

MICHAEL T. COE

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Curriculum Vitae

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 models 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

- Woodwell Climate 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

- Associate Research Scientist, Amazon Environmental Research Institute, Brasília, Brazil, 2010-present
- Adjunct Associate Research Scientist, Department of Ecology, Evolution, and Environmental Biology, Columbia University, New York; 2012-2018
- Affiliate, The Gund Institute for Ecological Economics, University of Vermont, Burlington VT; 2013-present
- 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

Teaching Experience

- Co-Instructor, Environmental consequences of tropical land cover change, State University of Mato Grosso - Nova Xavantina, Mato Grosso, Brazil, November 9-18, 2015

- 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, 2015-2018
- 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; 14 since 2009
- Editor, *Journal of Climate*, 2011-2017
- 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
- 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

2025

Atwood, A. M.T. Coe, C. Neill, L. Maracahipes-Santos, P. Brando, S.H. Riskin, A. Castanho, L. Deegan, A.C. Silveiro and M.N. Macedo, 2025 Deep Soil Water Reservoirs Modulate Land Use and Drought Effects on the Water Budget of Amazon Headwaters, *Wat. Resour. Res.*, 61(9), <https://doi.org/10.1029/2024WR039729>.

Brando, P.M., et al., 2025, Tipping points of Amazonian forests: moving beyond myths and toward solutions, *Annu. Rev. Environ. Resour.* 2025. 50:97–131, <https://doi.org/10.1146/annurev-environ-111522-112804>.

Stabile M.C., C.S.C. Salomão, P. Henrique, H. Coimbra^{1,4}, A.L. Guimarães, A. Garcia, A. Alencar, E. Pinto, L. Souza, L. Rattis, M.N. Macedo, M.T. Coe, P.R.S. Moutinho, 2024, Solving the Brazilian Amazon land use and land cover puzzle: four steps to ensuring conservation, justice, and sustainable development.

Nature Communications Earth and Environment, in review, <https://doi.org/10.21203/rs.3.rs-4366124/v1>

2024

Silveiro, A.C., D.V. Silvério, M.N. Macedo, M.T. Coe, P.T.S. Oliveira, L. Maracahipes, M. Uribe, L. Maracahipes-Santos, P.T.S. Oliveira, L. Rattis, and P.M. Brando, 2024, Droughts amplify soil moisture losses in burned forests of southeastern Amazonia. *J. Geophys. Res.-Bio*, 129, 10.1029/2024JG008011.

Teixeira Leite-Filho, A., B.S. Soares-Filho, U. Oliveira, M.T. Coe, 2024, Intensification of climate change impacts on Cerrado agriculture due to deforestation, *Nature Sustainability*, [10.1038/s41893-024-01475-8](https://doi.org/10.1038/s41893-024-01475-8).

2023

Uribe Diosa, M.R., A. Castanho, P.M. Brando, M.N. Macedo, and M.T. Coe, 2023, Net Loss of Biomass Predicted for Tropical Biomes in a Changing Climate, *Nat. Clim. Change*, doi: [10.1038/s41558-023-01600-z](https://doi.org/10.1038/s41558-023-01600-z).

2022

Banerjee, O., M. Cicowiez, M. Macedo, Ž. Malek, P.H. Verburg, S. Goodwin, R. Vargas, L. Rattis, P.M. Brando, M.T. Coe, C. Neill, and O.D. Marti, 2022, Can we Avert an Amazon Tipping Point? The Economic and Environmental Costs, *Envir. Res. Lett*, 17, 125005, doi 10.1088/1748-9326/aca3b8.

Lawrence, D., M.T. Coe, W. Walker, L. Verchot, and K. Vandecar, 2022, The unseen effects of deforestation: Biophysical effects on climate, *Front. For. Glob. Change*, 5, 756115, <https://doi.org/10.3389/ffgc.2022.756115>.

