

**UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF COLUMBIA**

STATE OF NEW YORK, <i>et al.</i> ,)	
Plaintiffs,)	
ENVIRONMENTAL DEFENSE FUND,)	
Plaintiff-Intervenor,)	Civil Action No. 18-cv-0773 (RBW)
v.)	
ANDREW WHEELER, <i>et al.</i> ,)	
Defendants.)	

DECLARATION OF DR. ILISSA B. OCKO

I, Ilissa B. Ocko, declare as follows:

1. I am a Senior Climate Scientist at the Environmental Defense Fund (EDF). I earned a Ph.D. in Atmospheric and Oceanic Science from Princeton University, where I studied the impact of human-emitted greenhouse gases (including methane) and aerosols on Earth’s radiative balance and the climate using observational and global climate model-derived datasets. I have written several peer-reviewed papers on the impacts of short-lived climate pollutants on radiative forcing, air temperature, hydrological patterns, and atmospheric and oceanic circulation. My curriculum vitae is attached as Exhibit A.

2. I joined EDF in 2013. At EDF, my work focuses on analyzing the temperature impacts of various human-related activities and climate change mitigation strategies. I use all forms of analytical tools to evaluate climate effects, and I lead an effort to improve simple

metrics (i.e. Global Warming Potential) to make clearer the near- and longer-term impacts associated with different types of greenhouse gas emissions.¹ I work with scientists, government agencies, industries, and nonprofits to advance this effort. I specifically aim to enhance public understanding of climate impacts over all timescales, both near- and long-term.

3. Methane is a considerable driver of near-term climate change, responsible for a quarter of the warming we are experiencing today.² This year's emissions of methane from human activities will contribute 30% more to warming over the next 10 years than this year's emissions of carbon dioxide from fossil fuels.³ Globally, a quarter of human-emitted methane comes from the oil and gas sector,⁴ and current trends suggest that methane from global oil and gas will soon overtake livestock as the dominant source from human activities.⁵ Domestically,

¹ Ocko, I.B., Hamburg, S.P., Jacob, D.J., Keith, D.W., Keohane, N.O., Oppenheimer, M., Roy-Mayhew, J.D., Schrag, D.P. and Pacala, S.W., *Unmask temporal trade-offs in climate policy debates*, 356(6337) SCIENCE 492-493 (2017).

² Calculation from Shindell et al. 2009 of fraction of total positive radiative forcing that methane emissions are responsible for; Shindell, D.T., Faluvegi, G., Koch, D.M., Schmidt, G.A., Unger, N. and Bauer, S.E., *Improved attribution of climate forcing to emissions*, 326(5953) SCIENCE 716-718 (2009).

³ Calculation based on current emissions of methane and carbon dioxide Environmental Protection Agency, Global Anthropogenic Non-CO2 Greenhouse Gas Emissions: 1990-2030 (2012); International Energy Agency World Energy Outlook (2018), atmospheric lifetimes from IPCC, 2013: *Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* ("IPCC AR5 2013") (Chapter 8: Myhre, G., Shindell, D., Bréon, F.-M., Collins, W., Fuglestedt, J., Huang, J., Koch, D., Lamarque, J.-F., Lee, D., Mendoza, B., Nakajima, T., Robock, A., Stephens, G., Takemura, T., and Zhang, H.: Anthropogenic and Natural Radiative Forcing. In: *Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* [Stocker, T.F., D. Qin, G.-K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P.M. Midgley (eds.)], Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 2013), and radiative properties for CO2 and methane indirect from IPCC AR5 2013 (WGI Chapter 8 – Myhre et al. 2013) and methane direct from Etminan, M., Myhre, G., Highwood, E. J., & Shine, K. P. (2016), *Radiative forcing of carbon dioxide, methane, and nitrous oxide: A significant revision of the methane radiative forcing*, *Geophysical Research Letters*, 43(24).

⁴ EPA GLOBAL ANTHROPOGENIC NON-CO2 GREENHOUSE GAS EMISSIONS: 1990-2030, available at <https://www.epa.gov/global-mitigation-non-co2-greenhouse-gases/global-anthropogenic-non-co2-greenhouse-gas-emissions>.

⁵ Calculated from data on emissions from livestock from Food and Agriculture Organization (FAO), available at <http://www.fao.org/faostat/en/#home>; data on emissions from oil and gas from International Energy Agency World Energy Outlook 2018, available at <https://www.iea.org/weo2018/>.

the EPA recognizes that the oil and gas sector is the largest industrial source of methane emissions in the United States, accounting for nearly one-third of U.S. methane emissions.⁶ However, the actual amount of emissions is almost certainly higher, as studies show the EPA underestimates methane emissions from the oil and natural gas section by approximately sixty-percent,⁷ and nearly two percent of those emissions happens during extraction and delivery.⁸ My research includes determining the impacts that methane emission reductions will have on slowing the rate of global warming. Of all methane sources from human activities, reducing waste of gas from oil and gas operations—whether that waste is through venting, flaring, or leaking—presents an important opportunity considering its cost-effectiveness, technological availability, and immediate impacts on climate.

