

Robert D. Field

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Research interests

Climate modeling, biomass burning, stable water isotopes, paleoclimatology.

Education

2010 PhD Atmospheric Physics, University of Toronto
2005 MSc Statistics, University of Alberta
1999 BSc Computing Science, University of Alberta

Employment

2013 – Associate Research Scientist
present Columbia University, Department of Applied Physics and Applied Mathematics
NASA Goddard Institute for Space Studies

2010 – Postdoctoral Fellow
2013 Columbia University, Department of Applied Physics and Applied Mathematics
NASA Goddard Institute for Space Studies

2004 - Research Associate
2005 University of Alberta, Department of Rural Economy

1999 - Scientific Programmer
2004 Canadian Forest Service, Forest Fire Research Group

Publications

Mortelmans, J., A. Felsberg, G.J.M. De Lannoy, S. Veraverbeke, R.D. Field, N. Andela, and M. Bechtold, The Fire Weather Index Improved for Boreal Peatlands Using Hydrological Modeling and Satellite-Based L-band Microwave Observations, submitted.

M. Luo, H.M. Worden, R.D. Field, K. Tsigaridis, G.S. Elsaesser, TROPES CrIS CO single pixel vertical profiles: Intercomparisons with MOPITT and model comparisons for 2020 US Western wildfires, submitted.

Field, R.D., M. Luo, S.E. Bauer, J.E. Hickman, G.S. Elsaesser, K. Mezuman, M. van Lier-Walqui, K. Tsigaridis, J. Wu, Estimating the impact of a 2017 smoke plume on surface climate over northern Canada with a climate model, satellite retrievals, and weather forecasts, submitted.

Larose, J., É. Boucher, A. de Vernal, I. Hermoso de Mendoza, F. Gennaretti, A. Lavergne, L. Andreu-Hayles, R.D. Field, Labrador Sea's influence on black spruce forests: insights from tree-ring stable oxygen isotopes, submitted.

Tanpipat, V., K. Manomaiphiboon, R.D. Field, W.J. de Groot, P. Nhuchaiya, N. Jaroornattanapak, C. Buaniam, J. Yodcum, An Operational Fire Danger Rating System for Thailand and Lower Mekong Region: Development, Utilization, and Experiences, eds. K. P. Vadrevu, T Ohara, C. Justice, Vegetation Fires and Pollution in Asia, Springer, submitted.

Borges, D., S. Ramage, D. Green, C. Justice, C. Nakalembe, A.K. Whitcraft, B. Barker, I. Becker-Reshef, C. Balagizi, S. Salvi, V.G. Ambrosia, J. San-Miguel-Ayanz, L. Boschetti, R. Field, L. Giglio, L. Kühle, F. Löw, A. Kettner, G. Schumman, G. R. Brakenridge, R. Adler, H. Kontoes, D. de Boissezon, A. Eddy, D. Kirschbaum, R. Emberson, K. Reichenbach, S. Cooley, S. Lloyd, C. Blake, Earth Observations into Action: Systemic Integration of Earth Observation Application into National Risk Reduction Decision Structures, Disaster Prevention Management, doi:10.1108/DPM-09-2022-0186, 2023.

Grillakis, M., A. Voulgarakis, A. Rovithakis, K. D. Seiradakis, A. Koutroulis, R. D. Field, M. Kasoar, A. Papadopoulos, M. Lazaridis, Climate drivers of global wildfire burned area, Environmental Research Letters, 17, no. 4, 045021, doi:10.1088/1748-9326/ac5fa1, 2022.

Rovithakis, A., M.G. Grillakis, K.D. Seiradakis, C. Giannakopoulos, A. Karali, R.D. Field, M. Lazaridis and A. Voulgarakis, Future Climate Change Impact on Wildfire Danger over the Mediterranean: the case of Greece, Environmental Research Letters, 17, no. 4, 045022, doi:10.1088/1748-9326/ac5f94, 2022.

Hermoso de Mendoza, I., E. Boucher, F. Gennaretti, A. Lavergne, L. Andreu-Hayles, and R.D. Field, A new snow module improves predictions of isotope-enabled MAIDENiso forest growth model, Geoscientific Model Development, doi.org/10.5194/gmd-15-1931-202215, 1931-1952, 2022.

Field, R.D., L. Andreu-Hayles, R.D. D'Arrigo, R. Oelkers, B.H. Luckman, D. Morimoto, E. Boucher, F. Gennaretti, I. Hermoso, A. Lavergne, M. Levesque, Tree-ring cellulose $\delta^{18}\text{O}$ records similar large-scale climate influences as precipitation $\delta^{18}\text{O}$ in the Northwest Territories of Canada, Climate Dynamics, doi: 10.1007/s00382-021-05932-4, 2022.

Field, R.D., J.E. Hickman, I.V. Geogdzhayev, K. Tsigaridis, S.E. Bauer, Changes in satellite retrievals of atmospheric composition over China during the 2020 COVID-19 lockdowns, Atmospheric Chemistry and Physics, 21, 18333–18350, doi: 10.5194/acp-21-18333-2021, 2021.

Braneon, C., R.D. Field, E. Seto, L. Chen, K. McConnell, L. Robinson, S. Richardson, S., 2020, Towards disentangling lockdown-driven air quality changes in the Northeastern U.S., Journal of Extreme Events, 20, 8, doi: 10.1142/S2345737621500172, 2021.

Schon, J., K. Mezuman, A. Heslin, R.D. Field, M.J. Puma, How fire patterns reveal uneven stabilization at the end of conflict: Examining Syria's unusual fire year in 2019, Environmental Research Letters, 16, 044046, doi: 10.1088/1748-9326/abe327, 2021.