Rodrigues, A.dA., M.N. Macedo, D. Silvério, L. Maracahipes, M.T. Coe, P.M. Brando, J. Shimbo, R. Rajão, B.S. Soares Filho, and M. Bustamante, 2022, Cerrado deforestation threatens regional climate and water availability for agriculture and ecosystems, *Glob. Change Bio.*, 1-16, <http://doi.org/10.1111/gcb.16386>.

Fleischmann, A., P. Fabrice, A. Fassoni-Andrade, J. Melack, S. Wongchuig, R. Paiva, S. Hamilton, E. Fluet-Chouinard, R. Barbedo, F. Aires, A. Al Bitar, M.P. Bonnet, M.T. Coe, J. Ferreira-Ferreira, L. Hess, K. Jensen, K. McDonald, A. Ovando, E. Park, and W. Collischonn, 2022, How much inundation occurs in the Amazon River basin? *Rem. Sens. Envir.*, 278, 1, 113099, <https://doi.org/10.1016/j.rse.2022.113099>.

2021

Artaxo, P., V.A. Val, B. Bilbao, P.M. Brando, M. Bustamante, S.B. Correa, M.T. Coe, F. Cuesta, M.H. Costa, F. Miralles – Wilhelm, N. Salinas, D.V. Silvério, and A.L. Val, 2021, Chapter 20. Impacts of climate change on biodiversity, ecological processes and environmental adaptation. In: Nobre C., Encalada A., Anderson E., Roca Alcazar F.H., Bustamante M., et al. (eds). Amazon Assessment Report. United Nations Sustainable Development Solutions Network, New York, USA. doi 10.55161/TAKR3454

Banerjee, O., M. Cicowiez, M. Macedo, Ž. Malek, P.H. Verburg, S. Goodwin, R. Vargas, L. Rattis, P.M. Brando, M.T. Coe, C. Neill, and O.D. Marti, 2021, An Amazon Tipping Point: The Economic and Environmental Fallout, IDB Working Paper Series No IDB-WP-01259, doi:[10.18235/0003385](https://doi.org/10.18235/0003385).

Costa C. Jr, G.L. Galford, M.T Coe, M.N. Macedo, K. Jankowski, C. O'Connell, and C. Neill, 2021, Modeling Nitrous Oxide Emissions from Large-scale Intensive Cropping Systems in the Southern Amazon, *Frontiers in Sustainable Food Systems*, *Front. Sustain. Food Syst.*, <https://doi.org/10.3389/fsufs.2021.701416>.

Koriche, S.A. S.D. Nandini-Weiss, M. Prange, J.S. Singarayer, H.L. Cloke, M. Schulz, P. Bakker, K. Arpe, S.A.G. Leroy, and M.T. Coe, 2021, Impacts of variations in Caspian Sea surface area on catchment-scale and large-scale climate, *J Geophys. Res., Atmos.*, doi: 10.1029/2020JD034251.

Kruid, S., M.N. Macedo, S. Goreli, W. Walker, P. Moutinho, P.M. Brando, A.A. Castanho, A. Baccini, A. Alencar, and M.T. Coe, 2021, Beyond deforestation: tracking carbon losses from land grabbing and forest degradation in the Brazilian Amazon, *Front. For. Glob. Change*, doi.org/10.3389/ffgc.2021.645282.

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Rattis. L., P.M Brando, M.N. Macedo, S. Spera, A. Castanho, E. Marques, N. Queiroz, D. Silverio, and M.T. Coe, 2021, Climatic limit for agriculture in Brazil, *Nature Climate Change*, 20 pp. doi: 10.1038/s41558-021-01214-3.

2020

Brando P.M., B.S. Soares-Filho, L. Rodrigues, A. Assunção, D. Morton, D. Tuchsneider, E.C.M. Fernandes, M.N. Macedo, U. Oliveira, and M.T. Coe, 2020, The gathering firestorm in southern Amazonia, *Science Advances*, 6, 9pp., doi: 10.1126/sciadv.aay1632.