4. For the same mass of carbon dioxide (CO₂) and methane emissions, methane can trap 120 times more heat than CO₂, both directly from methane as a greenhouse gas and indirectly from the production of further greenhouse gases: tropospheric ozone, stratospheric water vapor, and CO₂.⁹ Over a twenty-year period, this number drops to 84 as methane dissipates from the atmosphere more quickly than CO₂.¹⁰ The latest science suggests that methane absorbing shortwave radiation in addition to longwave significantly increases its

⁶ *Overview of Greenhouse Gases: Methane Emissions*, EPA.GOV, <https://www.epa.gov/ghgemissions/overview-greenhouse-gases#methane> (last visited Oct. 8, 2019).

⁷ Ramon A. Alvarez, et al, *Assessment of Methane Emissions from the U.S. Oil and Gas Supply Chain*, 361 *Science* 186, 186 (2018), available at <https://science.sciencemag.org/content/361/6398/186> (last accessed Oct. 8, 2019).

⁸ J.A. Littlefield, et al., *Synthesis of Recent Ground-level Methane Emission Measurements from the U.S. Natural Gas Supply Chain*, 148 *Journal of Cleaner Production* 118, 118 (2017).

⁹ IPCC AR5 2013, Myhre, Gunnar et al., *Anthropogenic and Natural Radiative Forcing*, available at http://www.ipcc.ch/pdf/assessment-report/ar5/wg1/WG1AR5_Chapter08_FINAL.pdf.

¹⁰ *Id.*

radiative potency by nearly 25%.¹¹ Including the shortwave component in calculations, the twenty-year number jumps from 84 to 96.

5. Further, through the creation of tropospheric ozone, methane contributes to ground-level ozone, which is harmful to humans and is linked to short- and long-term negative health effects, including shortness of breath, decreased lung function, and chronic obstructive pulmonary disease (COPD). Ozone also aggravates existing cardiovascular and respiratory conditions, such as asthma, emphysema, and bronchitis, with long-term exposure increasing the risk of death from these conditions. As nearly one in three Americans are exposed to harmful levels of ozone,¹² reducing methane emissions would directly enhance human health while improving air quality and mitigating climate change.¹³

6. Methane only lasts for approximately a decade in the atmosphere (though its effects can last much longer),¹⁴ because it is oxidized on average after 12.4 years, breaking down and forming other chemical species.¹⁵ Methane reductions, therefore, can rapidly slow the rate of warming.¹⁶ Even though methane forms tropospheric ozone, another strong greenhouse gas,

¹¹ Etminan, M., Myhre, G., Highwood, E. J., & Shine, K. P. (2016). Radiative forcing of carbon dioxide, methane, and nitrous oxide: A significant revision of the methane radiative forcing. *Geophysical Research Letters*, 43(24).

¹² U.S. GLOBAL CHANGE RESEARCH PROGRAM, IMPACTS, RISKS, AND ADAPTATION IN THE UNITED STATES 518, D.R. REIDMILLER, ET AL. (eds., 4th ed, 2018).

¹³ *Id.* at 512.

¹⁴ For example, as discussed below, oceans absorb 90% of the excess heat trapped by greenhouse gases. Therefore, even though the methane is gone and no longer trapping additional heat in the atmosphere, the warming that it had caused is now in the oceans, contributing to sea level rise decades to come. Hu, A., Xu, Y., Tebaldi, C., Washington, W.M. and Ramanathan, V., *Mitigation of short-lived climate pollutants slows sea-level rise*, 3 NATURE CLIMATE CHANGE 730 (2013).

¹⁵ Myhre, *supra* note 9.

¹⁶ Shoemaker, J.K., Schrag, D.P., Molina, M.J. and Ramanathan, V., *What role for short-lived climate pollutants in mitigation policy?*, 342(6164) SCIENCE 1323-1324 (2013); Shindell, D., Kuylentierna, J.C., Vignati, E., van Dingenen, R., Amann, M., Klimont, Z., Anenberg, S.C., Muller, N., Janssens-Maenhout, G., Raes, F. and

when it oxidizes, the ozone does not last long in the atmosphere, contributing to the immediacy of the climate benefits of reduced methane.

