

# Marshall Burke

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## Professional appointments and affiliations

- 2014-present      Assistant Professor, Dept. of Earth System Science, Stanford University  
Deputy Director, Center on Food Security and the Environment,  
Freeman Spogli Institute for International Studies, Stanford University
- 2016-present      Faculty Research Fellow, National Bureau of Economic Research  
2015-present      Faculty Fellow, Stanford Institute for Economic Policy Research  
2015-present      Faculty Fellow (by courtesy), Stanford Woods Institute for the Environment  
2015-present      Faculty Affiliate, Stanford Center on International Development  
2015-present      Faculty Affiliate, Center for Effective Global Action
- 2014-2015        Visiting Fellow, Stanford Institute for Economic Policy Research

## Education

- Ph.D., Agricultural and Resource Economics, UC Berkeley, 5/2014  
B.A. International Relations, Stanford University, 6/2003

## Papers in revision or submitted

- Buying low and selling high: an arbitrage puzzle in Kenyan villages (with Lauren Bergquist and Ted Miguel). NBER Working Paper w24476 [under revision, *Quarterly Journal of Economics*.]
- Eoin McGuirk and Marshall Burke. The economic origins of conflict in Africa. NBER Working Paper w23056. [under revision, *Journal of Political Economy*]
- Eyes in the sky, boots on the ground: assessing satellite- and ground-based approaches to crop yield measurement and analysis. (with David Lobell, George Azzari, Sydney Gourlay, Zhenong Jin, Talip Kilic, Siobhan Murray). [in review] World Bank Policy Research Working Paper 8374.
- Economic and Non-Economic Factors in Violence: Evidence from Organized Crime, Suicides and Climate in Mexico. (with Ceren Baysan, Felipe González, Solomon Hsiang, Edward Miguel). NBER Working Paper w24897

## Published and forthcoming journal articles

1. Zach Wagner, Sam Heft-Neal, Bob Black, Zulfi Bhutta, Marshall Burke, and Eran Bendavid. 2018. Armed conflict and child mortality in Africa [forthcoming, *Lancet*]
2. Jonathan Proctor, Sol Hsiang, Jen Burney, Marshall Burke, and Wolfram Schlenker. 2018. Estimating the agricultural impacts of geoengineering using volcanic eruptions as natural experiments. *Nature* 560, 480-483

