


Stanford



Marshall Burke

Associate Professor of Earth System Science and Senior Fellow at the Freeman Spogli Institute for International Studies, at the Woods Institute for the Environment and at the Stanford Institute for Economic Policy Research

 Curriculum Vitae available Online

Bio

BIO

Marshall Burke is an associate professor in the Department of Earth System Science, deputy director at the Center on Food Security and the Environment, and center fellow at the Freeman Spogli Institute for International Studies (FSI) at Stanford University. He is also a faculty research fellow at the National Bureau of Economic Research, and a co-founder of AtlasAI, a remote sensing start-up. His research focuses on social and economic impacts of environmental change and on measuring and understanding economic development in emerging markets. His work has appeared in both economic and scientific journals, including recent publications in *Nature*, *Science*, *The Quarterly Journal of Economics*, and *The Lancet*. He holds a PhD in agricultural and resource economics from the University of California, Berkeley and a BA in international relations from Stanford University.

Prospective students should see my personal webpage, linked at right.

ACADEMIC APPOINTMENTS

- Associate Professor, Earth System Science
- Senior Fellow, Freeman Spogli Institute for International Studies
- Senior Fellow, Stanford Woods Institute for the Environment
- Senior Fellow, Stanford Institute for Economic Policy Research (SIEPR)
- Member, Bio-X
- Faculty Fellow, Stanford Institute for Economic Policy Research (SIEPR)
- Member, Wu Tsai Neurosciences Institute

PROGRAM AFFILIATIONS

- Program in International Relations

LINKS

- Personal webpage: <http://web.stanford.edu/~mburke/>
- Blog: <http://www.g-feed.com/>

Teaching

COURSES

2021-22

- Climate and Society: EARTH 2 (Win)

- Data for Sustainable Development: CS 325B, EARTHSYS 162, EARTHSYS 262 (Aut)
- Empirical Methods in Sustainable Development: ESS 268 (Win)

2020-21

- Climate and Society: EARTH 2 (Win)
- Empirical Methods in Sustainable Development: ESS 268 (Win)

2019-20

- Climate and Society: EARTH 2 (Win)
- Data for Sustainable Development: CS 325B, EARTHSYS 162, EARTHSYS 262 (Aut)
- Empirical Methods in Sustainable Development: ESS 268 (Win)
- Topics in Earth System Science: ESS 301 (Win, Spr)

2018-19

- Climate and Society: EARTH 2 (Win)
- Data for Sustainable Development: CS 325B, EARTHSYS 162, EARTHSYS 262 (Aut)
- Empirical Methods in Sustainable Development: ESS 268, INTLPOL 272 (Win)

STANFORD ADVISEES

Jeff Wen

Postdoctoral Faculty Sponsor

Carlos Gould, Minghao Qiu

Doctoral Dissertation Co-Advisor (AC)

Marissa Childs, Nathan Ratledge

Doctoral (Program)

Garrett Albistegui Adler, Marissa Childs, June Choi, Ivan Higuera-Mendieta

Publications

PUBLICATIONS

- **Upstream oil and gas production and ambient air pollution in California.** *The Science of the total environment*
Gonzalez, D. J., Francis, C. K., Shaw, G. M., Cullen, M. R., Baiocchi, M., Burke, M.
2022; 806 (Pt 1): 150298
- **Upstream oil and gas production and ambient air pollution in California** *SCIENCE OF THE TOTAL ENVIRONMENT*
Gonzalez, D. X., Francis, C. K., Shaw, G. M., Cullen, M. R., Baiocchi, M., Burke, M.
2022; 806
- **Associations between wildfire smoke exposure during pregnancy and risk of preterm birth in California.** *Environmental research*
Heft-Neal, S., Driscoll, A., Yang, W., Shaw, G., Burke, M.
2021; 111872
- **Historical warming has increased US crop insurance losses** *ENVIRONMENTAL RESEARCH LETTERS*
Differbaugh, N. S., Davenport, F., Burke, M.
2021; 16 (8)
- **Twice Is Nice: The Benefits of Two Ground Measures for Evaluating the Accuracy of Satellite-Based Sustainability Estimates** *REMOTE SENSING*
Lobell, D. B., Di Tommaso, S., Burke, M., Kilic, T.
2021; 13 (16)