Brando P.M., M.N. Macedo, D.V. Silvério, L. Rattis, L. Paolucci, A. Alencar, M.T. Coe, and C. Amorim, 2020, Amazon wildfires: Scenes from a foreseeable disaster, *Flora*, <https://doi.org/10.1016/j.flora.2020.151609>

Caioni, C., D.V. Silvério, M.N. Macedo, M.T. Coe, and P.M. Brando, 2020, Droughts amplify differences in the energy balance components between croplands and Amazon forest, *Remote Sens.*, 12, 525, 18pp., doi:10.3390/rs12030525.

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Heerspink, B.P., A.D. Kendall, M.T. Coe, and D.W. Hyndman, 2020, Investigating the effects of changing climate and land cover on the hydrologic cycle in the Brazilian Amazon Basin, *J. Hydrol. Reg. Studies*, 32, <https://doi.org/10.1016/j.ejrh.2020.100755>.

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Rizzo, R., A.S. Garcia, V.M.F.N. Vilela, M.V.R. Ballester, C. Neill, D.C. Victoria, H.R. da Rocha, and M.T. Coe, 2020, Land use changes in southeastern Amazon and trends in rainfall and water yield of Xingu River during 1976-2015, *Clim. Change*, <https://doi.org/10.1007/s10584-020-02736-z>.

2019

Brando, P.M., D. Silvério, L. Maracahipes-Santos, C. Oliveira-Santos, S.R. Levick, M.T. Coe, M. Migliavacca, J. Balch, M. Macedo, D. Nepstad, L. Maracahipes, E. Davidson, G. Asner, O. Kolle, and S. Trumbore, 2019, Prolonged tropical forest degradation due to compounding disturbances: Implications for CO₂ and H₂O fluxes, *Glob. Change Biol.*, 25, 2855–2868, doi:10.1111/gcb.14659.

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Costa, M.H., L.C. Fleck, A.S. Cohn, G.M. Abrahão, P.M. Brando, M.T. Coe, R. Fu, D. Lawrence, G.F. Pires, R. Pousa, and B.S. Soares-Filho, 2019, Climate risks to agriculture in Amazonia create an incentive to conserve local ecosystems, *Front. in Ecol. and the Environ.*, 7pp., doi:10.1002/fee.2124.

Ramirez-Reyes, C., K.A., Brauman, R. Chaplin-Kramer, G.L. Galford, S.B. Adamo, C.B. Anderson, C. Anderson, G.R. Allington, K.J. Bagstad, M.T. Coe, A.F. Cord, L.E. Dee, R.K. Gould, M. Jain, V.A. Kowal, F. Muller-Karger, J. Norriss, P. Potapov, J. Qiu, J.T. Rieb, B.E. Robinson, L.H. Samberg, N. Singh, S.H. Szeto, B. Voigt, K. Watson, and T.M. Wright, 2019, Reimagining the potential of Earth observations for ecosystem services assessments, *Sci. of Tot. Env.*, 65, 1053-1063, <https://doi.org/10.1016/j.scitotenv.2019.02.150>.

Stabile, M.C.C. , A. Guimarães, D.S. Silva, V. Ribeiro, M.N. Macedo, M.T. Coe, E. Pinto, A. Alencar, and P.R.S. Moutinho, 2019, Solving Brazil's land use puzzle: Increasing production and slowing Amazon deforestation, *Land Use Policy*, 91, 6pp., <https://doi.org/10.1016/j.landusepol.2019.104362>.

2018

Anderson de Castro, A., L.A. Cuartas, M.T. Coe, C. Von Randow, A. Castanho, A. Ovando, A.D. Nobre, A. Koumrouyan, G. Sampaio, and M.H. Costa, 2018, Coupling the Terrestrial Hydrology Model with Biogeochemistry to the Integrated LAND Surface Model: Amazon Basin applications, *Hydrol. Sci. J.*, doi:10.1080/02626667.2018.1538592.

