Brazil's Last Agricultural Frontier, *Glob. Change Bio.*, *accepted*.

2015

Balch, J.K., P.M. Brando, D.C. Nepstad, M.T. Coe, D. Silvério, T.J. Massad, E.A. Davidson, P.A. Lefebvre, C. Oliveira-Santos, W. Rocha, R.T.S. Cury, A. Parsons, and K. Carvalho, 2015: The susceptibility of southeastern Amazon forests to fire: Insights from a large-scale burning experiment, *Bioscience*, doi: 10.1093/biosci/biv106.

Diás, L.C.P., M.N. Macedo, M.H. Costa, M.T. Coe, and C. Neill, 2015: Effects of land cover change on evapotranspiration and streamflow of small catchments in the Upper Xingu River Basin, Central Brazil, *J Hydrol., Regional Studies*, 4B, 108–122, doi:10.1016/j.ejrh.2015.05.010.

Panday, P., M.T. Coe, M.N. Macedo, D.V. Silvério, and P.M. Brando, 2015: Deforestation offsets water balance changes due to climate variability in the Xingu River in eastern Amazonia, Brazil, *J Hydrol.*, 523, 822-829, doi: 10.1016/j.jhydrol.2015.02.018

Penatti, N.C., T.I.R. De Almeida, L.G. Ferreira, A.E. Arantes, and M.T. Coe, 2015: Satellite-based hydrological dynamics of the world's largest continuous wetland, *Remote Sens. Env.*, 10.1016/j.rse.2015.08.031.

Silvério, D.V., P.M. Brando, M.N. Macedo, P.S.A. Beck, M. Bustamante, and M.T. Coe, 2015: Agricultural expansion dominates climate changes in southeastern Amazonia: The overlooked non-GHG forcing, *Env. Res. Lett.*, 10, 104105.

Zhang, K., A.D.A. Castanho, D.R. Galbraith, S. Moghim, N. Levine, R. Bras, M.T. Coe, M.H. Costa, Y. Malhi, M. Longo, R.G. Knox, S. McKnight, J. Wang, and P.R. Moorcroft, 2015: The fate of Amazonian ecosystems over the coming century arising from changes in climate, land-use and CO₂, *Glob. Change Bio.*, doi: 10.1111/gcb.12903

2014

Brando, P.M., J. Balch, D.C. Nepstad, D. Morton, F.E. Putz, M.T. Coe, D. Silvério, M.N. Macedo, E. Davidson, C. Nóbrega, A. Alencar, and B.S. Soares-Filho, 2014: Abrupt increases in Amazonian tree mortality due to drought-fire interactions, *Proc. Nat. Acad. Sci.*, doi/10.1073/pnas.1305499111.

Lima, L.S., M.T. Coe, B.S. Soares-Filho, S.V. Cuadra, L.C. Dias, M.H. Costa, L.S. Lima, and H.O. Rodrigues, 2014: Feedbacks between deforestation, climate, and hydrology in the Southwestern Amazon: Implications for the provision of ecosystem services, *Landscape Ecology*, 29, 261-274, DOI: 10.1007/s10980-013-9962-1.

Soares-Filho, B., R. Rajão, M.N. Macedo, A. Carneiro, W. Costa, M.T. Coe, H. Rodrigues, and A. Alencar, 2014: Cracking Brazil's Forest Code, *Science*, 344(6182), 363-364, DOI: 10.1126/science.1246663

Brando, P.M., M.T. Coe, R DeFries, and A.A. Azevedo, 2013: Ecology, economy, and management of an agroindustrial frontier landscape in the southeast Amazon, *Phil. Trans. Royal Soc., B*, 368, 20120152. <http://dx.doi.org/10.1098/rstb.2012.0152>.

Castanho A.D.A., M.T. Coe, M.H. Costa, Y. Malhi, D. Galbraith, and C.A. Quesada, 2013: Response of simulated above ground biomass and net primary productivity in the Amazon to spatial and temporal variability in the physical environment, *Biogeosciences*, 10, 2255-2272, doi:10.5194/bg-10-2255-2013, www.biogeosciences.net/10/2255/2013/.

