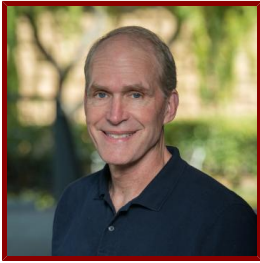



Stanford



Rob Jackson

Michelle and Kevin Douglas Provostial Professor and Senior Fellow at the Woods Institute for the Environment and at the Precourt Institute for Energy

Earth System Science

 Curriculum Vitae available Online

Bio

BIO

Rob Jackson and his lab examine the many ways people affect the Earth. They seek basic scientific knowledge and use it to help shape policies and reduce the environmental footprint of global warming, energy extraction, and other issues. They're currently examining the effects of climate change and drought on old-growth forests. They are also working to measure and reduce greenhouse gas emissions through the Global Carbon Project (globalcarbonproject.org), which Jackson chairs. Examples of new research Rob leads include establishing a global network of methane tower measurements across the Amazon and at more than 100 sites worldwide and measuring and reducing methane emissions and air pollution from oil and gas wells, city streets, and homes and buildings.

Rob's new book on climate solutions, *Into the Clear Blue Sky* (Scribner and Penguin Random House) publishes July 30th, 2024. As an author and photographer, Rob has published a previous trade book about the environment (*The Earth Remains Forever*, University of Texas Press), two books of children's poems, *Animal Mischief* and *Weekend Mischief* (Highlights Magazine and Boyds Mills Press), and recent or forthcoming poems in the journals *Southwest Review*, *Cortland Review*, *Cold Mountain Review*, *Atlanta Review*, *LitHub*, and more. His photographs have appeared in many media outlets, including the *NY Times*, *Washington Post*, *USA Today*, *US News and World Report*, *Science*, *Nature*, and *National Geographic News*.

Rob is a current Djerassi artist in residence and a recent Guggenheim Fellow and sabbatical visitor in the Center for Advanced Study in the Behavioral Sciences. He is also a Fellow in the American Academy of Arts and Sciences, American Association for the Advancement of Science, American Geophysical Union, and Ecological Society of America. He received a Presidential Early Career Award in Science and Engineering from the National Science Foundation, awarded at the White House.

ACADEMIC APPOINTMENTS

- Professor, Earth System Science
- Senior Fellow, Stanford Woods Institute for the Environment
- Senior Fellow, Precourt Institute for Energy

ADMINISTRATIVE APPOINTMENTS

- Board of Advisors, Spark Climate Solutions, (2023- present)
- Board of Directors, Center for Advanced Study in the Behavioral Sciences, (2022- present)
- Chair, External Advisory Board, School of Global Environmental Sustainability, CSU, (2018- present)
- Chair, Publications Committee, Ecological Society of America, (2017-2020)
- Chair, Earth System Science Department, Stanford University, (2016-2019)
- Advisory Board, School of Global Environmental Sustainability, CSU, (2015- present)

- Chair, Global Carbon Project (globalcarbonproject.org), (2014- present)
- Senior Associate Dean for Research, Nicholas School of the Environment, Duke University, (2010-2012)
- Co-Chair, U.S. Carbon Cycle Science Plan, (2009-2012)
- Vice President for Science, Ecological Society of America, (2007-2011)
- Director, National Institute for Climate Change Research, Department of Energy, (2005-2012)
- Co-Founder and Co-Director, Climate Change Policy Partnership, (2005-2011)
- Director, Duke University Center on Global Change, (2004-2013)
- President, Biogeosciences Section, American Geophysical Union, (2004-2006)
- Director, Duke University Program in Ecology, (2002-2006)
- Director, Duke University Laboratory for Isotope Ratio Mass Spectrometry, (2000-2013)
- President, Physiological Ecology Section, Ecological Society of America, (2000-2002)

HONORS AND AWARDS

- Fellow, Djerassi Resident Artists Program (2024)
- Fellow, American Academy of Arts and Sciences (2022)
- International Recognition Award, Mexican Carbon Program (PMC) (2021)
- Fellow, CASBS (2019)
- Fellow, John Simon Guggenheim Memorial Foundation (2018)
- Fellow, American Association for the Advancement of Science (2017)
- Fellow, Ecological Society of America (2012)
- Fellow, American Geophysical Union (2008)
- Presidential Early Career Award in Science and Engineering, National Science Foundation (1998)
- ISI Highly Cited, ISIHighlyCited.com (2004-present)
- Distinguished Postdoctoral Fellow for Global Change, Department of Energy, Stanford University
- Murray F. Buell Award for Excellence in Ecology, Ecological Society of America