Field, R.D., Evaluation of Global Fire Weather Database re-analysis and short-term forecast products, Nat. Hazards Earth Syst. Sci., 20, no. 4, 1123-1147, doi:10.5194/nhess-20-1123-2020, 2020.

Field, R.D., Using Satellite Estimates of Precipitation for Fire Danger Rating, In: Satellite Precipitation Measurement, eds. V. Levizzani, C. Kidd, D.B. Kirschbaum, C.D. Kummerow, K. Nakamura, F. J. Turk, Advances in Global Change Research, vol. 69. Springer, pp. 1131-1154, doi:10.1007/978-3-030-35798-6_33, 2020.

Jethva, H., O. Torres, R.D. Field, A. Lyapustin, R. Guatam, V. Kayetha, Connecting Crop Productivity, Residue Fires, and Air Quality over Northern India, Scientific Reports, 9, doi:10.1038/s41598-019-52799-x, 2019.

Pan, X., Chin, M., Ichoku, C., Field, R.D., Connecting Indonesian Fires and Drought With the Type of El Niño and Phase of the Indian Ocean Dipole During 1979–2016, *Journal of Geophysical Research – Atmospheres*, 123, 7974–7988, doi: 10.1029/2018JD028402, 2018.

Heyer, J.P., M.J. Power, R.D. Field, M.J.E. van Marle, Effects of drought and forest loss in lowland Bolivia on fire and smoke emissions, *Biogeosciences*, 15, 4317–4331, doi:10.5194/bg-15-4317-2018.

Shawki, D., R.D. Field, M.K. Tippett, B.H. Saharjo, I. Albar, D. Atmoko, A. Voulgarakis, Long-lead prediction of the 2015 fire and haze episode in Indonesia, *Geophysical Research Letters*, 44, 9996–10,005, <https://doi.org/10.1002/2017GL073660>, 2017.

van Marle, M.J.E., S. Kloster, B.I. Magi, J.R. Marlon, A. Daniau, R.D. Field, A. Arneth, M. Forrest, S. Hantson, N. Kehrwald, W. Knorr, G. Lasslop, F. Li, S. Mangeon, C. Yue, J.W. Kaiser, G.R. van der Werf, Historic global biomass burning emissions based on merging satellite observations with proxies and fire models (1750–2015), *Geoscientific Model Development*, 10, 3329–3357, <https://doi.org/10.5194/gmd-10-3329-2017>, 2017.

CMIP6 biomass burning emissions estimates data

van Marle, M.J.E., R.D. Field, G.R. van der Werf, I.A. Estrada de Wagt, R.A. Houghton, L.V. Rizzo, P. Artaxo, K. Tsigaridis, Fire and deforestation dynamics in Amazonia (1973–2012), *Global Biogeochemical Cycles*, 10.1002/2016GB005445, 2017.

EOS Research Spotlight

Galewsky, J., H.C. Steen-Larsen, R.D. Field, C. Risi, J. Worden, Stable isotopes in atmospheric water vapor and applications to the hydrologic cycle, *Reviews of Geophysics*, doi:10.1002/2015RG000512, 2016.

AGU Editor's Highlight

Field, R.D., G.R. van der Werf, T. Fanin, E.J. Fetzer, R. Fuller, H. Jethva, R. Levy, N. J. Livesey, M. Luo, O. Torres, H.M. Worden, 2015 Indonesian fire activity and smoke pollution show persistent non-linear sensitivity to El Niño-induced drought, *Proceedings of the National Academy of Sciences*, doi:10.1073/pnas.1524888113, 2016.

NASA Feature and PNAS news release

Geller, M.A., T. Zhou, D. Shindell, R. Ruedy, I. Aleinov, L. Nazarenko, N.L. Tausnev, M. Kelley, S. Sun, Y. Cheng, R.D. Field, G. Faluvegi, Modeling the QBO – Other model improvements resulting from the required increased vertical resolution, *Journal of Advances in Modeling Earth Systems*, doi:10.1002/2016MS000699, 2016.

Field, R.D., M. Luo, M. Fromm, A. Voulgarakis, S. Mangeon, J. Worden, Simulating the Black Saturday 2009 smoke plume with an interactive composition-climate model: sensitivity to emissions amount, timing and injection height, *Journal of Geophysical Research - Atmospheres*, 121, doi:10.1002/2015JD024343, 2016.

Moore, G.W.K., R.D. Field, C. Benson, Impact of source region on the $\delta^{18}\text{O}$ signal in snow: A case study from Mount Wrangell Alaska, *Journal of Hydrometeorology*, doi: 10.1175/JHM-D-14-0224.1, 2016.

Mangeon, S., R.D. Field, M. Fromm, C. McHugh, and A. Voulgarakis, Satellite versus ground-based estimates of burned area: A comparison between MODIS based burned area and fire agency reports over North America in 2007. *Anthropocene Rev.*, 3, no. 2, 76-92, doi:10.1177/2053019615588790, 2016.

Field, R.D., M. Luo, D. Kim, A. D. Del Genio, A. Voulgarakis, J. Worden, Sensitivity of simulated tropospheric CO to subgrid physics parameterization: a case study of Indonesian biomass burning emissions in 2006, *Journal of Geophysical Research – Atmospheres*, 120, doi:10.1002/2015JD023402, 2015.

Field, R.D., A.C. Spessa, N.A. Aziz, A. Camia, A. Cantin, R. Carr, W.J. de Groot, A.J. Dowdy, M.D. Flannigan, K. Manomaiphiboon, F. Pappenberger, V. Tanpipat, X. Wang, Development of a Global Fire Weather Database, *Natural Hazards and Earth System Sciences*, 15, 1407-1423, doi:10.5194/nhess-15-1407-2015, 2015.

