

## SUSAN M. NATALI

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### EDUCATION

B.S. Biology, Villanova University, 1991  
Ph.D. Ecology and Evolution, Stony Brook University, 2008

### PROFESSIONAL APPOINTMENTS

Senior Scientist, Woodwell Climate Research Center, 2021-present  
Arctic Program Director, Woodwell Climate Research Center, 2019-present  
Associate Scientist, Woodwell Climate Research Center, 2015-2021  
Assistant Scientist, Woodwell Climate Research Center, 2012-2105  
National Science Foundation (NSF) Polar Postdoctoral Fellow, 2010-2012  
Postdoctoral Associate, University of Florida, 2008-2010

### PUBLICATIONS

94. Liu Z, Kimball JS, Ballantyne AP, Parazoo NC, Wang WJ, Bastos A, Madani N, **Natali SM**, Watts JD, Rogers BM, Ciais P, Yu K, Virkkala AM, Chevallier F, Peters W, Patra PK, ChandraN (2022) Respiratory loss during late-growing season determines the net carbon dioxide sink in northern permafrost regions. *Nature Communications* 13, 5626 (2022).  
<https://doi.org/10.1038/s41467-022-33293-x>
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87. Treharne R, Rogers BM, Gasser T, MacDonald E, **Natali SM** (2022) Identifying Barriers to Estimating Carbon Release from Interacting Feedbacks in a Warming Arctic. *Frontiers in Climate*, <https://doi.org/10.3389/fclim.2021.716464>
86. Curasi SR, Fetcher N, Hewitt RE, Lafleur PM, Loranty MM, Mack MC, May JL, Myers-Smith IH, **Natali SM**, Oberbauer S (2022) Range shifts in a foundation sedge potentially induce large Arctic ecosystem carbon losses and gains. *Environmental Research Letters*, 17 045024
85. Ludwig SM, **Natali SM**, Mann PJ, Schade JD, Holmes RM, Powell M, Fiske G, Commane R (2022) Using machine learning to predict inland aquatic CO<sub>2</sub> and CH<sub>4</sub> concentrations and the effects of wildfires in the Yukon-Kuskokwim Delta, Alaska. *Global Biogeochemical Cycles*, 36, e2021GB007146. <https://doi.org/10.1029/2021GB007146>
84. Abbott BW, Brown M, Carey JC, Ernakovich J, Frederick JM, Guo L, Hugelius G, Lee RM, Loranty MM, Macdonald R, Mann PJ, **Natali SM**, Olefeldt D, Pearson P, Rec A, Robards M, Salmon VG, Sayedi Sayedeh S, Schädel C, Schuur EAG, Shakil S, Shogren AJ, Strauss J, Tank SE, Thornton BF, Treharne R, Turetsky M, Voigt C, Wright N, Yang Y, Zarnetske JP, Zhang Q, Zolkos S (2022) We Must Stop Fossil Fuel Emissions to Protect Permafrost Ecosystems. *Frontiers in Environmental Science*, 10.3389/fenvs.2022.889428
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78. Virkkala A-M, **Natali SM**, Rogers BM, Watts JD, Savage K, Connon SJ, Mauritz M, Schuur EAG, Peter D, Minions C, Nojeim J, et. al. (2021) The ABCflux database: Arctic-Boreal CO<sub>2</sub> flux observations and ancillary information aggregated to monthly time steps across terrestrial ecosystems. *Earth System Science Data*, DOI:10.5194/essd-2021-233
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the Arctic tundra-taiga ecotone. *Canadian Journal of Forest Research*, DOI:10.1139/cjfr-2020-0466