BOARDS, ADVISORY COMMITTEES, PROFESSIONAL ORGANIZATIONS

- Chair, External Advisory Board, CSU School of Global Environmental Sustainability (2018 - present)
- Policy Advisory Board, Carbon Mapper (2022 - present)
- External Advisory Board, CREAM, Barcelona, Spain (2015 - present)
- Advisory Board, Methane Action (2021 - present)

PROFESSIONAL EDUCATION

- Ph.D., Utah State University , Ecology (1992)
- M.S., Utah State University , Statistics (1992)
- M.S., Utah State University , Ecology (1990)
- B.S., Rice University , Chemical Engineering (1983)

LINKS

- Jackson Lab Website: <https://jacksonlab.stanford.edu>
- Google Scholar Profile: <https://scholar.google.com/citations?user=G3NBUzwAAAAJ&hl=en>
- Into the Clear Blue Sky: <https://www.simonandschuster.com/books/Into-the-Clear-Blue-Sky/Rob-Jackson/9781668023266>

Research & Scholarship

PROJECTS

- Research Project - Stanford University
- Research Project - Stanford University
- Research Project - Stanford University

Teaching

COURSES

2023-24

- Carbon Dioxide and Methane Removal, Utilization, and Sequestration: EARTHSYS 308, ENERGY 308, ENVRES 295, ESS 308, ME 308 (Aut)
- Will Technology Save the World?: Environmental Ethics and Techno-Optimism: ESS 166, ESS 266 (Spr)

2022-23

- Carbon Dioxide and Methane Removal, Utilization, and Sequestration: EARTHSYS 308, ENERGY 308, ENVRES 295, ESS 308, ME 308 (Aut)

2021-22

- Carbon Dioxide and Methane Removal, Utilization, and Sequestration: EARTHSYS 308, ENERGY 308, ENVRES 295, ESS 308, ME 308 (Aut)
- Control of Nature: EARTHSYS 107, ESS 107 (Spr)

2020-21

- Control of Nature: EARTHSYS 107, ESS 107 (Spr)

STANFORD ADVISEES

Postdoctoral Faculty Sponsor

Xinyu Dou, Anchal Garg, Fa Li, Mengze Li, Rafael Stern, Xueying Yu

Master's Program Advisor

Laney Conger

Doctoral Dissertation Co-Advisor (AC)

Kelsey Foster, Leona Neftaliev, Metta Nicholson, Celina Scott-Buechler

Doctoral (Program)