Castello, L., D.G. McGrath, L.L. Hess, M.T. Coe, P.A. Lefebvre, P. Petry, M.N. Macedo, V.F. Renó, and C.C. Arantes, 2013: The Vulnerability of Amazon wetlands, *Conservation Letters*, doi: 10.1111/conl.12008

Coe, M.T, T.R. Marthews, M.H. Costa, D. Galbraith, N. Greenglass, H.M.A. Imbuzeiro, N.M. Levine, Y. Malhi, P. Moorcroft, M.N. Muza, T.L. Powell, S. Saleska, L.A. Solorzano, and J. Wang, 2013: Deforestation and climate feedbacks threaten the ecological integrity of south-southeastern Amazonia, *Phil. Trans. R. Soc., B*, 368, 20120155. <http://dx.doi.org/10.1098/rstb.2012.0155>.

Holmes, R.M., M.T. Coe, G.J. Fiske, T. Gurtovaya, J.W. McClelland, A.I. Shiklomanov, R.G.M. Spencer, S.E. Tank, A.V. Zhulidov, 2013: Climate Change Impacts on the Hydrology and Biogeochemistry of Arctic Rivers. C.R. Goldman, M. Kumagai and R. Robarts (eds.), *Climate Change and Global Warming of Inland Waters: Impacts and Mitigation for Ecosystems and Societies*, John Wiley and Sons, Inc., DOI: 10.1002/9781118470596.ch1.

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Macedo, M.N., M.T. Coe, R.S. DeFries, M. Uriarte, P.M. Brando, C. Neill, and W.S. Walker, 2013: Land use-driven stream warming in southeastern Amazonia, *Phil. Trans. R. Soc., B*, 368, 20120153. <http://dx.doi.org/10.1098/rstb.2012.0153>.

Melack, J., and M.T. Coe, 2013: Climate change and the floodplain lakes of the Amazon basin. C.R. Goldman, M. Kumagai and R. Robarts (eds.), *Climate Change and Global Warming of Inland Waters: Impacts and Mitigation for Ecosystems and Societies*, John Wiley and Sons, Inc., DOI: 10.1002/9781118470596.ch17.

Neill, C., M.T. Coe, S.H. Riskin, A.V. Krusche, H. Elsenbeer, M.N. Macedo, R. McHorney, P. Lefebvre, E.A. Davidson, R. Scheffler, M. Figueira, S. Porder, and L.A. Deegan, 2013: Watershed responses to Amazon soya bean cropland expansion and intensification, *Phil. Trans. R. Soc., B*, 368, 20120452.

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Stickler, C.M., M.T. Coe, M.H. Costa, L.C. Dias, D.C. Nepstad, D.G. McGrath, H.O. Rodrigues, B.S. Soares-Filho, 2013: The Dependence of hydropower energy generation on forests in the Amazon Basin at local and regional scales, *Proc. Nat. Acad. Sci.*, 13, doi:10.1073/pnas.1215331110.

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Brando, P.M., D.C. Nepstad, J.K. Balch, B. Bolker, M.C. Christman, M.T. Coe, and J.E. Putz, 2012: Fire-induced tree mortality in a neotropical forest: The roles of bark traits, tree size, wood density, and fire behavior, *Global Change Biol.* 18, 2, 630-641, doi:10.1111/j.1365-2486.2011.02533.x

Davidson, E.A., A.C. de Araújo, P. Artaxo, J. K. Balch, I. F. Brown, M.M. da C. Bustamante, M.T. Coe, R.S. DeFries, M. Keller, M. Longo, J. W. Munger, W. Schroeder, B.S. Soares-Filho, C.M. Souza Jr., S.C. Wofsy, 2012: The Amazon basin in transition. *Nature*, doi:10.1038/nature10717.

Soares-Filho, B.S., Silvestrini, R.A., D.C. Nepstad, P.M. Brando, H.O. Rodrigues, A. Alencar, M.T. Coe, C. Locks, L.S. Lima, L. Hissa, and C. Stickler, 2012: Forest fragmentation, climate change and understory fire regimes on the Amazonian landscape of the Xingu headwaters, *Landscape Ecology*, doi:10.1007/s10980-012-9723-6.

Wolh, E., A. Barros, N. Brunzell, N. Chappell, M.T. Coe, T. Giambelluca, S. Goldsmith, R. Harmon, J. Hendrickx, J. Juvik, J. McDonnell, and F. Ogden, 2012: A research vision for hydrology of the humid tropics: Balancing water, energy, and land use. *Nature Clim. Change*, 10.1038/nclimate1556

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Coe, M.T., E.M. Latrubesse, M.E. Ferreira, and M.L. Amsler, 2011: The effects of deforestation and climate variability on the streamflow of the Araguaia River, Brazil, *Biogeochemistry*, 105, 119-131, doi:10.1007/s10533-011-9582-2.