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- Lamentowicz M, Lapshina E, Limpens J, Linkosalmi M, Ma J, Mauritz M, Mitchell EAD, Munir TM, **Natali SM**, Natcheva R, Payne RJ, Philippov DA, Rice SK, Robinson S, Robroek BJM, Rochefort L, Singer D, Stenøien HK, Tuittila ES, Vellak K, Waddington JM, Granath G (2020) Environmental drivers of Sphagnum growth in peatlands across the Holarctic region. *Journal of Ecology*, 00: 1– 15, doi: 10.1111/1365-2745.13499
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- but reduces old soil carbon contribution to ecosystem respiration in tundra ecosystems. *Glob Change Biol.* 25: 1315– 1325, doi: 10.1111/gcb.14578
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  54. **Natali SM**, Watts JD, Rogers BM et al. (2019) Large loss of CO<sub>2</sub> in winter observed across the northern permafrost region. *Nature Climate Change*, 9, 852–857, doi:10.1038/s41558-019-0592-8
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  19. Schuur EAG, Carbone MS, Hicks Pries C, **Natali SM** (2015) Radiocarbon in terrestrial ecosystems. In: *Radiocarbon and Climate Change*. pp 167-220. doi: 10.1007/978-3-319-25643-6\_6
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  17. Treat C, **Natali SM**, Ernakovich J, Iversen CM, Lupascu M, McGuire AD, Norby RJ, Chowdhury TR, Richter A, Santruckova H, Schädel C, Schuur EAG, Sloan VL, Turetsky M, Waldrop M (2015) A pan-arctic synthesis of CH<sub>4</sub> and CO<sub>2</sub> production from anoxic soil incubations, *Global Change Biology*. doi: 10.1111/gcb.12875
  16. Li J, Luo Y, **Natali SM**, Schuur EAG, Xia J, Kowalczyk EA, Wang Y (2014) Modeling permafrost thaw and ecosystem carbon cycle under annual and seasonal warming at a tundra site in Alaska. *JGR Biogeosciences*, 119: 1129-1146, doi: 10.1002/2013JG002569
  15. Loranty MM, **Natali SM**, Berner LT, Goetz SJ, Holmes RM, Zimov NS, Zimov SA (2014) Siberian tundra ecosystem vegetation and carbon stocks four decades after wildfire. *JGR Biogeosciences*, 119: 2144–2154
  14. **Natali SM**, Schuur EAG, Webb E, Hicks Pries CE, Crummer, CG (2014) Permafrost degradation stimulates carbon loss from experimentally warmed tundra. *Ecology*, 95:602–608, doi: <http://dx.doi.org/10.1890/13-0602.1>
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6. Schuur EAG, Abbott BW, Bowden WB, Brovkin V, Camill P, Canadell JP, Chapin III FS, Christensen TR, Chanton JP, Ciais P, Crill PM, Crosby BT, Czimczik CI, Grosse G, Hayes DJ, Hugelius G, Jastrow JD, Kleinen T, Koven CD, Krinner G, Kuhry P, Lawrence DM, **Natali SM**, Ping CL, Rinke A, Riley WJ, Romanovsky VE, Sannel ABK, Schädel C, Schaefer K, Subin ZM, Tarnocai C, Turetsky M, Walter-Anthony KM, Wilson CJ, Zimov SA (2011) High risk of permafrost thaw. *Nature*, 480: 32-33, doi:10.1038/480032a
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4. **Natali SM**, Sañudo-Wilhelmy SA, Lerdau MT (2009) Effects of elevated carbon dioxide and nitrogen fertilization on nitrate assimilation in forest trees. *Plant and Soil*, 314: 197-210
3. **Natali SM**, Sañudo-Wilhelmy SA, Norby R, Zhang H, Finzi A, Lerdau MT (2008) Increased mercury in forest soils under elevated carbon dioxide. *Oecologia*, 158: 343-354
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## DATASETS AND CONTRIBUTED PAPERS

Lead or contributing author on 40+ openly available datasets archived at the Environmental Data Initiative, <https://environmentaldatainitiative.org/>

Lead or contributing author on 35+ openly available datasets archived at the Arctic Data Center, <https://arcticdata.io/>

Lead or contributing author on 4 openly available datasets archived ORNL DAAC, <https://daac.ornl.gov/>

Lead or contribution author on >140 presentations at national and international science conferences

## **COMMUNICATION TO POLICY MAKERS (SELECT)**

UNFCCC Climate Change Conference (COP27), co-led Permafrost Day in the Cryosphere Pavilion, November 2022, Sharm el-Sheikh

Testimony to the House Committee on Science, Space, and Technology, September 2022

Testimony to the House Foreign Affairs Subcommittee on Europe, Energy, the Environment, and Cyber on Arctic Risk, November 2021