Data available at the NASA GISS GFWED website and Columbia IRI Data Library
EGU Highlighted Paper

Voulgarakis, A. and R.D. Field, Fire influences on atmospheric composition, air quality, and climate, *Current Pollution Reports*, 10.1007/s40726-015-0007-z, 2015.

Spessa, A. C., R. D. Field, F. Pappenberger, A. Langner, S. Englhart, U. Weber, T. Stockdale, F. Siegert, J. W. Kaiser, and J. Moore, Seasonal forecasting of fire in Kalimantan, Indonesia, *Natural Hazards and Earth System Sciences*, 15, 429-442, doi:10.5194/nhess-15-429-2015, 2015.

Lestari, R.K., M. Watanabe, Y. Imada, H. Shiogama, R. D. Field, T. Takemura, M. Kimoto, Increasing potential of biomass burning over Sumatra, Indonesia induced by anthropogenic tropical warming, *Environmental Research Letters*, 9, no. 10, 104010, doi:10.1088/1748-9326/9/10/104010, 2014.

Field, R.D., D. Kim, A.N. LeGrande, J. Worden, M. Kelley, G.A. Schmidt, Evaluating climate model performance in the tropics with retrievals of water isotopic composition from Aura TES, *Geophysical Research Letters*, doi:10.1002/2014GL060572, 2014.

Porter, T., M. J. Pisaric, R.D. Field, S. Kokelj, T. D. Edwards, P. deMontigny, R. Healy, and A. LeGrande, Spring-summer temperatures since AD 1780 reconstructed from stable oxygen isotope ratios in white spruce tree-rings from the Mackenzie Delta, northwestern Canada, *Climate Dynamics*, doi:10.1007/s00382-013-1674-3, 2014.

Voulgarakis, A., V. Naik, J.-F. Lamarque, D. T. Shindell, P. J. Young, M. J. Prather, O. Wild, R. D. Field, D. Bergman, P. Cameron-Smith, I. Cionni, W. J. Collins, S. B. Dalsøren, R. M. Doherty, V. Eyring, G. A. Folberth, L. W. Horowitz, B. Josse, I. A. McKenzie, T. Nagashima, D. A. Plummer, M. Righi, S. T. Rumbold, D. S. Stevenson, S. A. Strode, K. Sudo, S. Szopa, and G. Zeng, Simulations of present-day and future OH and methane lifetime in the ACCMIP project, *Atmospheric Chemistry and Physics*, 13, doi:10.5194/acp-13-2563-2013, 2563-2587, 2013.

Field, R.D., C. Risi, G.A. Schmidt, J. Worden, A. Voulgarakis, A.N. LeGrande, A.H. Sobel, R.J. Healy, A Tropospheric Emission Spectrometer HDO/H₂O retrieval simulator for climate models, *Atmospheric Chemistry and Physics*, 12, doi:10.5194/acp-12-10485-2012, 10485-10504, 2012.

Field, R.D., D.B.A. Jones and D.P. Brown, The effects of post-condensation exchange on the isotopic composition of water in the atmosphere, *Journal of Geophysical Research-Atmospheres*, 115, D24305, doi:10.1029/2010JD014334, 2010.

Field, R.D., Observed and modeled controls on precipitation $\delta^{18}\text{O}$ over Europe: from local temperature to the Northern Annular Mode, *Journal of Geophysical Research-Atmospheres*, 115, D12101, doi:10.1029/2009JD013370, 2010.

Field, R.D., G.W.K. Moore, G. Holdsworth, and G. A. Schmidt. A GCM-based analysis of circulation controls on $\delta^{18}\text{O}$ in the southwest Yukon, Canada: implications for climate reconstructions in the region, *Geophysical Research Letters*, 37 (5), doi:10.1029/2009GL041408, 2010.

Hanesiak, J., R. Stewart, P. Taylor, K. Moore, D. Barber, G. McBean, W. Strapp, M. Wolde, R. Goodson, E. Hudson, D. Hudak, J. Scott, G. Liu, J. Gilligan, S. Biswas, D. Desjardins, R. Dyck, S. Fargey, R. Field, G. Gascon, M. Gordon, H. Greene, C. Hay, W. Henson, K. Hochheim, A. Laplante, R. Martin, M. Melzer, and S. Zhang, Storm Studies in the Arctic (STAR), *Bulletin of the American Meteorological Society*, 91 (1), 47-68, 2010.

Field, R.D., G.R. van der Werf, and S.S.P. Shen, Human amplification of drought-induced biomass burning in Indonesia since 1960, *Nature Geoscience*, 2 (3), 185-188, doi:10.1038/ngeo443, 2009.

Nature Geoscience Backstory and news releases from University of Toronto, VU Amsterdam, Netherlands Organization for Scientific Research

Field, R. D. and S. S. P. Shen. Predictability of carbon emissions from biomass burning in Indonesia from 1997 to 2006, *Journal of Geophysical Research-Biogeosciences*, 113, G04024, doi:10.1029/2008JG000694, 2008.

de Groot, W.J., R.D. Field, M.A. Brady, O. Roswintiarti, and M. Mohamad. Development of the Indonesian and Malaysian Fire Danger Rating Systems. *Mitigation and Adaptation Strategies for Global Change*, 12, 165-180, 2007.

Dymond, C.C., R.D. Field, O. Roswintiarti, and Guswanto. Calibrating components of a fire management system using satellite fire detection. *Environmental Management*, 35, 426-440, 2005.

Field, R.D., Y. Wang, O. Roswintiarti, and Guswanto. A drought-based predictor of recent haze events in western Indonesia. *Atmospheric Environment*, 38, 1869-1878, 2004.