Jankowski, K.J. C. Neill, E.A. Davidson, M.N. Macedo, C. Costa, G.L. Galford, L. Maracahipes Santos, P. Lefebvre, D. Nunes, C.E.P. Cerri Jr., R.M. McHorney, C.S. O'Connell, and M.T. Coe, 2018, Deep soils reduce environmental consequences of increased nitrogen fertilizer use in intensifying Amazon agriculture, *Sci. Reports*, doi:10.1038/s41598-018-31175-1.

Lathuillière, M.J, M.T. Coe, A. Castanho, J. Graesser, and M.S. Johnson, 2018, Evaluating Water use for Agricultural Intensification in Southern Amazonia using the Water Footprint Sustainability Assessment, *Water*, 10, 349; doi:10.3390/w10040349.

Lee, J.H., J.A., Cardille, and M.T. Coe, 2018, BULC-U: Sharpening resolution and improving accuracy of land-use/land-cover classifications in Google Earth Engine, *Remote Sens.*, 10, 1455, doi:10.3390/rs10091455.

Simmons, C.S., L. Famolare, M. Macedo, R.T. Walker, M.T. Coe, B. Scheffers, E. Arima, R. Munoz-Carpena, D. Valle, C. Fraisee, P. Moorecroft, M. Diniz, M. Diniz, C. Szlafsztein, R. Pereira, C. Ruiz, G. Rocha, D. Juhn, L.O. do Canto Lopes, M. Waylen, and A. Antunes., 2018, Science in Support of Amazonian Conservation in the 21st Century, *Biotropica*, doi:10.1111/btp.12610.

2017

Coe, M.T., P.M. Brando, L.A. Deegan, M.N. Macedo, C. Neill, and D.V. Silvério, 2017, The forests of the Amazon and Cerrado moderate regional climate and are the key to the future of the region, *Trop. Conserv. Sci.*, 10, 6pp., doi:10.1177/1940082917720671.

Neill, C., J. Jankowski, P.M. Brando, M.T. Coe, L.A. Deegan, M.N. Macedo., S.H. Riskin, S. Porder, H. Elsenbeer and A.V. Krusche, 2017, Surprisingly modest water quality impacts from expansion and intensification of large-scale commercial agriculture in the Brazilian Amazon-Cerrado region. *Trop. Conserv. Sci.*, 10, doi: 10.1177/1940082917720669

De Faria, B., P.M. Brando, M.N. Macedo, P. Panday, B.S. Soares-Filho, and , M.T Coe, 2017, Current and future patterns of fire-induced forest degradation in Amazonia, *Envir. Res. Lett.*, at press, <https://doi.org/10.1088/1748-9326/aa69ce>

2016

Arantes, A.E., L.G. Ferreira, and M.T. Coe, 2016: 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*, 117, pp 66-78, doi:10.1016/j.isprsjprs.2016.02.008.

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Coe, M.T., M.N. Macedo, P.M. Brando, P. Lefebvre, P. Panday, and D Silvério, 2016: Hydrology and energy balance of the Amazon, L. Nagy, B. Forsberg, and P. Artaxo (eds.), *Interactions between Biosphere, Atmosphere, and Human Land Use in the Amazon Basin*. 41-53, Springer Verlag, Berlin, Ecological Studies: Analysis and Synthesis 227, DOI: 10.1007/978-3-662-49902-3.

Costa, M.H., M.T. Coe, and D. Galbraith, 2016: Land-atmosphere interactions, *Advances in Met.*, doi: 10.1155/2016/2362398

Lathuillière, M.J., M.T. Coe and M.S. Johnson, 2016: A review of green and blue water resources and their trade-offs for future agricultural production in the Amazon Basin. What could irrigated agriculture mean for Amazonia?, *Hydrol. Earth Sys. Sciences*, doi: 10.5194/hess-2016-71.

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2015

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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

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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>.

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