Sierra Castaneda, Philippe Roberge

Publications

PUBLICATIONS

- **Emergent temperature sensitivity of soil organic carbon driven by mineral associations** *NATURE GEOSCIENCE*
Georgiou, K., Koven, C. D., Wieder, W. R., Hartman, M. D., Riley, W. J., Pett-Ridge, J., Bouskill, N. J., Abramoff, R. Z., Slessarev, E. W., Ahlstrom, A., Parton, W. J., Pellegrini, A. A., Pierson, et al
2024
- **Global Carbon Budget 2023** *EARTH SYSTEM SCIENCE DATA*
Friedlingstein, P., O'Sullivan, M., Jones, M. W., Andrew, R. M., Bakker, D. E., Hauck, J., Landschutzer, P., Le Quere, C., Luijkx, I. T., Peters, G. P., Peters, W., Pongratz, J., Schwingshackl, et al
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- **Soil carbon storage capacity of drylands under altered fire regimes** *NATURE CLIMATE CHANGE*
Pellegrini, A. A., Reich, P. B., Hobbie, S. E., Coetsee, C., Wigley, B., February, E., Georgiou, K., Terrer, C., Brookshire, E. J., Ahlstrom, A., Nieradzik, L., Sitch, S., Melton, et al
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- **Gas and Propane Combustion from Stoves Emits Benzene and Increases Indoor Air Pollution.** *Environmental science & technology*
Kashtan, Y. S., Nicholson, M., Finnegan, C., Ouyang, Z., Lebel, E. D., Michanowicz, D. R., Shonkoff, S. B., Jackson, R. B.
2023
- **Global patterns of water storage in the rooting zones of vegetation** *NATURE GEOSCIENCE*
Stocker, B. D., Tumber-Davila, S., Konings, A. G., Anderson, M. C., Hain, C., Jackson, R. B.
2023
- **Extensive global wetland loss over the past three centuries.** *Nature*
Fluet-Chouinard, E., Stocker, B. D., Zhang, Z., Malhotra, A., Melton, J. R., Poulter, B., Kaplan, J. O., Goldewijk, K. K., Siebert, S., Minayeva, T., Hugelius, G., Joosten, H., Barthelmes, et al
2023; 614 (7947): 281-286
- **Land-use emissions embodied in international trade.** *Science (New York, N.Y.)*
Hong, C., Zhao, H., Qin, Y., Burney, J. A., Pongratz, J., Hartung, K., Liu, Y., Moore, F. C., Jackson, R. B., Zhang, Q., Davis, S. J.
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- **Human well-being and per capita energy use** *ECOSPHERE*
Jackson, R. B., Ahlstrom, A., Hugelius, G., Wang, C., Porporato, A., Ramaswami, A., Roy, J., Yin, J.
2022; 13 (4)
- **Global fossil carbon emissions rebound near pre-COVID-19 levels** *ENVIRONMENTAL RESEARCH LETTERS*
Jackson, R. B., Friedlingstein, P., Le Quere, C., Abernethy, S., Andrew, R. M., Canadell, J. G., Ciais, P., Davis, S. J., Deng, Z., Liu, Z., Korsbakken, J., Peters, G. P.
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- **Global temperature goals should determine the time horizons for greenhouse gas emission metrics** *ENVIRONMENTAL RESEARCH LETTERS*
Abernethy, S., Jackson, R. B.
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- **A tradeoff between plant and soil carbon storage under elevated CO2** *Nature*
Terrer, C., et al
2021; 591: 599–603
- **Atmospheric Methane Removal: A Research Agenda** *Philosophical Transactions of the Royal Society A*
Jackson, R. B., et al
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- **Global and regional drivers of land-use emissions in 1961-2017.** *Nature*
Hong, C. n., Burney, J. A., Pongratz, J. n., Nabel, J. E., Mueller, N. D., Jackson, R. B., Davis, S. J.
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- **Temporary reduction in daily global CO2 emissions during the COVID-19 forced confinement** *NATURE CLIMATE CHANGE*
Le Quere, C., Jackson, R. B., Jones, M. W., Smith, A. P., Abernethy, S., Andrew, R. M., De-Gol, A. J., Willis, D. R., Shan, Y., Canadell, J. G., Friedlingstein, P., Creutzig, F., Peters, et al
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- **Pervasive shifts in forest dynamics in a changing world.** *Science (New York, N.Y.)*
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2020; 368 (6494)
- **Methane removal and atmospheric restoration** *Nature Sustainability*
Jackson, R. B., Solomon, E. I., Canadell, J. G., Cargnello, M., Field, C. B.
2019; 2: 436-438