Wang, Y., R.D. Field, and O. Roswintiarti. Trends in atmospheric haze induced by peat fires in Sumatra Island, Indonesia and El Niño phenomenon from 1973 to 2003. *Geophysical Research Letters*, 31, L04103, 2004.

Reports

International Union of Forest Research Organizations, 2018. *Global Fire Challenges in a Warming World*. Robinne F.-N., Burns J., Kant P., de Groot B., Flannigan M.D., Kleine M., Wotton D. M. (eds.). Occasional Paper No. 32. IUFRO, Vienna, Austria.

Goldammer, J. G., Mangeon, S., Keywood, M., Kaiser, J. W., de Groot, W. J., Gunawan, D., Gan, C., Field, R., Sofiev, M., Baklanov, A., 2018. Vegetation Fire and Smoke Pollution Warning and Advisory System (VFSP-WAS): concept note and expert recommendations. Vol. 235 of GAW Report series. World Meteorological Organization, Geneva, Switzerland.

Media and outreach

“The Smoke Is Actually Making Us Colder – For Now”, Matthew Zeitlin, Heatmap, July 1, 2023.

“Wildfire smoke hits New York again”, Catherine Clifford, CNBC, June 28, 2023.

“The Only Positive of Smokemageddon”, New York Times, Peter Coy, June 9, 2023.

“An ungodly, dystopian landscape’: New York’s skies underscore climate stakes”, Rachel Frazin, The Hill, June 8, 2023.

“Let’s Go”, CBC Radio, Sabrina Marandola, June 7, 2023.

“Satellite Observations and Tools for Fire Risk, Detection, and Analysis”, NASA Applied Remote Sensing Training Program, May 11, 2021.

“With La Niña conditions back, is it good news for tropical forests?”, Mongabay, Carolyn Cowan, November 22, 2021.

“How Wildfires Start – And Why Climate Change is Making Them Worse”, NBCLX, Sara Sanchez, August 25, 2021.

“The Dixie Fire is now the largest blaze in the U.S., and third-largest wildfire on record in California.”, New York Times, Sophie Kasakove, August 6, 2021.

“How extreme fire weather can cool the planet”, National Geographic, Maddie Stone, August 6, 2021.

“Simply Science Climate Change Special”, CUNY TV, April 7, 2021.

“2020 Was Earth’s 2nd-Hottest on Record and Colorado Felt it”, Colorado Public Radio Interview, January 14, 2021.

“Smoke From California Wildfires Creates Haze Over NYC”, Patch, Jeff Arnold, September 16, 2020.

“Sky tinged yellow, brown as wildfire smoke arrives in tri-state area”, PIX11 TV Interview, Shirley Chan, September 15, 2020.

“Siberia is on Fire With Arctic Temperatures Reaching 100 Degrees: Why?” Newsweek, Aristos Georgiou, June 26, 2020.

“Heat and Fire Scorches Siberia”, NASA Earth Observatory, Adam Voiland, June 23, 2020.

“A Fiery Month in Zulia”, NASA Earth Observatory, Adam Voiland, April 28, 2020.

“What Is Left in the Air After a Wildfire Depends on Exactly What Burned”, AGU EOS, Megan Sever, January 23 2020.

“NASA Tracks Carbon Monoxide from the 2020 Australia Fires”, NASA Earth Science Disasters Program, Jacob Reed, January 29, 2020.

“Indonesia forest fires raise concerns about health”, The Lancet, Chris McCall, November 9, 2019.

J. Schon, R.Field, M. Puma “How Fires Threaten Syria’s Security”, New Security Beat, October 15, 2019.

“Parched peatlands fuel Indonesia’s blazes”, Science, Dennis Normile, October 4, 2019.

“Forest fire haze clears over Singapore ahead of F1”, The Jakarta Post, Martin Abbugao, September 20, 2019.

“Smoke Blankets Borneo”, NASA Earth Observatory, Adam Voiland, September 14, 2019.

“The Everglades is on fire, but it’s actually fine”, VICE News, Alex Lubben, June 26, 2019.

“Val Alen Sessions: Fireproofing the Future in California”, panel event and film premiere, hosted by the Van Alen Institute and School of Visual Arts, February 19, 2019.

“2018 Wildfires”, AGU 2018 Fall Meeting Media Availability, December 11, 2018.

“Could Indonesia’s mega-fires return in 2019?”, Unearthed, Joe Sandler Clarke, September 24, 2018.

“Forecasting Fire”, NASA Earth Observatory, Kasha Patel, July 6 2018.

“NASA Rainfall Data and Global Fire Weather”, NASA GSFC Scientific Visualization Studio, Ryan Fitzgibbons, June 28, 2018.

“Here’s what Indonesia is doing about its deadly haze from forest and peatland fires”, Ensia, Nithin Coca, August 15 2017.

“Wildfires cause evacuation of Olympic Venues near Rio”, Washington Post, Des Belier, August 15 2016.

“2015 Indonesian fire activity and smoke pollution show persistent non-linear sensitivity to El Niño-induced drought”: coverage in National Geographic, New Scientist, Gizmodo, The Straits Times, Phys.Org, Deutsche Welle.

NASA Goddard Space Flight Center Wildfire Live Shot, July 29, 2016 for TV, radio and print.

“Climate Change’s Fingerprints All Over California Wildfires”, Climate Central, Bobby Magill, July 2016.

“Heat Fuels Fire at Fort McMurray”, NASA Earth Observatory, Kathryn Hansen, May 6 2016.

“Seeing through the Smoky Pall: Observations from a Grim Indonesian Fire Season”, NASA Earth Observatory”, Adam Voiland, December 1 2015.