7. It is crucial to limit both the rate of near-term warming and long-term warming, in order to reduce warming impacts during our lifetimes and for generations to come. Both near-term and long-term warming are associated with specific sets of damages, and all must be reduced. Near-term warming impacts infrastructure, plant and animal species survival rates,¹⁷ extreme events, and sea level rise.¹⁸ Long-term warming impacts glacial melt, permafrost melt, tipping points, shifts in biomes, and more. Carbon dioxide is the main driver of long-term warming because of its long atmospheric lifetime.¹⁹ Methane emissions are an important driver of near-term warming, and so taking immediate steps to reduce methane emissions can help to immediately impact warming rates.²⁰ Conversely, allowing near-term methane emissions to persist will accelerate this harmful warming.²¹

Schwartz, J., *Simultaneously mitigating near-term climate change and improving human health and food security*, 335(6065) SCIENCE 183-189 (2012).

¹⁷ Settele, J. et al., *Terrestrial and Inland Water Systems*, CLIMATE CHANGE 2014: IMPACT, ADAPTATION, AND VULNERABILITY. CONTRIBUTION OF WORKING GROUP II TO THE FIFTH ASSESSMENT REPORT OF THE INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE (2014), available at http://www.ipcc.ch/pdf/assessment-report/ar5/wg2/WGIIAR5-Chap4_FINAL.pdf.

¹⁸ Hu et al., *supra* note 14.

¹⁹ Myhre et al., *supra* note 9.

²⁰ Shindell et al., *supra* note 16.

²¹ *Id.*

8. Warming to date has already negatively impacted every continent and every ocean,²² and resulted in tropical island villages disappearing,²³ Arctic houses sinking,²⁴ coral reefs dissolving and dying,²⁵ mosquito seasons growing weeks longer,²⁶ and worsened extreme heat events yielding high death tolls.²⁷ Continuing methane emissions will likely result in more pronounced impacts in the future. Further warming also enhances the risk that the climate surpasses irreversible tipping points that could render long-term climate stabilization difficult or impossible.²⁸ Immediate methane reductions can therefore also mitigate long-term warming and

²² IPCC, CLIMATE CHANGE 2014: IMPACTS, ADAPTATION, AND VULNERABILITY, SUMMARY FOR POLICY MAKERS, http://www.ipcc.ch/pdf/assessment-report/ar5/wg2/ar5_wgII_spm_en.pdf.

²³ Albert, S., Leon, J.X., Grinham, A.R., Church, J.A., Gibbes, B.R. and Woodroffe, C.D., *Interactions between sea-level rise and wave exposure on reef island dynamics in the Solomon Islands*, 11(5) ENVIRONMENTAL RESEARCH LETTERS 054011 (2016).

²⁴ ALASKA CLIMATE CHANGE IMPACT MITIGATION PROGRAM, <https://www.commerce.alaska.gov/web/dcra/planninglandmanagement/accimp.aspx>.

²⁵ Muehllehner et al., *Dynamics of carbonate chemistry, production, and calcification of the Florida Reef Tract (2009-2010): Evidence for seasonal dissolution*, 30(5) GLOBAL BIOGEOCHEMICAL CYCLES 661, 661-688 (2016); ONLY 7% OF THE GREAT BARRIER REEF HAS AVOIDED CORAL BLEACHING, <http://www.coralcoe.org.au/media-releases/only-7-of-the-great-barrier-reef-has-avoided-coral-bleaching>.

²⁶ Muehllehner et al., *Dynamics of carbonate chemistry, production, and calcification of the Florida Reef Tract (2009-2010): Evidence for seasonal dissolution*, 30(5) GLOBAL BIOGEOCHEMICAL CYCLES 661, 661-688 (2016); ONLY 7% OF THE GREAT BARRIER REEF HAS AVOIDED CORAL BLEACHING, <http://www.coralcoe.org.au/media-releases/only-7-of-the-great-barrier-reef-has-avoided-coral-bleaching>.

²⁷ EXPLAINING EXTREME EVENTS FROM A CLIMATE PERSPECTIVE, <https://www.ametsoc.org/ams/index.cfm/publications/bulletin-of-the-american-meteorological-society-bams/explaining-extreme-events-from-a-climate-perspective/>; WORLD WEATHER ATTRIBUTION, <https://www.climatecentral.org/analyses/>.