- **Persistent fossil fuel growth threatens the Paris Agreement and planetary health** *Environmental Research Letters*
Jackson, R. B., Friedlingstein, P., Andrew, R. M., Canadell, J. G., Le Quéré, C., Peters, G. P.
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- **Fire frequency drives decadal changes in soil carbon and nitrogen and ecosystem productivity.** *Nature*
Pellegrini, A. F., Ahlström, A., Hobbie, S. E., Reich, P. B., Nieradzik, L. P., Staver, A. C., Scharenbroch, B. C., Jumpponen, A., Anderegg, W. R., Randerson, J. T., Jackson, R. B.
2018; 553 (7687): 194-198
- **The Ecology of Soil Carbon: Pools, Vulnerabilities, and Biotic and Abiotic Controls** *ANNUAL REVIEW OF ECOLOGY, EVOLUTION, AND SYSTEMATICS, VOL 48*
Jackson, R. B., Lajtha, K., Crow, S. E., Hugelius, G., Kramer, M. G., Pineiro, G., Futuyma, D. J.
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- **Global nitrous oxide budget (1980-2020)** *EARTH SYSTEM SCIENCE DATA*
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2024; 16 (6): 2543-2604
- **Cost modeling of photocatalytic decomposition of atmospheric methane and nitrous oxide** *ENVIRONMENTAL RESEARCH LETTERS*
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- **Downstream natural gas composition across US and Canada: implications for indoor methane leaks and hazardous air pollutant exposures** *ENVIRONMENTAL RESEARCH LETTERS*
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- **Nitrogen dioxide exposure, health outcomes, and associated demographic disparities due to gas and propane combustion by U.S. stoves.** *Science advances*
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- **Atmospheric methane removal may reduce climate risks** *ENVIRONMENTAL RESEARCH LETTERS*
Abernethy, S., Jackson, R. B.
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- **Communities conditionally support deployment of direct air capture for carbon dioxide removal in the United States (vol 5, 175, 2024)** *COMMUNICATIONS EARTH & ENVIRONMENT*
Scott-Buechler, C., Cain, B., Osman, K., Ardoin, N. M., Fraser, C., Adcox, G., Polk, E., Jackson, R. B.
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- **Boreal-Arctic wetland methane emissions modulated by warming and vegetation activity.** *Nature climate change*
Yuan, K., Li, F., McNicol, G., Chen, M., Hoyt, A., Knox, S., Riley, W. J., Jackson, R., Zhu, Q.
2024; 14 (3): 282-288
- **Global distribution of surface soil organic carbon in urban greenspaces.** *Nature communications*
Guo, H., Du, E., Terrer, C., Jackson, R. B.
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- **Recent increases in annual, seasonal, and extreme methane fluxes driven by changes in climate and vegetation in boreal and temperate wetland ecosystems** *GLOBAL CHANGE BIOLOGY*
Feron, S., Malhotra, A., Bansal, S., Fluet-Chouinard, E., McNicol, G., Knox, S. H., Delwiche, K. B., Cordero, R. R., Ouyang, Z., Zhang, Z., Poulter, B., Jackson, R. B.
2024; 30 (1): e17131
- **Net-zero approaches must consider Earth system impacts to achieve climate goals** *NATURE CLIMATE CHANGE*
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2023; 13 (12): 1298-1305

- **Characterizing Performance of Freshwater Wetland Methane Models Across Time Scales at FLUXNET-CH₄ Sites Using Wavelet Analyses** *JOURNAL OF GEOPHYSICAL RESEARCH-BIOGEOSCIENCES*
Zhang, Z., Bansal, S., Chang, K., Fluet-Chouinard, E., Delwiche, K., Goeckede, M., Gustafson, A., Knox, S., Leppanen, A., Liu, L., Liu, J., Malhotra, A., Markkanen, et al