- **Scalable deep learning to identify brick kilns and aid regulatory capacity.** *Proceedings of the National Academy of Sciences of the United States of America*
Lee, J., Brooks, N. R., Tajwar, F., Burke, M., Ermon, S., Lobell, D. B., Biswas, D., Luby, S. P.
2021; 118 (17)
- **The effect of information about climate risk on property values.** *Proceedings of the National Academy of Sciences of the United States of America*
Hino, M., Burke, M.
2021; 118 (17)
- **Contribution of historical precipitation change to US flood damages.** *Proceedings of the National Academy of Sciences of the United States of America*
Davenport, F. V., Burke, M., Diffenbaugh, N. S.
2021; 118 (4)
- **The changing risk and burden of wildfire in the United States.** *Proceedings of the National Academy of Sciences of the United States of America*
Burke, M., Driscoll, A., Heft-Neal, S., Xue, J., Burney, J., Wara, M.
2021; 118 (2)
- **Using satellite imagery to understand and promote sustainable development.** *Science (New York, N.Y.)*
Burke, M., Driscoll, A., Lobell, D. B., Ermon, S.
2021; 371 (6535)
- **Efficient Poverty Mapping from High Resolution Remote Sensing Images**
Ayush, K., Uzkent, B., Tanmay, K., Burke, M., Lobell, D., Ermon, S., Assoc Advancement Artificial Intelligence
ASSOC ADVANCEMENT ARTIFICIAL INTELLIGENCE.2021: 12-20
- **Predicting Livelihood Indicators from Community-Generated Street-Level Imagery**
Lee, J., Grosz, D., Uzkent, B., Zeng, S., Burke, M., Lobell, D., Ermon, S., Assoc Advancement Artificial Intelligence
ASSOC ADVANCEMENT ARTIFICIAL INTELLIGENCE.2021: 268-276
- **Quantifying the Effect of Precipitation on Landslide Hazard in Urbanized and Non-Urbanized Areas** *Geophysical Research Letters*
Johnston, E. C., Davenport, F. V., Wang, L., Caers, J. K., Muthukrishnan, S., Burke, M., Diffenbaugh, N. S.
2021; 48 (16)
- **Addressing Climate Change and Its Effects on Human Health: A Call to Action for Medical Schools.** *Academic medicine : journal of the Association of American Medical Colleges*
Goshua, A., Gomez, J., Erny, B., Burke, M., Luby, S., Sokolow, S., LaBeaud, A. D., Auerbach, P., Gisondi, M. A., Nadeau, K.
2020
- **The Economic Origins of Conflict in Africa** *JOURNAL OF POLITICAL ECONOMY*
McGuirk, E., Burke, M.
2020
- **The COVID-19 lockdowns: a window into the Earth System** *NATURE REVIEWS EARTH & ENVIRONMENT*
Diffenbaugh, N. S., Field, C. B., Appel, E. A., Azevedo, I. L., Baldocchi, D. D., Burke, M., Burney, J. A., Ciais, P., Davis, S. J., Fiore, A. M., Fletcher, S. M., Hertel, T. W., Horton, et al
2020; 1 (9): 470-481
- **Directions for Research on Climate and Conflict.** *Earth's future*
Mach, K. J., Adger, W. N., Buhaug, H., Burke, M., Fearon, J. D., Field, C. B., Hendrix, C. S., Kraan, C. M., Maystadt, J., O'Loughlin, J., Roessler, P., Scheffran, J., Schultz, et al
2020; 8 (7): e2020EF001532
- **Dust pollution from the Sahara and African infant mortality** *NATURE SUSTAINABILITY*
Heft-Neal, S., Burney, J., Bendavid, E., Voss, K. K., Burke, M.
2020
- **Reply to: Temporal displacement, adaptation and the effect of climate on suicide rates** *NATURE CLIMATE CHANGE*
Burke, M., Gonzalez, F., Baylis, P., Heft-Neal, S., Baysan, C., Hsiang, S.
2020
- **EYES IN THE SKY, BOOTS ON THE GROUND: ASSESSING SATELLITE- AND GROUND-BASED APPROACHES TO CROP YIELD MEASUREMENT AND ANALYSIS** *AMERICAN JOURNAL OF AGRICULTURAL ECONOMICS*