²⁸ Lenton, T.M., Held, H., Kriegler, E., Hall, J.W., Lucht, W., Rahmstorf, S. and Schellnhuber, H.J., *Tipping elements in the Earth's climate system*, 105(6) PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES 1786-1793 (2008).

make it easier to stabilize global warming below 1.5 °C.²⁹ But inaction may cause permanent damage or irreversible impacts for thousands of years.³⁰

9. Reducing emissions of methane will also help to limit sea level rise. Ninety percent of heat that is trapped in the atmosphere gets absorbed by the oceans.³¹ While methane only lasts for about a decade in the atmosphere, a substantial fraction of the atmospheric heating that methane causes during this period is absorbed by the oceans, where the warming signal lasts far longer than in the atmosphere. Accordingly, near-term methane emissions can cause sea level rise for decades to come.³²

10. I am aware that the Environmental Protection Agency (EPA) has promulgated standards to reduce methane emissions at new and modified facilities in the oil and gas sector in 2016 (New Source Rule). I am further aware that the New Source Rule triggers a legal obligation under Section 111(d) of the Clean Air Act, 42 U.S.C. § 7411(d), for EPA to issue emissions guidelines for existing sources, but that EPA has not yet issued such guidelines.

11. I am likewise aware that EPA has requested an indefinite stay of this litigation challenging EPA's unreasonable delay in issuing Section 111(d) emissions guidelines for existing sources in the oil and gas sector until EPA finalizes a proposed rule to revise the New Source Rule to remove the regulation of methane.

²⁹ W.J. Collins, et al., *Increased Importance of Methane Reduction for a 1.5 Degree Target*, *Env't Res. Letters*, 13, 054002, <https://iopscience.iop.org/article/10.1088/1748-9326/aab89c> (last visited Oct. 8, 2019); see also IPCC, SUMMARY FOR POLICYMAKERS OF IPCC SPECIAL REPORT ON GLOBAL WARMING OF 1.5 C APPROVED BY GOVERNMENTS, Chapter 2 (Oct. 8, 2018), available at <http://www.ipcc.ch/sr15/chapter/chapter-2/>.

³⁰ *U.S. Global Change Research Program* at 1357.

³¹ IPCC, CLIMATE CHANGE 2013: THE PHYSICAL SCIENCE BASIS, SUMMARY FOR POLICY MAKERS (2013), http://www.climatechange2013.org/images/report/WG1AR5_SPM_FINAL.pdf.

³² Hu et al., *supra* note 14.

12. I understand that in the three years since EPA issued the New Source Rule, existing oil and gas sources have emitted 33.4 million metric tons of methane.³³ This is equivalent to the 20-year³⁴ climate impact of nearly 600 million passenger vehicles driving for one year or over 3,000 billion pounds of coal burned. I further understand that federal emissions guidelines could have prevented 12.2 million metric tons of these methane emissions,³⁵ equivalent to the climate impact of over 200 million passenger vehicles driving for one year or over 1,000 billion pounds of coal burned.³⁶

13. I further understand that each additional year EPA delays the adoption of federal emissions guidelines for existing sources will allow methane emissions that would otherwise be prevented. For example, in 2021, existing sources will emit 9.8 million metric tons of methane.³⁷ This is equivalent to the 20-year³⁸ climate impact of over 170 million passenger vehicles driving for one year or nearly 900 billion pounds of coal burned. Federal emissions guidelines could prevent 3.6 million metric tons of these methane emissions,³⁹ equivalent to the climate impact of over 60 million passenger vehicles driving for one year or over 330 billion pounds of coal

³³ See Declaration of Renee McVay ¶ 11.

³⁴ Calculation uses the IPCC AR5 WGI 20-year GWP. The latest science, *see* n. 11, *supra*, suggests that this GWP is 14% higher than what is reported in the IPCC and therefore the number of vehicles would be over 680 million and the number of pounds of coal burned would be over 3,500 billion.

³⁵ McVay Decl. ¶ 11.

³⁶ Updated for the latest science, *see* n. 11, *supra*, the number of vehicles would be nearly 250 million and the number of pounds of coal burned would be over 1,200 billion.

³⁷ McVay Decl. ¶ 12.

³⁸ Updated for the latest science, *see* n. 11, *supra*, the number of vehicles would be nearly 200 million and the number of pounds of coal burned would be over 1 trillion.

³⁹ McVay Decl. ¶ 12.

burned.⁴⁰ Once released, methane emissions cannot be removed from the atmosphere and will contribute to both near- and longer-term climate damages, including impacts associated with an increased rate of warming, sea level rise, and others.

⁴⁰ Updated for the latest science, *see* n. 11, *supra*, the number of vehicles would be over 70 million and the number of pounds of coal burned would be over 370 billion.

I declare that the foregoing is true and correct.

A handwritten signature in black ink, appearing to read "Ilissa B. Ocko", written in a cursive style.