3. Sam Heft-Neal, Jen Burney, Eran Bendavid, and Marshall Burke. 2018. One in five infant deaths in Africa attributable to poor air quality. *Nature*, 559, 254-258.
4. Marshall Burke, Felipe Gonzalez, Patrick Baylis, Sam-Heft Neal, Ceren Baysan, Sanjay Basu, and Sol Hsiang. 2018. Effect of ambient temperature on suicide in the US and Mexico. *Nature Climate Change* 8, 723-729.
5. Marshall Burke, Matt Davis, and Noah Diffenbaugh. Large potential reduction in economic damages under UN mitigation targets. 2018. *Nature*, 559, 254-258.
6. Barak Oshri, Annie Hu, Peter Adelson, Xiao Chen, Pascaline Dupas, Jeremy Weinstein, Marshall Burke, David Lobell, Stefano Ermon. 2018. "Infrastructure Quality Assessment in Africa using Satellite Imagery and Deep Learning". Proc. 24th ACM SIGKDD Conference, 2018.
7. Zhenong Jin, George Azzari, Marshall Burke, Step Aston, David Lobell. 2017. Mapping and explaining smallholder yield heterogeneity in Eastern Africa. *Remote Sensing*, 9(9).
8. Marshall Burke and David Lobell. 2017. Satellite-based assessment of yield variation and its determinants in smallholder African systems. *PNAS* 114(9), 2189-2194.
9. Sam Heft-Neal, David Lobell, and Marshall Burke. 2017. Using remotely sensed temperature to estimate climate response functions. *Environmental Research Letters* 12(1) 014013.
10. Marshall Burke, Sam Heft-Neal, and Eran Bendavid. 2016. Understanding variation in child mortality across Sub-Saharan Africa: A spatial analysis. *Lancet Global Health*, 4(12), e936-e945
11. Neal Jean\*, Marshall Burke\*, Michael Xie, Matt Davis, David Lobell, and Stefano Ermon. 2016. Combining satellite imagery and machine learning to predict poverty. *Science*, 353(6301), 790-794. (\*denotes equal authorship) [[webpage](#)]
12. Marshall Burke and Kyle Emerick. 2016. Adaptation to climate change: evidence from US agriculture. *American Economic Journal - Economic Policy*, 8(3), 106-140.
13. Opportunities for advances in climate change economics. 2016. (with Melanie Craxton, Charlie Kolstad, Chikara Onda, and 20 coauthors). *Science* 352, 292-293, 2016
14. Tamma Carleton, Sol Hsiang, and Marshall Burke. 2016. Conflict in a changing climate. *European Physical Journal* 225, 489-511.
15. Some research challenges in the economics of climate change (with Melanie Craxton, Charlie Kolstad, and Chikara Onda). *Climate Change Economics*, 7(2), 2016
16. Marshall Burke\*, Sol Hsiang\*, and Edward Miguel. 2015. Global non-linear effect of temperature on economic output. *Nature* 527: 235-239. (\*denotes equal authorship) [[webpage](#)]
17. Climate and conflict (with Sol Hsiang and Edward Miguel). *Annual Review of Economics*, 2015.
18. Marshall Burke, Edward Miguel, Shanker Satyanath, John Dykema, and David Lobell. 2015. Incorporating climate uncertainty into estimates of climate change impacts. *Review of Economics and Statistics*, 97(2): 461-471.
19. Marshall Burke, Erick Gong, Kelly Jones. 2015. Income shocks and HIV. *Economic Journal* 125, 1157-1189.
20. Sol Hsiang, Marshall Burke, and Edward Miguel. 2014. Reconciling climate-conflict meta-analyses: reply to Buhaug et al. *Climatic Change*, DOI 10.1007/s10584-014-1276-z
21. S. Hsiang\*, M. Burke\*, and E. Miguel. 2013. Quantifying the influence of climate on human conflict. *Science* 341: 1212. (\*denotes equal authorship)
22. S. Hsiang and M. Burke. 2013. Climate, conflict, and social stability: what does the literature say? *Climatic Change*, 10.1007/s10584-013-0868-3.
23. J. Burney, L. Woltering, M. Burke, D. Pasternak, R. Naylor. 2010. Solar powered drip irrigation enhances food security in the Sudano-Sahel. *PNAS*, 10.1073/pnas.0909678107
24. T. Hertel, M. Burke, D. Lobell. 2010. The poverty implications of climate-induced yield changes by 2030. *Global Environmental Change*, 20(4), 577-585.

25. D. Lobell and M. Burke. 2010. On the uses of statistical models to predict crop yield responses to climate change. *Agricultural and Forest Meteorology* 150, 1443-1452.
26. M. Burke, E. Miguel, S. Satyanath, J. Dykema, D. Lobell. 2009. Warming increases the risk of civil war in Africa. *PNAS* 106, 20670-20674.
27. M. Burke, D. Lobell, L. Guarino. 2009. Shifts in African crop climates by 2050 and the implications for adaptation. *Global Environmental Change* 19, 317-325.
28. D. Lobell, M. Burke et al. 2008. Prioritizing climate change adaptation needs for food security in 2030. *Science* 319, 607-610.
29. D. Lobell, M. Burke. 2008. Why are agricultural impacts of climate change so uncertain? The importance of temperature relative to precipitation. *Environmental Research Letters* 3, July 2008.
30. M. Burke, K. Oleson, E. McCullough, J. Gaskell. 2008. Quantifying the environmental impacts of trade in meat products. *Environmental Modeling and Assessment* 13, July 2008.
31. R. Naylor, A. Liska, M. Burke et al. 2007. The ripple effect: Biofuels, food security, and the Environment. *Environment* 49 (9), 30-43.
32. J. Galloway, M. Burke et al. 2007. International trade in meat: The tip of the pork chop. *Ambio* 36 (8), 622-628.
33. R. Naylor, D. Battisti, D. Vimont, W. Falcon, M. Burke. 2007. Assessing risks of climate variability and climate change for Indonesian rice agriculture, *PNAS* 104, 7752-7757.
34. R. Naylor and M. Burke. 2005. Aquaculture and ocean resources: Raising the tigers of the sea. *Annual Review of Environment and Resources* 30: 185-218.
35. W. Falcon, R. Naylor, W. Smith, M. Burke, and E. McCullough. 2004. Using climate models to improve Indonesian food security. *Bulletin of Indonesian Economic Studies* 40(3): 355-377.