UNFCCC Climate Change Conference (COP26), co-led Permafrost Day in the Cryosphere Pavilion, November 2021, Edinburgh

UNFCCC Climate Change Conference (COP25), co-led Permafrost Day in the Cryosphere Pavilion, December 2019, Madrid

Capitol Hill Briefing organized by Reps. Tonko and Castor, presented overview of Arctic carbon emissions (Natali et al. 2019)

Arctic Circle Assembly, Plenary Session Panelist, Reykjavik, Iceland, October 2016

UNFCCC Climate Change Conference (COP21), ICCI/WHRC Sponsored Side Event, *Thresholds and Closing Windows: Risks of Irreversible Cryosphere Climate Change*, Invited Speaker, 2015 Paris

Contributor to International Cryosphere Climate Initiative (ICCI) report, *Thresholds and Closing Windows: Risks of Irreversible Cryosphere Climate Change*, December 2015

Arctic Circle Assembly, Invited Speaker and Panelist, Reykjavik, Iceland, October 2015

UNFCCC Bonn Climate Change Conference, SB42, ICCI Sponsored Side Event, *Cryosphere as a Lens for Paris: Science-based Urgency and Ambition*, Invited Speaker, June 2015

Capitol Hill and State Dept. meetings, Washington DC. Met with staff from several Congressional offices and the House Science Committee, and Senior Arctic officials from the State Department for briefings on relevance of permafrost thaw for global climate, June 2015

## **MEDIA, OUTREACH, AND EDUCATION (SELECT)**

[TED talk](#). How ancient carbon threatens everyone on the planet (2022)

Program Director for [the Polaris Project](#), an undergraduate Arctic research program.

Featured in a educational films narrated by Richard Gere and featured on PBS, [Earth Emergency](#)

Panelist for virtual event with Dalai Lama and Greta Thunberg, [A Conversation on the Crisis of Climate Feedback Loops](#)

Panelist for a virtual event for [Climate Week](#) 2020: *Arctic Permafrost Thaw: Science & Policy*.

Interviewed by [Living on Earth](#) about the extreme climate events that occurred in the Arctic in the summer of 2020.

Featured in [National Geographic article](#) on Siberian methane craters (2020).

Contributed to a multiple-award winning book, [The Big Thaw](#) (2019), about permafrost thaw and featuring stories of Polaris Project participants.

Worked with a film-maker on an award-winning documentary, [Permafrost Now](#), (2018) that featured participants of the Polaris Project.

Worked with [The N.Y. Times](#) on a permafrost thaw article (2017).

Featured in news segment about permafrost thaw on [CBS This Morning](#), Oct 2017.

Interviewed for [Washington Post article](#) about permafrost emissions in the context of the Paris agreement, Dec 2015.

Press Event at Bonn Climate Conference, media coverage included: Agence France-Presse, which was picked up by >300 media outlets, June 2015.

### **PROFESSIONAL SERVICE & LEADERSHIP**

Session convener, Arctic Science Summit Week (2021), Arctic in Transition: Monitoring ecosystem change from the ground, air, and space

Co-organizer, Arctic-Boreal Carbon Flux Upscaling Workshop (2020)

Permafrost Carbon Network, (Working Group Lead/Member since 2012; Steering Committee since 2019)

NASA Arctic Boreal Vulnerability Experiment, Carbon Dynamics Working Group Lead (2016-2018) and Science Team Member (2016-2021)

International Arctic Systems for Observing the Atmosphere (IASOA), Atmosphere-Surface Exchanges Steering Committee (2016-2017)

American Geophysical Union (AGU) Biogeosciences Section, Outstanding Student Presentation Award Coordinator (2013-2018)

Associate Editor for Biogeosciences Special Issue, Changing Permafrost in the Arctic and its Global Effects in the 21st Century

Guest Editor for Environmental Research Letters, Resiliency and Vulnerability of Arctic and Boreal Ecosystems to Environmental Change: Advances and Outcomes of ABoVE (2017-2020)

PolarTREC Scientist (2011-2013, 2017); several ongoing collaborations with K-12 teachers

Reviewer for ~3-5 manuscripts/year; ~1-3 ad-hoc proposals/year; ~1 panel/year

### **GRANTS**

Integrating Permafrost into Our Global Solution to Climate Change, The Audacious Project, 2022-2028, \$41M (lead PI)