Ilissa B. Ocko

Dated October 18, 2019

ILISSA OCKO
SENIOR CLIMATE SCIENTIST
ENVIRONMENTAL DEFENSE FUND

Email: iocko@edf.org | Phone: 212-616-1228 | Website: ilissaocko.com

EDUCATION

Ph.D. Atmospheric & Oceanic Sciences, Princeton University, 2013
M.A. Atmospheric & Oceanic Sciences, Princeton University, 2010
B.S.E Earth System Science & Engineering, magna cum laude, University of Michigan, 2008

POSITIONS HELD

2019— Senior Climate Scientist, Environmental Defense Fund (EDF), Washington, DC
Pursue climate science research, support climate science communication

2015-2019 Climate Scientist, EDF, Washington, DC & New York, NY
Pursued climate science research, supported climate science communication

2014-2015 Kravis Postdoctoral Science Fellow (with Dr. Steven Hamburg), EDF, New York, NY
Conducted research on short-lived climate pollutant mitigation strategies

2013-2014 High Meadows Postdoctoral Fellow (with Dr. Steven Hamburg), EDF, New York, NY
Framed EDF's long-term climate vision and convened expert workshops

2012-2013 Research Assistant (with Dr. V Ramaswamy), Princeton University
Studied aerosol radiative forcings and climate responses using climate models

2009-2012 NSF Graduate Research Fellow (with Dr. V Ramaswamy), Princeton University
Studied aerosol radiative forcings and climate responses using climate models

2008-2009 AMS Industry/Gov't Graduate Fellow (with Dr. V Ramaswamy), Princeton University
Studied transport of aerosols to the Arctic

2007-2008 Research Assistant (with Dr. Christiane Jablonowski), University of Michigan
Analyzed how small-scale atmospheric eddies interact with large-scale circulation

2007 NOAA Hollings Scholar (with Taneil Uttal), NOAA ESRL, Boulder, CO
Researched historical air-flow patterns for Arctic locations using HYSPLIT model

2006-2007 Research Assistant (with Dr. Mary Anne Carroll), University of Michigan
Explored the linkage between ozone levels and air flow in northern Michigan

2006 Field Researcher (with Drs. Perry Samson & Robert Clauer), Greenland
Set up instruments to measure atmospheric conditions in Greenland locations

2006 REU Participant (with Dr. Mary Anne Carroll), UMBS, Pellston, MI
Examined the climatology of northern Michigan to determine pollution exposure

2005-2006 Research Assistant (with Dr. Daniel C. Fisher), Undergrad Research Opp. Program, UM
Casted models of mastodon skeletons and pieced together excavated tusks

SERVICE ACTIVITIES

- 2017-2018 Contributing author, U.S. Global Change Research Program, State of the Carbon Cycle Report, Chapters 3, 17, 18
- 2017-2018 Founder, Good Climate News, @goodclimatenews
Managed a Twitter account that collated all of the good climate change news
- 2016-2017 Founder, @theclimatепicture
Managed and developed daily original climate infographics for social media (Instagram)
- 2016 Climate Science Consultant, UCAR Center for Science Education
Provided guidance and content for climate change exhibit
- 2016 Participant, American Geophysical Union Sharing Science Advisory Board
- 2015 Co-convener, Climate Science is a Cross-Disciplinary Challenge, AGU Fall Meeting Session
- 2015— Reviewer, Climate Feedback
Review the scientific integrity of climate change media articles
- 2015 Contributor, More Than Scientists
Contributed several videos with 15-30 second climate change snippets
- 2014— Speaker, Climate Voices
Speak with different local communities about climate change causes, impacts, solutions
- 2011— Science Graphic Designer, freelance
Develop science infographics to for blogs, research articles, news stories
Select clients: Stanford University, Princeton University, Climate Central
- 2009-2010 Conference Organizer, High Meadows, Princeton University
Co-organized a daylong environmental sustainability conference for students and public
- 2007-2008 Chief Meteorologist, WOLV-TV, University of Michigan
Managed weather anchors of student-run television network news program
- 2006-2008 Weather Anchor, WOLV-TV, University of Michigan
Forecasted and broadcasted weather on student-run television network news program

PROFESSIONAL ASSOCIATIONS

Union of Concerned Scientists
Climate Access
Earth Science Women's Network
American Meteorological Society
American Geophysical Union

CERTIFICATES

Science, Technology, and Environmental Policy Certificate, Woodrow Wilson School, Princeton, 2012
Co-authored climate change mitigation strategies report for U.S. DOE and EPA, attended 22nd UN Montreal Protocol Meeting, wrote policy memos/reports, researched how climate metrics impact policy

Arctic Climate Change Certificate, Summer School, University Centre in Svalbard, Svalbard, 2009

Physics of the Climate System Certificate, Summer School, Utrecht Univ., Utrecht, Netherlands, 2008