“Potentially record-setting El Niño on the way as Pacific Ocean temperatures continue to rise”, Southern California Public Radio audio interview, Jed Kim, November 12, 2015.

Radio France International audio interview, Clea Broadhurst, October 31 2015.

“Indonesian fires now on a par with Brazil’s total annual emissions”, Carbon Brief, Roz Pidcock, October 29 2015.

“Indonesia’s Fires Are Driving Climate, Public Health Crises”, Climate Central, Brian Kahn, October 26, 2015.

R. Field, “Indonesia’s dangerous haze”, The Asia & Pacific Policy Society Policy Forum, October 26 2015.

“Haze Choking Asia May Get Worse as El Nino Delays Seasonal Rain”, Bloomberg, Jason Gale, October 12 2015.

“Indonesia on Track to Have the Worst Fire Season Since 1997”, Union of Concerned Scientists The Equation Blog, October 9 2015.

“Indonesia on track to have the worst fire season 1997”, Columbia University International Research Institute for Climate and Society, Francesco Fiondella, October 9, 2015.

BBC World Newsday live television interview on 2015 Indonesian Haze, October 5 2015, Rico Hizon.

“Smoke Blankets Indonesia”, NASA Earth Observatory, September 27 2015, Adam Voiland. Covered by Bloomberg, Christian Science Monitor, Straights Times, ABC Online, Deutsche Welle, The Independent, Jakarta Post, CNN Indonesia, National Post, The Guardian, The Washington Post, TIME.

“Why Southeast Asia's haze problem persists”, Deutsche Well, September 15 2015, Gabriel Domínguez.

Interview on El Niño effects on Southeast Asia, Deutsche Presse-Agentur, August 6 2015, Christiane Oelrich.

“How 'El Niño' affects Indonesian forest fires”, Deutsche Welle, July 30 2015, Rodion Ebbighausen.

“El Niño and Southeast Asia”, The Diplomat, July 16, 2015, Nithin Coca.

A. Spessa and R. Field “Indonesia at risk from huge fires because of El Niño”, The Conversation, June 16, 2015.

“Indonesia’s Fire Fight”, Geographical Magazine, December 24 2014, Tom Hart.

Wildfire expert, Climate Reality Project, 2012.

For “Human amplification of drought-induced biomass burning in Indonesia since 1960”: covered in *New York Times*, *De Pers* (in Dutch), *Discovery Channel Magazine*, *NASA Earth Observatory*, *ScienceDaily*, *PhysOrg.com*.

Field, R.D. Revisiting the 1950 Great Smoke Pall, *The Canadian Smoke Newsletter*, Fall 2008, 13-15.

Oral presentations

Biomass Burning in Indonesia: Signs of Progress in 2019? (NASA GMAO Seminar Series on Earth System Science, January 2020, Goddard Space Flight Center, Greenbelt, MD).

Causes, predictability and mitigation of severe biomass burning in Indonesia (Invited, AGU 2019 Fall Meeting, San Francisco).

Wildfire Risk in the 21st Century: Weather and Climate (Columbia University Earth Institute and RenaissanceRe Climate Change: Response and Resilience Leadership Forum, October 2019, New York, NY).

Enhancements to Fire Danger Rating in Indonesia (Wildfire 2019, Campo Grande, Brazil (remote); Global Observation of Forest Cover and Land Cover Dynamics Fire Implementation Team Meeting, October 2019, Rome, Italy).

Coupled chemistry-climate model simulations of a massive 2017 smoke plume (EGU 2019 General Assembly, Vienna, Austria; AGU 2018 Fall Meeting, Washington DC, December 2018).

Advances in Fire Danger Rating Using Precipitation Estimates from Space (NASA Precipitation Measurement Missions Science Team Meeting, Phoenix AZ, October 2018).

Enhancements to the Global Wildfire Information System: Fire Danger Rating and Applications in Indonesia 2018 Update (GOFC-GOLD Fire Implementation Team meeting, College Park MD, October 2018).

Fire and haze in Indonesia: causes, impacts and predictability (City College of New York, Department of Earth and Atmospheric Sciences, September 2018).

Fire, climate and air quality in Southeast Asia (The Joint Graduate School of Energy and Environment King Mongkut's University of Technology Thonburi, Thailand, 2018).

Advances in water isotope applications in atmospheric and hydrological sciences (Thailand Hydro and Agro Informatics Institute, Bangkok, Thailand, 2018).

Global climate and fire weather projections (IUFRO Forest Fires Global Expert Workshop, Vienna, Austria, 2018).

Enhancements to the Global Wildfire Information System: Fire Danger Rating and Applications in Indonesia (Global Wildfire Information System and GOFC-GOLD Fire Implementation Team meeting, Windsor, UK, 2017).

Long-lead prediction of the 2015 fire and haze episode in Indonesia (Columbia University Initiative on Extreme Weather and Climate Conference on Fire Prediction Across Scales, 2017, New York, NY).

Overview of the Global Fire Weather Database (2017 MERRA-2 Applications Workshop, Goddard Space Flight Center, Greenbelt, Maryland).

Convective Transport of Biomass Burning Emissions: The Passive and Active Cases (Invited, 2017 AMS Annual Meeting, Seattle, Washington).

2015 Indonesian fire activity and smoke pollution show persistent non-linear sensitivity to El Niño-induced drought (2017 AMS Annual Meeting, Seattle, Washington; 2016 AGU Fall Meeting, San Francisco, California; 2016, IAWF 2nd International Smoke Symposium, Long Beach, California).

Integrating satellite precipitation estimates into the Global Fire Weather Database (2016 NASA Precipitation Measurement Missions Science Team Meeting, Houston, Texas).