Mapping Abrupt Permafrost Thaw in the Arctic, Heising Simons Foundation, 2021-2023, \$249K (lead PI)

Mitigating the Global Threat from Thawing Permafrost: The Arctic Carbon Monitoring and Prediction System (Arctic MaPS), Quadrature Climate Foundation, 2021-2024, \$3M (lead PI)

Building an International Network of Ground Observations for the Arctic Carbon Monitoring and Prediction System, Woodwell Fund for Climate Solutions, 2020-2022, \$98K (lead PI)

Accounting for permafrost carbon feedbacks in global climate policy, One Earth Foundation, 2020-2021, \$75K (lead PI)

Arctic Carbon Monitoring and Prediction System, Gordon & Betty Moore Foundation, 2019-2023, \$2.4M (Lead PI)

The Polaris Project: Catalyzing change in the Arctic research community, NSF IUSE, 2019-2023, \$1.4M (lead PI)

Developing a mechanistic understanding of decomposition of organic matter in frozen soil, NSF DEB, 2019-2021, \$171K (lead PI)

Mapping Methane Craters in the Arctic, Heising Simons Foundation, 2019-2021, \$148K (Lead PI)

Integrating science and Indigenous knowledge to support threatened Arctic communities, Woodwell Fund for Climate Solutions, 2019-2021, \$134K (Lead PI)

Establishing an Arctic Climate Change and Carbon Observatory, Woodwell Fund for Climate Solutions, \$180K, 2018-2020 (Lead PI)

Towards a northern pyrogenic carbon budget, Woodwell Fund for Climate Solutions, 2019-2020, \$49K, (J. Sanderman, Lead PI)

Understanding the causes and implications of enhanced seasonal CO<sub>2</sub> exchange in boreal and arctic ecosystems, NASA ABoVE, 2017-2020, \$1.4M (B. Rogers, Lead PI)

Polaris Project: Catalyzing demographic change in the Arctic research community through an immersive and sustained undergraduate research experience, NSF DUE, 2016-2019, \$1.5M (R. Holmes, Lead PI)

Winter respiration in the Arctic: Constraining current and future estimates of CO<sub>2</sub> emissions during the non-growing season, NASA ABoVE, 2015-2019, \$886K (Lead PI)

Mapping Hotspots for Methane Craters in the Siberian Arctic, NASA Novel Research, 2018-2019, \$42K (Lead PI)

Vegetation and ecosystem impacts on permafrost vulnerability, NSF Office of Polar Programs, 2015-2018, \$560K to Woodwell (\$1.3M total, Lead PI)

Fire regime influences on carbon dynamics of Siberian boreal forests. NSF Office of Polar Programs, 2013-2018, \$370K to Woodwell (\$800K total, H. Alexander, Lead PI)

The impact of fire on active layer thickness, NASA Rapid, 2016-2017, \$20K (K. Schaefer, Lead PI)

The carbon balance of Arctic River Deltas: Tundra fire as an agent of system change, NSF Rapid, 2015-2016, \$220K

Russian Visiting Scholars Program, Trust for Mutual Understanding, 2014-2016, \$12K

Developing a pan-arctic ecosystem respiration model, MBL-UChicago Collaboration Award, 2014-2015, \$25K, (E. Rastetter, Lead PI)

Effects of warming and drying on ecosystem carbon balance in Alaskan tundra. NSF Office of Polar Programs, 2012-2015, \$600K (Lead PI)

Vegetation permafrost dynamics in the context of changing climate. National Geographic Society, 2012-2014, \$21K (Lead PI)

## **FELLOWSHIPS & AWARDS**

AGU Biogeosciences, Sulzman Award for Excellence in Education and Mentoring, 2021

NSF, Polar Programs Postdoctoral Research Fellowship, 2010-2012

U.S. Permafrost Association, AGU Travel Grant, 2011

NSF, Graduate Research Fellowship, 2004-2008

NSF, Doctoral Dissertation Improvement Grant, 2007-2008

U.S. Department of Energy, Global Change Education Program Graduate Fellowship, 2006-2007

Association for Women in Science, Ruth Satter Predoctoral Award, 2006