HONORS AND AWARDS

Streisand Chair in Environmental Studies, EDF	2018
Finalist, International FameLab Competition, Cheltenham UK	2016
Winner & Audience Favorite, NASA FameLab USA Finals, Washington DC	2016
Winner & Audience Favorite, NASA FameLab USA Semi-Finals, San Francisco CA	2015
Wildcard, NASA FameLab Regional Heat, San Francisco CA	2014
Aspen Ideas Festival Scholar, Aspen Ideas Festival, Aspen CO	2014
Emerging Alumni Scholars Award, Princeton University—given to three graduate students	2013
Award for Outstanding Poster Presentation, World Climate Research Programme	2011
Outstanding Student Poster Presentation, American Meteorological Society (AMS)	2011
National Science Foundation Graduate Research Fellowship	2009-2012
AMS Industry/Government Graduate Fellowship, NOAA Climate Program Office	2008-2009
Order of Omega National Honor Society	2008
First Place Winner, UM Best Student Paper on Environmental Issues & Climate Change	2007
Weather Underground Inc. Scholarship, AOSS Department, Univ. of Michigan	2007
Delta Epsilon Iota Academic Honor Society	2007
Eliza Ann Roark Scholarship, Chi Omega Fraternity, Univ. of Michigan	2006
Marian Sarah Parker Scholarship, College of Engineering, Univ. of Michigan	2006-2008
Ernest F. Hollings Scholarship, National Oceanic and Atmospheric Administration	2006-2008

PUBLICATIONS

- Ocko, IB, D Shindell, M Oppenheimer, A Hristov, SW Pacala, D Mauzerall, Y Xu, and SP Hamburg: Methane mitigation: an achievable lever to limit warming in near- and long-term, in prep
- Ivanovich, CC, IB Ocko, D Gordon: Surpassing 2 °C from Diet Alone, *Nature*, in review
- Ivanovich, CC, IB Ocko, P Piris-Cabezas, and A Petsonk: Climate benefits of proposed carbon dioxide mitigation strategies for international shipping and aviation, *Atmospheric Chemistry and Physics*, in review
- Ocko, IB, and SP Hamburg: Climate impacts of hydropower: enormous differences among facilities and over time, *Environmental Science & Technology*, in review
- Ocko, IB, V Naik, D Paynter: Rapid and reliable assessment of methane impacts on climate, *Atmos. Chem. Phys.*, 18, 15555-15568, doi:10.5194/acp-18-15555-2018 (2018)
- Ocko, IB, SP Hamburg, DJ Jacob, DW Keith, NO Keohane, M Oppenheimer, JD Roy-Mayhew, DP Schrag, SW Pacala, Unmask temporal trade-offs in climate policy debates, *Science*, 356, 6337, p.492-493 (2017)
- Ocko, IB, P Ginoux, Comparing multiple model-derived aerosol optical properties to spatially collocated ground-based and satellite measurements, *Atmos. Chem. Phys.*, 17, 4451-4475, doi:10.5194/acp-17-4451-2017 (2017)
- Ocko, IB, V Ramaswamy, Y Ming, Contrasting climate responses to the scattering and absorbing features of anthropogenic aerosol forcings, *J. Climate*, 27, doi:10.1175/JCLI-D-13-00401.1 (2014)
- Ocko, IB, V Ramaswamy, PA Ginoux, Y Ming, LW Horowitz, Sensitivity of scattering and absorbing aerosol direct radiative forcing to physical climate factors, *J. Geophys. Res.*, 117, doi:10.1029/2012JD018019 (2012)
- Ocko, IB, Hot Seat in Our Warming World, *Science*, 337, 6092, p. 296, doi:10.1126/science.1224878 (2012)

Bankuti, M, B Ellis, M Frades, D Kanter, J Losh, I Ocko, J Roy-Mayhew, P Shevlin, C Sierawski, A Wasserman, J Zuckerman, D Mauzerall, Complements to carbon: Opportunities for near-term action on non-CO2 climate forcers, Policy Report, Princeton University (2011)