Historical and seasonal fire danger (2016, WMO/BMKG Forecasting Emissions from Vegetation Fires and their Impacts on Human Health and Security in South East Asia workshop, Jakarta, Indonesia).

Introducing the Global Fire Weather Database (2016 EGU General Assembly, Vienna, Austria; 2015 AGU Fall Meeting, San Francisco, California).

Fire in Indonesia: causes, impacts and predictability (Invited, 2016, European Centre for Medium Range Weather Forecasting, Reading, UK).

Simulating the Black Saturday 2009 UTLS Smoke Plume with an Interactive Composition-Climate Model (Invited, 2015 AGU Fall Meeting, San Francisco, California; 2016 IAWF 2nd International Smoke Symposium, Long Beach, California).

Evaluating climate models with satellite retrievals of water isotopes and carbon monoxide (Invited, 2015, Stony Brook University School of Marine and Atmospheric Science, Topics in Atmospheric and Oceanic Sciences Seminar).

Trace gas constraints on vertical transport in models: a case study of Indonesian biomass burning emissions in 2006 (Invited, 2014, AGU Fall Meeting, San Francisco, California).

Using water isotopes and CO to constrain convective parameterizations in the NASA GISS ModelE2 (Invited, 2014, NASA JPL Atmospheric Composition and Convection Workshop, Pasadena, California).

Constraining sub-grid GCM processes with retrievals of water isotopic composition from Aura TES (2014 EGU General Assembly, Vienna, Austria; 2013, AGU Fall Meeting, San Francisco, California; NEWS Science Team Meeting, May 2013, NASA Goddard Space Flight Center, Greenbelt, MD).

Studying the origin, fate and effects of high altitude smoke with the NASA GISS composition-climate model (Invited, 2014, Interdisciplinary Biomass Burning Initiative 3rd Workshop, Ringberg, Germany).

Preliminary analysis of drought and fire relationships over NW Thailand (August 2012, Malaysian Meteorological Department Seminar, Kuala Lumpur, Malaysia).

Wexler's Great Smoke Pall: A chemistry-climate model analysis of a singularly large emissions pulse (2011 AGU Fall Meeting).

The effects of post-condensation exchange on the isotopic composition of water in the atmosphere (Invited, 2010 AGU Fall Meeting).

Human amplification of drought-induced biomass burning in Indonesia since 1960 (2009, IAMAS Joint Assembly Montreal, Quebec).

Fire in Indonesia: the roles of drought and land use in causing a singularly large source of pollution (December 2009, Lamont-Doherty Earth Observatory, Columbia University).

Large-scale controls on water isotopologues in the atmosphere, (December 2009, Department of Applied Physics and Applied Mathematics, Columbia University).

Fire in Indonesia: human and climatic causes of the world's worst source of pollution? (December 2009, Environment Canada, Downsview, Ontario).

A GCM partitioning of controls on precipitation $\delta^{18}\text{O}$ (2009 AGU Joint Assembly Toronto, Ontario).

Calibration of the Canadian Fire Weather Index System for Southeast Asia (July 2008, International Workshop on Advances in Operational Weather Systems for Fire Danger Rating, organized by the World Meteorological Organization and Natural Resources Canada, Edmonton, Alberta).

Identifying controls on the stable water isotope composition of precipitation in the southwestern Yukon using GCMs (2009, IAMAS Joint Assembly, Montreal, Quebec; 2008, Congress, Kelowna, British Columbia; 2007, AGU Fall Meeting, San Francisco, California; 2007, AOGS 4th Annual Meeting, Bangkok, Thailand; 2007, IUGG 24th General Assembly, Perugia, Italy; 2007, CMOS Congress St. John's, Newfoundland and Labrador).

Coupling of drought and C emissions from biomass burning in Indonesia (2007, Indonesian National Institute of Aeronautics and Space, Jakarta, Indonesia).

Modeling the economic impacts of wildfire smoke on human health in Alberta (2007, IAWF Human Dimensions of Wildland Fire Conference, Ft. Collins, Colorado).

Coupling of drought and C emissions from biomass burning in Indonesia (2007, AOGS 4th Annual Meeting, Bangkok, Thailand; 2007, IUGG 24th General Assembly, Perugia, Italy).

Regional modeling of the stable water isotopes over ice core sites in Canada (2007, CMOS Congress St. John's, Newfoundland and Labrador).

Academic needs for a smoke forecasting system (February 2007, Environment Canada Smoke Forecasting Workshop, Edmonton, Alberta).

Interpreting ice core records from the St. Elias Mountains using climate models (October 2006, University of Alaska at Fairbanks Geophysical Institute, Fairbanks, Alaska).

Modeling the economic impacts of wildfire smoke on human health (2005, Adapting to Climate Change: Reducing Health Risks From Wood Smoke, Fredericton, New Brunswick).

Development of a haze forecasting system for Southeast Asia (2003, National Conference on Fire and Remote Sensing, Kuala Lumpur, Malaysia).

Early warning of haze disasters in Indonesia (2002, Indonesian Meteorological and Geophysical Agency, Jakarta, Indonesia).

Spatial distribution of fire season and ENSO effects on the island of Sumatra, Indonesia (2001, AMS 4th Symposium on Fire and Forest Meteorology, Reno, Nevada).

Poster presentations

Coupled chemistry-climate model simulations of a massive 2017 smoke plume (Columbia University workshop on Extreme Air Pollution, New York, NY, November 2018).

IMERG-based improvements to the Indonesian Fire Danger Rating System (2018 NASA Precipitation Measurement Missions Science Team Meeting, Phoenix AZ, October 2018).

IMERG-based evaluation of long-lead fire danger forecasts over New Guinea for 2015 (2017 NASA Precipitation Measurement Missions Science Team Meeting, San Diego, CA, October 2017).