- Lobell, D. B., Azzari, G., Burke, M., Gourlay, S., Jin, Z., Kilic, T., Murray, S.
2020; 102 (1): 202–19
- **Using publicly available satellite imagery and deep learning to understand economic well-being in Africa.** *Nature communications*
Yeh, C. n., Perez, A. n., Driscoll, A. n., Azzari, G. n., Tang, Z. n., Lobell, D. n., Ermon, S. n., Burke, M. n.
2020; 11 (1): 2583
 - **Sight for Sorghums: Comparisons of Satellite- and Ground-Based Sorghum Yield Estimates in Mali** *REMOTE SENSING*
Lobell, D. B., Di Tommaso, S., You, C., Djima, I., Burke, M., Kilic, T.
2020; 12 (1)
 - **Flood Size Increases Nonlinearly Across the Western United States in Response to Lower Snow-Precipitation Ratios** *WATER RESOURCES RESEARCH*
Davenport, F. V., Herrera-Estrada, J. E., Burke, M., Diffenbaugh, N. S.
2020; 56 (1)
 - **Oil and gas production and spontaneous preterm birth in the San Joaquin Valley, CA: A case-control study.** *Environmental epidemiology (Philadelphia, Pa.)*
Gonzalez, D. J., Sherris, A. R., Yang, W. n., Stevenson, D. K., Padula, A. M., Baiocchi, M. n., Burke, M. n., Cullen, M. R., Shaw, G. M.
2020; 4 (4): e099
 - **Non-economic factors in violence: Evidence from organized crime, suicides and climate in Mexico** *JOURNAL OF ECONOMIC BEHAVIOR & ORGANIZATION*
Baysan, C., Burke, M., Gonzalez, F., Hsiang, S., Miguel, E.
2019; 168: 434–52
 - **Smallholder maize area and yield mapping at national scales with Google Earth Engine** *REMOTE SENSING OF ENVIRONMENT*
Jin, Z., Azzari, G., You, C., Di Tommaso, S., Aston, S., Burke, M., Lobell, D. B.
2019; 228: 115–28
 - **Global warming has increased global economic inequality** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*
Diffenbaugh, N. S., Burke, M.
2019; 116 (20): 9808–13
 - **SELL LOW AND BUY HIGH: ARBITRAGE AND LOCAL PRICE EFFECTS IN KENYAN MARKETS** *QUARTERLY JOURNAL OF ECONOMICS*
Burke, M., Bergquist, L., Miguel, E.
2019; 134 (2): 785–842
 - **Global warming has increased global economic inequality.** *Proceedings of the National Academy of Sciences of the United States of America*
Diffenbaugh, N. S., Burke, M.
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 - **Back to the root causes of war: food shortages Reply** *LANCET*
Wagner, Z., Heft-Neal, S., Bhutta, Z. A., Black, R. E., Burke, M., Bendavid, E.
2019; 393 (10175): 982
 - **Back to the root causes of war: food shortages - Authors' reply.** *Lancet (London, England)*
Wagner, Z., Heft-Neal, S., Bhutta, Z. A., Black, R. E., Burke, M., Bendavid, E.
2019; 393 (10175): 982
 - **Reply to Rosen: Temperature-growth relationship is robust.** *Proceedings of the National Academy of Sciences of the United States of America*
Diffenbaugh, N. S., Burke, M. n.
2019
 - **Mapping Missing Population in Rural India: A Deep Learning Approach with Satellite Imagery**
Hu, W., Patel, J., Robert, Z., Novosad, P., Asher, S., Tang, Z., Burke, M., Lobell, D., Ermon, S., Assoc Comp Machinery
ASSOC COMPUTING MACHINERY.2019: 353–59
 - **Women and children living in areas of armed conflict in Africa: a geospatial analysis of mortality and orphanhood.** *The Lancet. Global health*
Wagner, Z. n., Heft-Neal, S. n., Wise, P. H., Black, R. E., Burke, M. n., Boerma, T. n., Bhutta, Z. A., Bendavid, E. n.
2019