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Hayhoe, S, C. Neill, R. McHorney, S. Porder, P. Lefebvre, M.T. Coe, H. Elsenbeer and A. Krusche, 2011: Conversion to soy on the Amazonian agricultural frontier increases streamflow without affecting stormflow dynamics, *Global Change Biology*, doi:10.1111/j.1365-2486.2011.02392.x.

Silvestrini, R.A., B.S. Soares-Filho, H.O. Rodrigues, D.C. Nepstad, M.T. Coe, and R. Assunção, 2011: Simulating fire regimes in the Amazon in response to climate change and deforestation, *Ecol. Appl.*, 21(5), 1573-1590, doi:10.1890/10-0827.1.

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Coe, M.T., M.H. Costa, and B.S. Soares-Filho, 2009: The Influence of historical and potential future deforestation on the stream flow of the Amazon River - Land surface processes and atmospheric feedbacks, *J. Hydrol.* doi:10.1016/j.jhydrol.2009.02.043.

Costa, M.H., M.T. Coe, and J-L Guyot, 2009: Effects of climatic variability and deforestation on flow regime, In: *Amazonia and Global Change*. American Geophysical Union, Geophysical Monograph Series, Volume 186, 576 pp.

Stickler, C.M., D.C. Nepstad, M.T. Coe, D.G. McGrath, H.O. Rodrigues, W.S. Walker, B.S. Soares-Filho, and E.A. Davidson, 2009: The potential ecological costs and co-benefits of REDD: A critical review and case study from the Amazon region, *Global Change Biology*, 15, 2803-2824, doi:10.1111/j.1365-2486.2009.02109.x.

2008

Garcia-Montiel, D.C., M.T. Coe, M.P. Cruz, J.N. Ferreira, E.M. da Silva, and E.A. Davidson, 2008: Estimating seasonal changes in volumetric soil water content at landscape scales in a savanna ecosystem using two-dimensional resistivity profiling, *Earth Inter.*, 12, 1-25, doi:10.1175/2007EI238.1

Vano, J.A., J.A. Foley, C.J. Kucharik, and M.T. Coe, 2008: Controls of climatic variability and land cover on land surface hydrology of northern Wisconsin, USA, *J. Geophys. Res.*, 113, G04040, doi: 10.1029/2007JG000681.

2007

Cardille, J. A., S. R. Carpenter, M. T. Coe, J. A. Foley, P. C. Hanson, M. G. Turner, and J. A. Vano 2007: Carbon and water cycling in lake-rich landscapes: Landscape connections, lake hydrology, and biogeochemistry, *J. Geophys. Res.*, 112, G02031, doi:10.1029/2006JG000200.

Coe, M.T., M.H. Costa and E.A. Howard, 2007: Simulating the surface waters of the Amazon River Basin: Impacts of new river geomorphic and dynamic flow parameterizations, *Hydrol. Procs.* 21, doi:10.1002/hyp.6850.

Coe, M.T. and C.M. Birkett, 2007: The Desiccation of Lake Chad, in: *Our Changing Planet: The View from Space*, M.D. King, C.L Parkinson, K.C. Partington, and R.G. Williams, eds., Cambridge University Press, 400 pp.

Foley, J.A., G.P. Asner, M.H. Costa, M.T. Coe, R. DeFries, H.K. Gibbs, E.A. Howard, S. Olson, J. Patz, N. Ramankutty and P. Snyder, 2007: Amazonian revealed: Forest degradation and loss of ecosystem goods and services in the Amazon Basin, *Frontiers in Ecol. and Environ.* 5(1): 25-32.

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Li, K.Y., M.T. Coe, N. Ramankutty, and R. De Jong, 2007: Modeling the hydrological impact of land-use change in West Africa, *J. Hydrol.* 337, 258-268, doi:10.1016/j.jhydrol.2007.01.038

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Li, K.Y., R. De Jong, M.T. Coe, N. Ramankutty, 2006: Root water uptake based upon a new water stress reduction and asymptotic root distribution function, *Earth Interact.*, 10, paper 10-014, 1 - 22.

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Li, K.Y., M.T. Coe, and N. Ramankutty, 2005, Investigation of hydrological variability in West Africa using land surface models, *J. Clim.*, 18, (16), 2893-2908.

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2003

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2002

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2000

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1998

Broström, A., M.T. Coe, S.P. Harrison, R. Gallimore, J.E. Kutzbach, J. Foley, I.C. Prentice, and P. Behling, 1998: Land surface feedbacks and palaeomonsoons in northern Africa, *Geophys. Res. Letters*, 25, 3615-1618.

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