GPM characterization of Indonesian fire danger during the severe 2015 fire season (2016 NASA Precipitation Measurement Missions Science Team Meeting, Houston, TX, October 2016).

Black Saturday 2009: Modeling UTLS smoke plumes with the NASA GISS ModelE2 composition-climate model (2014 EGU General Assembly, Vienna, Austria).

A Tropospheric Emission Spectrometer HDO/H₂O Retrieval Simulator for Climate Models (2012, AOGS-AGU Joint Assembly, Singapore).

The need for a forest fire early warning system for equatorial Southeast Asia (2011, APEC Climate Symposium, Honolulu, Hawaii).

Human amplification of drought-induced biomass burning in Indonesia since 1960 (2009, AGU Joint Assembly Toronto, Ontario; 2009, AMS Annual Meeting Phoenix, Arizona; 2008, AGU Fall Meeting San Francisco, California).

Identifying controls on the stable water isotope composition of precipitation in the southwestern Yukon using GCMs (2009, AMS Annual Meeting Phoenix, Arizona).

Ice core evidence of Wexler's Great Smoke Pall? Possible circumpolar smoke transport from a pyrocumulonimbus event in 1950 (2009, AMS Annual Meeting Phoenix, Arizona).

Funding

2017-2020	\$US 199, 922	NASA Group on Earth Observations (GEO) Work Program: "Enhancements to the Global Wildfire Information System: Fire
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		Danger Rating and Applications in Indonesia” (PI Field, w/ J. San-Miguel-Ayanz, M. Sudarisman, I. Albar, B. Saharjo, C. Ichoku).
2017-2020	\$US 41 389	NSF Large Scale Dynamics: “Improving constraints on tropical climate feedbacks with inverse modeling of the stable isotopic composition of atmospheric water vapor” (PI Joe Galewsky, Co-I Field).
2017	\$US 5,000	Past Global Changes: Support for October 2017 “Fire Prediction Across Scales” conference at Columbia University (PI Field, Co-Is K. Fernandes, A.P. Williams).
2017	\$US 31,500	NSF Prediction of and Resilience against Extreme Events Track 1: support for October 2017 “Fire Prediction Across Scales” conference at Columbia University (PI Field, Co-Is K. Fernandes, A.P. Williams).
2017-2021	\$US 1,307,585	NASA Modeling, Analysis and Prediction Program: Biomass burning in the NASA GISS ModelE: uncertainty and interactions between emissions, transport and chemistry (PI Field, Co-Is P. Kasibhatla, D. Shindell, M. Luo, G. Elsaesser, M. van Lier-Walqui, w/ A. Voulgarakis, K. Tsigaridis, S. Bauer, A. Ackerman, J. Worden).
2016-2019	\$US 112 860	NASA Precipitation Measurements Science Team: Applying NASA Satellite Precipitation Products to Global Fire Prediction: Assimilating GPCP, TRMM and GPM into the Global Fire Weather Database (PI Field w/ G. van der Werf).
2015-2018	\$US 579 971	NSF Arctic Natural Sciences: Response of high-latitude forests to a warmer and CO ₂ -enriched atmosphere: tree rings in a process-based model (PI L. Andreu-Hayles, Co-Is R. D’Arrigo, R. Field, E. Boucher).
2014-2017	\$US 335 166	NASA Energy and Water Cycle Study: Satellite and model constraints on water cycling responses to MJO and ENSO using water isotopes (PI A. LeGrande, Co-I Field, w/ D. Kim, J. Worden, M. Kelley, G. Schmidt).
2013-2016	\$US 574 073	NASA Atmospheric Composition Modeling and Analysis Program: The fate and effects of forest fire emissions injected directly into the stratosphere (PI Field, Co-Is M. Fromm, A. Voulgarakis, w/ D. Shindell, M. Flannigan, P. Bernath).
2012-2014	\$US 73 000	Asia Pacific Network for Global Change Research: Toward a fire and haze early warning system for Southeast Asia (PI J.H. Yoo, Co-Is S. Hameed, Field).
2004-2005	\$US 27 000	Southeast Asia START Regional Committee: Development of a fuel explicit model for biomass burning emissions and transport in Southeast Asia (PI O. Roswintarti, Co-I Field).
2004-	\$CDN 11 000	Meteorological Service of Canada: Improved precipitation

2005 interpolation for Alberta (PI S.S.P Shen, w/ Field).

Fellowships, scholarships and awards

2012 - Natural Science and Engineering Research Council of Canada

2014 Postdoctoral Fellowship

2010 - NASA Postdoctoral Program

2012 Postdoctoral Fellowship

2010 - Natural Science and Engineering Research Council of Canada

2012 Postdoctoral Fellowship (declined)

2009 American Meteorological Society

Best Student Poster Award, Hydrology Section, Annual Meeting

2008 - University of Toronto

2009 Graduate Fellowship

2006 - University of Toronto, Department of Physics

2008 R. Blyth Fellowship

2006 University of Toronto, Centre for Global Change Science

Graduate Student Research Award

2005 - University of Toronto, School of Graduate Studies

2006 Mary H. Beatty Fellowship

2005 - University of Toronto

2008 Graduate Fellowship (declined)

2005 - Natural Science and Engineering Research Council of Canada

2008 PGS Doctoral Scholarship

2004 University of Alberta, Dept. of Mathematical and Statistical Sciences

Josephine M. Mitchell Graduate Scholarship

2004 University of Alberta, Institute for Geophysical Research

Dr. Roy Dean Hibbs Graduate Memorial Scholarship

2004 - University of Alberta, Faculty of Graduate Studies and Research

2005 Province of Alberta Graduate Scholarship

2004 National Center for Atmospheric Research, Advanced Study Program

Travel Award

2003 Natural Resources Canada

Department Merit Award (group)

2003 Canadian Forest Service

Sector Merit Award (group)

Teaching

2008-2009	Teaching Assistant	ENV200Y: Assessing Global Change, Centre for Environment, University of Toronto.
2007-2008	Teaching Assistant	ENV200Y: Assessing Global Change, Centre for Environment, University of Toronto.
Fall 2006	Teaching Assistant	PHY205H1: The Physics of Everyday Life, Department of Physics, University of Toronto.