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- **Impacts of climate change, population growth, and power sector decarbonization on urban building energy use.** *Nature communications*
Wang, C., Song, J., Shi, D., Reyna, J. L., Horsey, H., Feron, S., Zhou, Y., Ouyang, Z., Li, Y., Jackson, R. B.
2023; 14 (1): 6434
- **Upscaling Wetland Methane Emissions From the FLUXNET-CH₄ Eddy Covariance Network (UpCH₄ v1.0): Model Development, Network Assessment, and Budget Comparison** *AGU ADVANCES*
McNicol, G., Fluet-Chouinard, E., Ouyang, Z., Knox, S., Zhang, Z., Aalto, T., Bansal, S., Chang, K., Chen, M., Delwiche, K., Feron, S., Goeckede, M., Liu, et al
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- **A large nitrogen supply from the stable mineral-associated soil organic matter fraction** *BIOLOGY AND FERTILITY OF SOILS*
Villarino, S. H., Talab, E., Contisciani, L., Videla, C., Di Geronimo, P., Mastrangelo, M. E., Georgiou, K., Jackson, R. B., Pineiro, G.
2023
- **Observational constraints reduce model spread but not uncertainty in global wetland methane emission estimates.** *Global change biology*
Chang, K. Y., Riley, W. J., Collier, N., McNicol, G., Fluet-Chouinard, E., Knox, S. H., Delwiche, K. B., Jackson, R. B., Poulter, B., Saunio, M., Chandra, N., Gedney, N., Ishizawa, et al
2023
- **Single-blind validation of space-based point-source detection and quantification of onshore methane emissions.** *Scientific reports*
Sherwin, E. D., Rutherford, J. S., Chen, Y., Aminfar, S., Kort, E. A., Jackson, R. B., Brandt, A. R.
2023; 13 (1): 3836
- **Reconciling the bottom-up and top-down estimates of the methane chemical sink using multiple observations** *ATMOSPHERIC CHEMISTRY AND PHYSICS*
Zhao, Y., Saunio, M., Bousquet, P., Lin, X., Hegglin, M. I., Canadell, J. G., Jackson, R. B., Zheng, B.
2023; 23 (1): 789-807
- **Modeled production, oxidation and transport processes of wetland methane emissions in temperate, boreal, and Arctic regions.** *Global change biology*
Ueyama, M., Knox, S. H., Delwiche, K. B., Bansal, S., Riley, W. J., Baldocchi, D., Hirano, T., McNicol, G., Schafer, K., Windham-Myers, L., Poulter, B., Jackson, R. B., Chang, et al
2023
- **Paddy rice methane emissions across Monsoon Asia** *REMOTE SENSING OF ENVIRONMENT*
Ouyang, Z., Jackson, R. B., McNicol, G., Fluet-Chouinard, E., Runkle, B. K., Papale, D., Knox, S. H., Cooley, S., Delwiche, K. B., Feron, S., Irvin, J., Malhotra, A., Muddasir, et al
2023; 284
- **The global spectrum of plant form and function: enhanced species-level trait dataset.** *Scientific data*
Díaz, S., Kattge, J., Cornelissen, J. H., Wright, I. J., Lavorel, S., Dray, S., Reu, B., Kleyer, M., Wirth, C., Prentice, I. C., Garnier, E., Bönisch, G., Westoby, et al
2022; 9 (1): 755
- **Microbes modify soil nutrient availability and mediate plant responses to elevated CO₂** *PLANT AND SOIL*
Pellitier, P. T., Jackson, R. B.
2022
- **Global Carbon Budget 2022** *EARTH SYSTEM SCIENCE DATA*
Friedlingstein, P., O'Sullivan, M., Jones, M. W., Andrew, R. M., Gregor, L., Hauck, J., Le Quere, C., Luijkx, I. T., Olsen, A., Peters, G. P., Peters, W., Pongratz, J., Schwingshackl, et al
2022; 14 (11): 4811-4900
- **Causality guided machine learning model on wetland CH₄ emissions across global wetlands** *AGRICULTURAL AND FOREST METEOROLOGY*
Yuan, K., Zhu, Q., Li, F., Riley, W. J., Torn, M., Chu, H., McNicol, G., Chen, M., Knox, S., Delwiche, K., Wu, H., Baldocchi, D., Ma, et al
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- **Make greenhouse-gas accounting reliable - build interoperable systems** *Comment NATURE*