## Papers in preparation

Warming and welfare: global micro evidence. (with Sol Hsiang)

African poverty maps, with applications (with Stefano Ermon, David Lobell, and others)

Environmental constraints on elite worker productivity: evidence from professional tennis (with Sam Heft-Neal, Vincent Tanutama, David Lobell, and Miyuki Hino)

Climate, health, and human capital in the developing world (with Eran Bendavid and Sam Heft-Neal)

## Books and book chapters

D. Lobell and M. Burke, eds. 2009. *Climate change and food security: Adapting Agriculture to a Warmer World*. Springer, (co-editor, and contributing four chapters).

D. Lobell and M. Burke. 2009. Economic impacts of climate change on agriculture to 2030, in *Climate Change and Crop Production*, M. Reynolds ed., CABI.

J. Galloway, M. Burke et al. 2007. Animal production and the nitrogen cycle, in *Livestock and a Changing Landscape*, H. Mooney et al, eds. SCOPE Scientific and Technical volume.

## Other writing

"Climate robustly linked to African civil war", *PNAS*, 2010 (with Ted Miguel, Shanker Satyanath, John Dykema, and David Lobell). [Comment on Buhaug, 2010]

"Weather and Violence", *New York Times* op-ed (with Sol Hsiang and Ted Miguel), August 30th, 2013

"Temperature and violence", *Nature Climate Change*, 2014 (with Mark Cane, Ted Miguel, Sol Hsiang, David Lobell, Kyle Meng, and Shanker Satyanath). [comment on Raleigh et al 2014]

## Awards

National Science Foundation, Graduate Student Research Fellowship, 2009-2013.

Berkeley Fellowship, 2009-2011.

## Grants

1. *Satellite-based Agricultural Yield and Poverty Measures*, US Agency for International Development. \$1.8million. PI with David Lobell, AidData. (2017-2020)
2. *Using high-resolution satellite imagery to measure and improve smallholder agricultural productivity in Africa*, Global Innovation Fund, \$459,000. PI with David Lobell. (2017-20).
3. *Poverty Mapping and Welfare Estimation: Combining Mobile Phone and Remote Sensing Data*, International Financial Corporation, \$178,000. PI with Josh Blumenstock. (2017-18)
4. *Understanding the productivity of the world's most numerous firms: evidence from surveys and satellites*. National Science Foundation, Economics program. \$243,000, PI with Kyle Emerick. (2017-19)
5. *The coupled climate and institutional dynamics of shortlived local pollutants and long-lived global greenhouse gases*. National Science Foundation, Coupled Natural and Human Systems program, \$1.5million. co-I with Jen Burney, Ken Caldeira, Eran Bendavid (2017-2021)
6. *DARPA: High expressivity modeling/ World Modelers Program*, DARPA. \$1.7million subaward, co-I with David Lobell and Stefano Ermon. (2017-2020)
7. *Closing the Data Divide: Machine Learning Approaches for Understanding Livelihoods of the Poor Using Unconventional Data Sources*, Stanford Global Development and Poverty initiative, \$379,000. co-PI with Stefano Ermon and David Lobell. (2015-17)
8. *Climate change, nutrition, and population health*, Stanford Woods Institute Environmental Ventures Project, \$180,000. PI with Eran Bendavid, Sanjay Basu, David Lobell. (2015-17)
9. *Remote sensing approaches to improving aid targeting and understanding aid effectiveness*, USAID/ AidData \$150,000. PI with David Lobell (2015-17)
10. *Climate and global poverty*, Stanford Global Development and Poverty initiative, \$50,000. PI with Sol Hsiang. (2015)
11. *Experimental evidence on grain storage among farmers and traders in Kenya*, Gates Foundation ATAI Initiative, \$425,000. Co-investigator with Edward Miguel and Lauren Falcao, (2014-2016)
12. *Barriers to private-sector arbitrage in Kenyan maize markets*, Center for Economic Policy Research, \$48,000, Investigator with Lauren Falcao, 2013.
13. *Quantifying agricultural adaptation to climate change*, Giannini Foundation, \$25,000. Co-investigator with Edward Miguel and Solomon Hsiang, 2013.
14. *Price fluctuations, grain storage, and barriers to arbitrage in Kenyan maize markets*, Anonymous donor, \$58,000. Co-investigator with Edward Miguel and Lauren Falcao, 2013.
15. *Enhancing smallholder storage*, Anonymous donor, \$100,000. Co-investigator with Edward Miguel and One Acre Fund, 2012.
16. *Optimal finance for agricultural technology adoption*, Gates Foundation ATAI Initiative, \$240,000. Co-investigator with Edward Miguel, 2011.
17. *Weather risk, index insurance, and agricultural technology adoption*, Gates Foundation ATAI Initiative, \$50,000. Co-investigator with Edward Miguel. 2010.