Training delivered under the Southeast Asia Fire Danger Rating System (FDRS) Project

2004	Coordinator	Applications of the Indonesian Fire Danger Rating System, West Kalimantan Provincial Forest Service, Pontianak, Indonesia.
2004	Coordinator	Applications of the Malaysian FDRS, Fire and Rescue Department Malaysia, Kuala Kubu Bahru, Malaysia.
2003	Coordinator	FDRS Applications and weather observation procedures, Sabah Forestry Department and Malaysian Meteorological Service, Sandakan, Malaysia.
2003	Coordinator	Applications of the Southeast Asia Fire Danger Rating System, Malaysian Remote Sensing Agency, Kuala Lumpur, Malaysia.
2002	Coordinator	FDRS Introductory Workshop, West Kalimantan Provincial Forest Service, Pontianak, Indonesia.
2002	Coordinator	Implementation of the Sabah Provincial Fire Weather Network, Sabah Forestry Department, Sandakan, Malaysia.
2002	Coordinator	Implementation of the Sabah Forest Fire Danger Rating System, Sabah Forestry Department, Sandakan, Malaysia.
2001	Coordinator	Introduction to Fire Weather and Fire Danger Rating Systems, Sarawak Timber Association, Kuching, Malaysia.

Other training

2007	Field assistant	Severe Storms in The Arctic (STAR) Campaign, Iqaluit, Nunavut.
2007	Field assistant	Mt. Logan Ice Core Update, Kluane National Park, Yukon.
2006	Field assistant	Mt. Logan Ice Core Update, Kluane National Park, Yukon.
2001	Participant	Advanced Wildland Fire Behaviour, Ontario Ministry of Natural Resources, Dorset, Ontario.
1999	Field assistant	Gravity and freeze coring of lake sediments in Northern Alberta and Jasper National Park.

Service

2018- Present	Member	Applied Physics and Applied Mathematics Graduate Admissions Committee.
2018- present	Principal Investigator	Earth System Modeling, Comparative Planetary Climatologies, and Remote Sensing, NASA – Columbia University Department of Applied Physics and Applied Mathematics Cooperative Agreement.
2018	Facilitator	Workshop on the Indonesian Fire Danger Rating System: training program and technical enhancements, July 2018, Indonesian Agency for Meteorology, Climatology and Geophysics, Jakarta, Indonesia.
2018- present	Member	Graduate Student Admissions Committee Department of Applied Physics and Applied Mathematics, Columbia University
2017	Conference Chair	Fire prediction across scales, Columbia University Initiative on Extreme Weather and Climate, October 2017, New York, NY.
2016	Facilitator	Forecasting Emissions from Vegetation Fires and their Impacts on Human Health and Security in South East Asia, August 2015, Jakarta, Indonesia.
2016 - 2019	Member	Scientific Steering Committee, WMO/IGAC/iLEAPS Interdisciplinary Biomass Burning Initiative (IBBI).
2012	Session co-chair	Applications of high-resolution predictions and analyses in the Asia Pacific region, AOGS-AGU Joint Assembly, Singapore.
2011	Facilitator	Climate and Agriculture Workshop, APEC Climate Symposium 2011, Honolulu, Hawaii.
2009	Member	Graduate Liaison Committee, Department of Physics, University of Toronto.
2008- 2009	Co-coordinator	Atmospheric Physics Noble Seminar Series, Department of Physics, University of Toronto.
2008	Session chair	Fire Danger Rating Approaches and Role of Weather Information, International Workshop on Advances in Operational Weather Systems for Fire Danger Rating, organized by the World Meteorological Organization and Natural Resources Canada, Edmonton, Alberta.
2007	Panelist	Smoke Forecasting Workshop 2007, organized by Environment Canada, Alberta Environment, Alberta Sustainable Resource Development, British Columbia Ministry of Environment, Edmonton, Alberta.
2005	Graduate representative	External review of the Department of Mathematical and Statistical Sciences Graduate Program, University of Alberta.

Refereeing

Arctic, Atmospheric Chemistry and Physics, Atmospheric Environment, Atmospheric Measurement Techniques, Cambridge University Press, Climate of the Past, Climatic Change, Earth System Dynamics, Earth System Science Data, Forest Ecology and Management, Geophysical Research Letters, Global Change Biology, Global Ecology and Biogeography, Global Environmental Change, International Journal of Climatology, International Journal of Remote Sensing, International Journal of Wildland Fire, Journal of Applied Meteorology and Climatology, Journal of Advances in Modeling Earth Systems, Journal of Climate, Journal of Environmental Management, Journal of Geophysical Research – Atmospheres, Journal of Geophysical Research – Biogeosciences, Journal of Hydrology, Journal of Hydrometeorology, NASA Science Mission Directorate, NASA Small Business Innovation Research, National Science Foundation, Natural Hazards and Earth System Sciences, Nature Geoscience, npj Climate and Atmospheric Science, Proceedings of the National Academy of Sciences, Remote Sensing of Environment, Tellus B, Theoretical and Applied Climatology, UK Natural Environment Research Council.