- **Predicting Economic Development using Geolocated Wikipedia Articles**
Sheehan, E., Meng, C., Tan, M., Uz Kent, B., Jean, N., Burke, M., Lobell, D., Ermon, S., *Assoc Comp Machinery*
ASSOC COMPUTING MACHINERY.2019: 2698–2706
- **Climate as a risk factor for armed conflict.** *Nature*
Mach, K. J., Kraan, C. M., Adger, W. N., Buhaug, H. n., Burke, M. n., Fearon, J. D., Field, C. B., Hendrix, C. S., Maystadt, J. F., O'Loughlin, J. n., Roessler, P. n., Scheffran, J. n., Schultz, et al
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- **Armed conflict and child mortality in Africa: a geospatial analysis.** *Lancet (London, England)*
Wagner, Z., Heft-Neal, S., Bhutta, Z. A., Black, R. E., Burke, M., Bendavid, E.
2018
- **Estimating global agricultural effects of geoengineering using volcanic eruptions.** *Nature*
Proctor, J., Hsiang, S., Burney, J., Burke, M., Schlenker, W.
2018
- **Robust relationship between air quality and infant mortality in Africa** *NATURE*
Heft-Neal, S., Burney, J., Bendavid, E., Burke, M.
2018; 559 (7713): 254+
- **Anticipated burden and mitigation of carbon-dioxide-induced nutritional deficiencies and related diseases: A simulation modeling study.** *PLoS medicine*
Weyant, C., Brandeau, M. L., Burke, M., Lobell, D. B., Bendavid, E., Basu, S.
2018; 15 (7): e1002586
- **Anticipated burden and mitigation of carbondioxide-induced nutritional deficiencies and related diseases: A simulation modeling study** *PLOS MEDICINE*
Weyant, C., Brandeau, M. L., Burke, M., Lobell, D. B., Bendavid, E., Basu, S.
2018; 15 (7)
- **Comment on "Food Abundance and Violent Conflict in Africa" Discussion** *AMERICAN JOURNAL OF AGRICULTURAL ECONOMICS*
Burke, M.
2018; 100 (4): 1007–9
- **Robust relationship between air quality and infant mortality in Africa.** *Nature*
Heft-Neal, S., Burney, J., Bendavid, E., Burke, M.
2018
- **Large potential reduction in economic damages under UN mitigation targets** *NATURE*
Burke, M., Davis, W., Diffenbaugh, N. S.
2018; 557 (7706): 549+
- **Climate and conflict: no stigma** *NATURE*
Hsiang, S., Burke, M.
2018; 555 (7698): 587
- **Higher temperatures increase suicide rates in the United States and Mexico** *Nature Climate Change*
Burke, M., González, F., Baylis, P., Heft-Neal, S., Baysan, C., Basu, S., Hsiang, S.
2018; 8 (8): 723--729
- **Infrastructure Quality Assessment in Africa using Satellite Imagery and Deep Learning**
Oshri, B., Hu, A., Adelson, P., Chen, X., Dupas, P., Weinstein, J., Burke, M., Lobell, D., Ermon, S., *ACM ASSOC COMPUTING MACHINERY*.2018: 616–25
- **Satellite-based assessment of yield variation and its determinants in smallholder African systems.** *Proceedings of the National Academy of Sciences of the United States of America*
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2017; 114 (9): 2189-2194
- **Using remotely sensed temperature to estimate climate response functions** *ENVIRONMENTAL RESEARCH LETTERS*
Heft-Neal, S., Lobell, D. B., Burke, M.

2017; 12 (1)