PRESENTATIONS

- Ocko, IB, Shindell, D, Oppenheimer M, Hristov, A, Pacala, SW, & Hamburg, SP, Methane mitigation achievable lever to limit warming in near- and long-term. Presented at the Fall Meeting of the American Geophysical Union. Washington, DC (2019)
- Ocko, IB, Balancing short- and long-lived climate pollutant mitigation: Clearer metrics are critical, 6th World Congress of Environmental and Resource Economists, Gothenburg, Sweden (2018)
- Ocko, IB, Methane from Oil & Gas: Serious but solvable, Advanced Energy Conference, Sustainable Gas Systems: Public Policies, panelist, New York, NY (2018)
- Ocko, IB, Climate Change Impacts in Africa, 21st Century Regional Climate in a Warming World, COP-22 Side Event, Marrakesh Morocco (2016)
- Ocko, IB, SP Hamburg, S Pacala, Balancing short- and long-lived climate pollutant mitigation: Clearer metrics are critical, AGU Fall Meeting, San Francisco, CA (2015)
- Ocko, IB, How to be more attractive... when communicating science, invited, AGU Fall Meeting, San Francisco, CA (2015)
- Ocko, IB, SP Hamburg, S Pacala, Balancing short- and long-lived climate pollutant mitigation: Clearer metrics are critical, Our Common Future Under Climate Change, Paris, France (2015)
- Ocko, IV, Contrasting Climate Responses of Absorbing and Scattering Aerosol Radiative Forcings, Stony Brook University, School of Marine and Atmospheric Sciences, Department Seminar (2015)
- Ocko, IB, V Ramaswamy, Climate responses to gases and aerosols from 1860 to 2000, AGU Fall Meeting, San Francisco, CA (2012)
- Ocko, IB, V Ramaswamy, Offsetting roles that black carbon and sulfate play in climate change, Princeton Graduate Student Symposium, Princeton, NJ (2011)
- Ocko, IB, V Ramaswamy, Offsetting roles that black carbon and sulfate play in climate change, World Climate Research Program Open Science Conference, Denver, CO (2011)
- Ocko, IB, V Ramaswamy, Offsetting and complementary characteristics of sulfate and soot direct radiative forcings, 90th Annual AMS Meeting, Seattle, WA (2011)

OUTREACH

- Montgomery College, Frank Islam Athenaeum Symposia speaker, Climate change: What is happening and what can we do about it?, Germantown MD, April 24 2018
- St. Paul's School for Girls, Zee Fambrough Science Speaker Series, Climate change and classroom and assembly speaker, Brooklandville MD, March 7 2018
- North Carolina State University, How scientists can create better visuals for more effective science communication, Coffee & Viz, training workshop, Raleigh NC, March 1 2018
- Science Improv, Climate Change, invited guest speaker, Washington DC, September 15 2017
- Washington DC Taste of Science festival, Wait Wait...Global Climate Change?, volunteer content developer, April 28 2017

Climate Corps Professional Development Webinar Series, Climate Change: What The Science Really Says About Skeptic Arguments, invited presenter, April 4 2017

Alpha Kappa Alpha Sorority, Global Climate Change: Causes, Impacts, Solutions, invited speaker, Suitland MD, March 4 2017

Old Bridge Public Library, Inquire Science Series, invited speaker, Old Bridge NJ, July 31 2016

Georgetown University, Mathematics and Climate Change, guest lecturer, July 27 2016

Baba Brinkman's Rap Guide to Climate Chaos, invited talkback guest, Soho Playhouse, New York NY, July 23 2016

Ignite Talks, Cooking Shouldn't Kill, San Francisco CA, December 16 2015

AGU Fall Meeting, Sharing Science in Plain English panel, invited panelist, San Francisco CA, December 15 2015

Saddle River Day School, School Assembly, invited speaker, Saddle River NJ, December 2 2015

Clearwater's Great Hudson River Revival, Climate Change is here; Climate Change is now, invited speaker, Croton-on-Hudson, NY, June 20-21 2015

Trinity Episcopal, GreenFaith Day, speaking with husband about climate change, April 26 2015

KidSpirit Table Talk, Climate Change: Tending Our Planet, invited panelist, "What we know about the science of climate change," New York, NY, April 19 2015

Miller's Run School, 8th Grade classroom, Teacher Patricia Norsworthy, "Climate Change: Causes, Impacts, Solutions," January 22 2015

American Meteorological Society Student Conference, Annual Meeting, "Experiences Beyond the Classroom," "Getting the word out: Science Policy and Communication," invited panelist, January 3 2015

Rutgers University, SEBS International Programs, Career Panel, invited panelist, November 14 2014

Princeton University, Atmospheric and Oceanic Sciences, Student Seminar, invited speaker, "Bridging Science and Advocacy as a Career," October 23 2014

Wells Fargo, Overview of Intergovernmental Panel on Climate Change 2013/2014 reports, May 8 2014

Watkinson High School, 9th Grade classroom, Teacher Jennifer O'Brien "A young climate scientist's professional journey," February 21 2014

Rutgers University, SEBS International Programs, Career Panel, invited panelist, November 8 2013

MEDIA

Radio/TV interviews: CTV, KPFA Berkeley, Radio Free Asia, and Circa. 2018

DC's Panorama, The Block is Hot! Climate Change is Not, invited panelist, television show, August 2 2017

POTUS 2017 with Brian Lehrer, CUNY TV, Evidence Based Politics, invited guest, June 7 2017