- Luers, A., Yona, L., Field, C. B., Jackson, R. B., Mach, K. J., Cashore, B. W., Elliott, C., Gifford, L., Honigsberg, C., Klaassen, L., Matthews, H., Peng, A., Stoll, et al
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- **Global stocks and capacity of mineral-associated soil organic carbon.** *Nature communications*
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 - **Global patterns of daily CO₂ emissions reductions in the first year of COVID-19** *NATURE GEOSCIENCE*
Liu, Z., Deng, Z., Zhu, B., Ciais, P., Davis, S. J., Tan, J., Andrew, R. M., Boucher, O., Ben Arous, S., Canadell, J. G., Dou, X., Friedlingstein, P., Gentine, et al
2022
 - **A 130-year global inventory of methane emissions from livestock: trends, patterns, and drivers.** *Global change biology*
Zhang, L., Tian, H., Shi, H., Pan, S., Chang, J., Dangal, S. R., Qin, X., Wang, S., Tubiello, F. N., Canadell, J. G., Jackson, R. B.
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 - **Anthropogenic emission is the main contributor to the rise of atmospheric methane during 1993-2017.** *National science review*
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 - **Global Carbon Budget 2021** *EARTH SYSTEM SCIENCE DATA*
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 - **Definitions and methods to estimate regional land carbon fluxes for the second phase of the REgional Carbon Cycle Assessment and Processes Project (RECCAP-2)** *GEOSCIENTIFIC MODEL DEVELOPMENT*
Ciais, P., Bastos, A., Chevallier, F., Lauerwald, R., Poulter, B., Canadell, P., Hugelius, G., Jackson, R. B., Jain, A., Jones, M., Kondo, M., Luijkx, I. T., Patra, et al
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 - **Methane and NO_x Emissions from Natural Gas Stoves, Cooktops, and Ovens in Residential Homes.** *Environmental science & technology*
Lebel, E. D., Finnegan, C. J., Ouyang, Z., Jackson, R. B.
1800
 - **Contrasting responses of woody and grassland ecosystems to increased CO₂ as water supply varies.** *Nature ecology & evolution*
Pan, Y., Jackson, R. B., Hollinger, D. Y., Phillips, O. L., Nowak, R. S., Norby, R. J., Oren, R., Reich, P. B., Luscher, A., Mueller, K. E., Owensby, C., Birdsey, R., Hom, et al
1800
 - **Plant sizes and shapes above- and belowground and their interactions with climate.** *The New phytologist*
Tumber-Dávila, S. J., Schenk, H. J., Du, E., Jackson, R. B.
2022
 - **Longevity Combating Climate Change in an Era of GENERATIONS**
Wang, C., Miller, J. G., Jackson, R. B., Carstensen, L. L.
2022; 46 (2)
 - **Fire effects on the persistence of soil organic matter and long-term carbon storage** *NATURE GEOSCIENCE*
Pellegrini, A. A., Harden, J., Georgiou, K., Hemes, K. S., Malhotra, A., Nolan, C. J., Jackson, R. B.
2021
 - **Rethinking the urban physical environment for century-long lives: from age-friendly to longevity-ready cities.** *Nature aging*
Wang, C., Huertas, D. S., Rowe, J. W., Finkelstein, R., Carstensen, L. L., Jackson, R. B.
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 - **Methane removal and the proportional reductions in surface temperature and ozone.** *Philosophical Transactions of the Royal Society A*
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- **Global mapping of crop-specific emission factors highlights hotspots of nitrous oxide mitigation.** *Nature food*
Cui, X., Zhou, F., Ciais, P., Davidson, E. A., Tubiello, F. N., Niu, X., Ju, X., Canadell, J. G., Bouwman, A. F., Jackson, R. B., Mueller, N. D., Zheng, X., Kanter, et al
2021; 2 (11): 886-893
- **Global mapping of crop-specific emission factors highlights hotspots of nitrous oxide mitigation** *NATURE FOOD*
Cui, X., Zhou, F., Ciais, P., Davidson, E. A., Tubiello, F. N., Niu, X., Ju, X., Canadell, J. G., Bouwman, A. F., Jackson, R. B., Mueller, N. D., Zheng, X., Kanter, et al
2021
- **Gap-filling eddy covariance methane fluxes: Comparison of machine learning model predictions and uncertainties at FLUXNET-CH4 wetlands** *AGRICULTURAL AND FOREST METEOROLOGY*
Irvin, J., Zhou, S., McNicol, G., Lu, F., Liu, V., Fluet-Chouinard, E., Ouyang, Z., Knox, S., Lucas-Moffat, A., Trotta, C., Papale, D., Vitale, D., Mammarella, et al
2021; 308
- **Regional trends and drivers of the global methane budget.** *Global change biology*
Stavert, A. R., Saunio, M., Canadell, J. G., Poulter, B., Jackson, R. B., Regnier, P., Lauerwald, R., Raymond, P. A., Allen, G. H., Patra, P. K., Bergamaschi, P., Bousquet, P., Chandra, et al
2021
- **Geochemical evidence for fugitive gas contamination and associated water quality changes in drinking-water wells from Parker County, Texas.** *The Science of the total environment*
Whyte, C. J., Vengosh, A., Warner, N. R., Jackson, R. B., Muehlenbachs, K., Schwartz, F. W., Darrah, T. H.
2021; 780: 146555
- **FLUXNET-CH4: a global, multi-ecosystem dataset and analysis of methane seasonality from freshwater wetlands** *EARTH SYSTEM SCIENCE DATA*
Delwiche, K. B., Knox, S., Malhotra, A., Fluet-Chouinard, E., McNicol, G., Feron, S., Ouyang, Z., Papale, D., Trotta, C., Canfora, E., Cheah, Y., Christianson, D., Alberto, et al
2021; 13 (7): 3607-3689
- **Divergent controls of soil organic carbon between observations and process-based models** *BIOGEOCHEMISTRY*
Georgiou, K., Malhotra, A., Wieder, W. R., Ennis, J. H., Hartman, M. D., Sulman, B. N., Berhe, A., Grandy, A., Kyker-Snowman, E., Lajtha, K., Moore, J. M., Pierson, D., Jackson, et al
2021
- **Quantification of global and national nitrogen budgets for crop production** *NATURE FOOD*
Zhang, X., Zou, T., Lassaletta, L., Mueller, N. D., Tubiello, F. N., Lisk, M. D., Lu, C., Conant, R. T., Dorich, C. D., Gerber, J., Tian, H., Bruulsema, T., Maaz, et al
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