- **Sources of variation in under-5 mortality across sub-Saharan Africa: a spatial analysis.** *The Lancet. Global health*
Burke, M., Hefit-Neal, S., Bendavid, E.
2016
- **Combining satellite imagery and machine learning to predict poverty.** *Science*
Jean, N., Burke, M., Xie, M., Davis, W. M., Lobell, D. B., Ermon, S.
2016; 353 (6301): 790-794
- **Adaptation to Climate Change: Evidence from US Agriculture** *AMERICAN ECONOMIC JOURNAL-ECONOMIC POLICY*
Burke, M., Emerick, K.
2016; 8 (3): 106-140
- **Global non-linear effect of temperature on economic production** *NATURE*
Burke, M., Hsiang, S. M., Miguel, E.
2015; 527 (7577): 235-?
- **INCORPORATING CLIMATE UNCERTAINTY INTO ESTIMATES OF CLIMATE CHANGE IMPACTS** *REVIEW OF ECONOMICS AND STATISTICS*
Burke, M., Dykema, J., Lobell, D. B., Miguel, E., Satyanath, S.
2015; 97 (2): 461-471
- **Climate and Conflict** *ANNUAL REVIEW OF ECONOMICS, VOL 7*
Burke, M., Hsiang, S. M., Miguel, E.
2015; 7: 577-?
- **Reconciling climate-conflict meta-analyses: reply to Buhaug et al.** *CLIMATIC CHANGE*
Hsiang, S. M., Burke, M., Miguel, E.
2014; 127 (3-4): 399-405
- **Climate, conflict, and social stability: what does the evidence say?** *CLIMATIC CHANGE*
Hsiang, S. M., Burke, M.
2014; 123 (1): 39-55
- **Quantifying the influence of climate on human conflict.** *Science*
Hsiang, S. M., Burke, M., Miguel, E.
2013; 341 (6151): 1235367-?
- **On the use of statistical models to predict crop yield responses to climate change** *AGRICULTURAL AND FOREST METEOROLOGY*
Lobell, D. B., Burke, M. B.
2010; 150 (11): 1443-1452
- **The poverty implications of climate-induced crop yield changes by 2030** *GLOBAL ENVIRONMENTAL CHANGE-HUMAN AND POLICY DIMENSIONS*
Hertel, T. W., Burke, M. B., Lobell, D. B.
2010; 20 (4): 577-585
- **Solar-powered drip irrigation enhances food security in the Sudano-Sahel** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*
Burney, J., Woltering, L., Burke, M., Naylor, R., Pasternak, D.
2010; 107 (5): 1848-1853
- **Impacts of El Nino-Southern Oscillation events on China's rice production** *JOURNAL OF GEOGRAPHICAL SCIENCES*
Deng Xiangzheng, X. Z., Huang Jikun, J. K., Qiao Fangbin, F. B., Naylor, R. L., Falcon, W. P., Burke, M., Rozelle, S., Battisti, D.
2010; 20 (1): 3-16
- **Warming increases the risk of civil war in Africa** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*
Burke, M. B., Miguel, E., Satyanath, S., Dykema, J. A., Lobell, D. B.
2009; 106 (49): 20670-20674
- **Shifts in African crop climates by 2050, and the implications for crop improvement and genetic resources conservation** *GLOBAL ENVIRONMENTAL CHANGE-HUMAN AND POLICY DIMENSIONS*

Burke, M. B., Lobell, D. B., Guarino, L.
2009; 19 (3): 317-325

- **A Global Model Tracking Water, Nitrogen, and Land Inputs and Virtual Transfers from Industrialized Meat Production and Trade** *ENVIRONMENTAL MODELING & ASSESSMENT*
Burke, M., Oleson, K., McCullough, E., Gaskell, J.
2009; 14 (2): 179-193
- **Why are agricultural impacts of climate change so uncertain? The importance of temperature relative to precipitation** *ENVIRONMENTAL RESEARCH LETTERS*
Lobell, D. B., Burke, M. B.
2008; 3 (3)
- **Prioritizing climate change adaptation needs for food security in 2030** *SCIENCE*
Lobell, D. B., Burke, M. B., Tebaldi, C., Mastrandrea, M. D., Falcon, W. P., Naylor, R. L.
2008; 319 (5863): 607-610
- **International trade in meat: The tip of the pork chop** *AMBIO*
Galloway, J. N., Burke, M., Bradford, G. E., Naylor, R., Falcon, W., Chapagain, A. K., Gaskell, J. C., McCullough, E., Mooney, H. A., Oleson, K. L., Steinfeld, H., Wassenaar, T., Smil, et al
2007; 36 (8): 622-629
- **The ripple effect: Biofuels, food security, and the environment** *ENVIRONMENT*
Naylor, R. L., Liska, A. J., Burke, M. B., Falcon, W. P., Gaskell, J. C., Rozelle, S. D., Cassman, K. G.
2007; 49 (9): 30-43
- **Assessing risks of climate variability and climate change for Indonesian rice agriculture** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*
Naylor, R. L., Battisti, D. S., Vimont, D. J., Falcon, W. P., Burke, M. B.
2007; 104 (19): 7752-7757