18. *Prioritizing Investments in Food Security Under a Changing Climate*, Rockefeller Foundation, \$350,000. Co-investigator with David Lobell and others. 2008.
19. *An Alternative Development Model? Assessing Solar Electrification for Income Generation in Rural Benin*. Stanford Woods Institute Environmental Ventures Project, \$150,000. Co-investigator with Roz Naylor and Jen Burney. 2008.

## Presentations and Seminars

### *Meetings and conferences*

1. World Bank/ Center for Effective Global Action, "Artificial Intelligence in Economic Development", conference speaker (2018; San Francisco)
2. DARPA World Modelers Meeting, conference speaker (2018; Tucson AZ)
3. Mulago Foundation "Future of an Acre", conference speaker, (2018; San Francisco)
4. American Economic Association annual meeting, conference speaker (2018; Philadelphia)
5. USC, Workshop on "Microeconomic impacts of climate change", conference speaker (2017; Los Angeles)
6. United Nations "Preventing Tomorrow's Conflicts" Series, invited speaker on climate change and conflict (2017; New York)
7. "Investing in a new climate", Steyer-Taylor Center for Energy Policy, Stanford, conference speaker on climate impacts (2017; Stanford)
8. "Machine learning and Big Data", World Bank, invited speaker on remote sensing and big data (2017)
9. NATO Parliamentary Assembly Spring Session, Tblisi Georgia, invited speaker on climate change and conflict (2017; Tblisi, Georgia)
10. Annual Bank Conference on Africa, World Bank, invited speaker on remote sensing and big data (2017; Berkeley, CA)
11. Center For Effective Global Action, Research Retreat, conference speaker (2017)
12. "Micro and Macro Effects of Climate Change" meeting, UC-Santa Barbara, conference speaker (2017; Santa Barbara, CA)
13. "Smart Farming" workshop, attended by Bill Gates and leadership of Gates Foundation, invited speaker (2017; Seattle, WA)
14. "Advances in Estimating Economic Effects from Climate Change", conference speaker (2017; Stanford, CA)
15. Mulago Foundation Research Retreat, invited speaker (2016; Santa Cruz, CA)
16. National Bureau of Economic Research, Environmental Economics Summer Institute, conference speaker (2016)
17. "Understanding the impacts of climate change on growth and development", Potsdam Institute for Climate, Germany, invited speaker (2016)
18. American Economic Association annual meeting, conference speaker (2016)
19. "Using Big Data to Improve International Food Security", U. Illinois, keynote speaker (2016)
20. International Conference on Global Food Security, Cornell, session chair and invited speaker (2015)
21. Gates Foundation, Agricultural Technology Adoption Initiative, invited speaker (2015)
22. "Climate and Human Security", NCAR/ Dept of State, invited speaker (2015)
23. American Economic Association annual meeting, conference speaker (2015)