Thomson Reuters TV, television interview, November 22 2016

Powerful Conversations, VoiceAmerica, invited guest, radio show, <http://www.sparkpluglabs.co/powerful-conversations/episode50>, June 21 2016

KXRY-FM in Portland, OR, invited guest, radio interview, "Hope for the Climate," December 24 2014

BLOG POSTS

Record-warm oceans: How worried should we be? February 22 2019 | EDF Voices

How can half a degree of warming matter so much? October 18 2018 | EDF Voices

UN Special Report confirms urgent need to reduce methane emissions, October 11 2018 | Energy Exchange

Hansen was right: Marking an anniversary by misleading the public, July 18 2018 | Climate411

Industry-backed white paper low-balls oil & gas methane impact, February 28 2018 | Energy Exchange

New science suggests methane packs more warming power than previously thought, February 7 2018 | Energy Exchange

Natural disasters are no longer purely natural, January 16 2018 | Climate411

It's now, it's us, it's not over – the top 7 takeaways from the new climate change report, November 15 2017 | Climate411

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How Do We Know That Humans Are Causing Climate Change? These Nine Lines of Evidence, March 23 2017 | Climate411

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Climate change is messing with clouds – and it's a really big deal, August 24 2016 | EDF Voices

How Hot It Gets Vs. How Fast: Understanding The Two Kinds Of Climate Pollution, May 17 2016 | EDF Energy Exchange

How Hot It Gets Vs. How Fast: Understanding The Two Kinds Of Climate Pollution, May 16 2016 | Energy Exchange

The Impacts of Climate Change on Human Health – a Sobering New Report, April 5 2016 | Climate411

3 reasons the Zika outbreak may be linked to climate change, February 16 2016 | EDF Voices

Human emissions just cancelled the next ice age. Here's why we should care, February 11 2016 | EDF Voices

Why we can't blame El Niño for the hottest year on record, January 5 2016 | EDF Voices

Scientist fact-checkers join new push to call out climate errors in news media, December 10 2015 | EDF Voices

9 million acres and counting: Will wildfires keep spreading with climate change?, September 30, 2015 | EDF Voices

Why a "Godzilla" El Niño won't end California's drought, August 27 2015 | EDF Voices

Methane and CO2: Why climate action means addressing both, August 12 2015 | EDF Voices

Sobering climate science: Extreme weather on the rise, July 23 2015 | EDF Voices

6 climate tipping points: How worried should we be?, May 28 2015 | EDF Voices

On El Niño, snowballs and real climate science, March 6 2015 | EDF Voices

Giant pandas face greatest threat yet: A hotter world, February 4 2015 | EDF Voices

This is how climate scientists should talk, December 17 2014 | EDF Voices

Climate hope amid melting ice, rising temps, December 10 2014 | EDF Voices

Why California thirsts for rain and the East Coast gets soaked, October 14 2014 | EDF Voices

How scientists linked the California drought to climate change, October 2 2014 | EDF Voices

Why "slowed" global warming is not what it seems, September 16 2014 | EDF Voices

Why those huge craters in Siberia are a climate wake-up call, August 11 2014 | EDF Voices

Why offshore wind energy should be on our radar, August 6 2014 | Global CCS Institute (Decarboni.se)

Moral Optimism of Climate Change, July 23 2014 | Global CCS Institute (Decarboni.se)

Bundle up, the polar vortex returns - but is it climate change?, July 15 2014 | EDF Voices

Taking the Earth's Historical Temperature, July 4 2014 | The Toast

Study: Climate change may push hurricanes farther north, south, June 2 2014 | EDF Voices

Crafting Your Own Visuals for Science Communication: Part I, May 7 2014 | The Plainspoken Scientist

New report: How climate change is impacting where you live, May 6 2014 | EDF Voices

Top takeaways from the latest IPCC report, April 14 2014 | EDF Voices

6 key insights from the latest IPCC climate report, March 31 2014 | EDF Voices

Crafting Your Own Visuals for Science Communication: Part II, May 22 2014 | The Plainspoken Scientist

Four reasons why the climate is still changing, despite the cold, March 18 2014 | EDF Voices

How an EDF scientist explains climate change in 30 seconds, March 13 2014 | EDF Voices

Why your car is covered with an inch of ice, instead of a foot snow!, March 8 2014 | Dan's Wild Wild Science Journal

Slowed global warming? New data suggests otherwise, December 23 2013 | EDF Voices

Geoengineering: A cure worse than the disease?, December 11 2013 | EDF Voices

Disinformation Spreads Confusion about the Reality of Climate Change, October 21 2013 | EDF Voices

New study projects when and where radically warmer temps will hit first, October 11 2013 | EDF Voices

Seven Things You Should Know about the U.N.'s New IPCC Climate Change Report, September 27 2013 | EDF Voices