24. World Bank, Development Impact Evaluation meeting, Kigali, Rwanda, invited speaker (2015)
25. Pacific Development Conference, Davis, conference speaker (2014)
26. Working Group on African Political Economy (WGAPE), Stanford, conference speaker (2013)
27. Pacific Development Conference, conference speaker (2013)

### *Invited Seminars*

1. UChicago, EPIC (May 2018)
2. UC Irvine, Earth System Science (May 2018)
3. Columbia Sustainable Development (2017)
4. UBC Economics (2017)
5. Brown University, Institute for Environment and Society (2017)
6. International Food Policy Research Institute (2017)
7. Princeton, Program in Science, Technology, and Environmental Policy (2016)
8. William & Mary, Economics (2016)
9. Air Force Academy (2015)
10. Cornell Economics (2014)
11. Cornell Applied Economics and Management (2014)
12. Northwestern, Kellogg Business School (2014)
13. UBC Economics (2014)
14. UC Davis Ag Econ (2014)
15. Stanford Environmental Forum (2014)
16. World Bank Development Economics (2014)
17. Minnesota Applied Economics (2014)
18. University of Colorado - Boulder Environmental Studies (2014)
19. Stanford Environmental Earth System Sciences (2014)
20. University of Washington Evans School (2014)
21. UCSD Econ/IRPS Development seminar (2013)

### Editorial service

Referee: *American Economic Review*, *Quarterly Journal of Economics*, *Journal of Political Economy*, *Economic Journal*, *Review of Economics and Statistics*, *Nature*, *PNAS*, *Nature Climate Change*, *Nature Communications*, *Science Advances*, *Journal of Public Economics*, *American Economic Journal - Economic Policy*, *American Journal of Agricultural Economics*, *World Bank Economic Review*, *Journal of Environmental Economics and Management*, *Journal of Development Economics*, *Energy Economics*, *Ecological Economics*, *Journal of Human Resources*, *World Politics*, *Journal of the European Economic Association*, *Journal of Development Studies*, *Journal of Economic Geography*, *Journal of African Economies*, *Economic Development and Cultural Change*, *Climatic Change*, *Climate Research*, *Environmental Research Letters*, *Global Environmental Change*, *Journal of Peace Research*, *PLOS One*, *Food Policy*

## University service

### Committees:

1. Dept of Earth System Science, Environmental Risk and Adaptation faculty search committee (2017/18)
2. Dept of Earth System Science, Graduate Admissions committee (2017/18)
3. Earth Systems – Executive Committee (2016-18)
4. Sustainability Science and Practice Masters Program – Executive committee (2017/18)
5. E-IPER graduate admissions committee (2016/17)
6. Woods Institute Environmental Ventures Program review committee (2016/18)
7. International Policy Studies Masters Program - curriculum committee (2016/17)

### Guest lectures:

1. SUST 2010 (Fall 2017)
2. Earth System Science 305 (Fall 2017)
3. Earth Systems 10 (2017)
4. ENVRES 300 (2017)
5. Energy Boot Camp (2017)
6. Earth System Science 305 (Spring 2017)
7. Earth 1b: Big Earth (Winter 2017)
8. Med 232: Discussions in Global Health (Fall 2016)
9. ENVRES 315 (Winter 2016)
10. Earth Systems 10 (2016)
11. Public Policy: Masters Colloquium (2015)
12. Earth Systems 10 (2015)

### Stanford outreach:

1. Earth Matters, New York (speaker), 2017
2. Stanford nationally-televised commercial, 2017 [[youtube link](#)]
3. FSI Advisory Council (speaker), 2017
4. Stanford Admit Weekend (speaker), 2017
5. Earth Matters, Los Angeles (speaker), 2016
6. FSI Advisory Council (speaker), 2016
7. Stanford Admit Weekend (speaker), 2016
8. Earth Matters, Stanford (speaker) 2015
9. Connecting the Dots, Stanford Earth (speaker) 2015

### Mentorship:

Current advisees: Earth Systems (3 undergrad, 2 masters), Interdisciplinary Program in Environment and Resources (5 PhD), International Relations (1 undergrad), International Policy Studies (1 masters), Economics (1 PhD).