

Introduction and Note from the Director

FY 2018 has been a strong year for the Center for Ecosystem Science and Society. It has been a year of growth, with new faculty, students, and staff joining the team. It has been a year of research, with new grants, papers, and discoveries about ecosystems, how they work, and how they respond to the changing environment. And it has been a year of engagement, marked by new inquiries and explorations into how to do science, how to talk about it, how to share it, and how to shape it so that what we produce is interesting, impactful, and meaningful. Globally, we just crossed the 410 ppm threshold of CO₂ in the atmosphere, making dangerous interference with the climate system even more likely. Locally, Ecosystem scientists in Flagstaff worked to generate new data, new science, new tools, and new ideas to help us understand what this rise in atmospheric CO₂ means for the carbon cycle, and, in turn, for the future of the Earth's climate.

New Faculty

This year, Ecosystem grew by four new faculty members and their labs, each strengthening our research team in depth, quality, and scope of ecosystem science.

Andrew Richardson joined NAU from Harvard University and now holds a joint appointment in the Center for Ecosystem Science and Society and the School of Informatics, Computing, and Cyber Systems. His research adds to Ecosystem's existing strength in the impacts of global change on terrestrial ecosystems and feedbacks between ecosystems



Figure 1. Long-term climate warming will not rid the world of extreme cold spells, but research led by Andrew Richardson at NAU shows how warming can shape how plants and ecosystems respond to those extreme winter chills. In the figure, the strip of spruce bog closest to the winter cloud represents the control plot, a plot where plants survived the extreme event. Shown in the foreground, the plants in the heated plot did not fare as well, because exposure to chronic heating increased their sensitivity to cold. This research is forthcoming in the journal, *Nature*. Artwork by Ecosystem's own Victor Leshyk.

and climate. Andrew's work also focuses on phenology, the seasonality of what plants and animals do throughout the year, important because it's perhaps the strongest ecological sensor of our changing climate. Andrew founded a global network to integrate observations of phenology, using cameras connected to the internet, amassing an amazing array of images that document how plants respond to climate (Figure 1).

Karen Haubensak also joined Ecosystem this year. While she has been at NAU for some time, her research collaborations with Ecosystem had grown so much so that it made sense for her to join the team officially. Karen brings expertise in invasive plant species and community dynamics, and how these interact to affect ecosystem processes. This year, she co-advised an MS student, Alessandra Zuniga, who completed her degree program studying the effects of climate change on litter decomposition, with the fascinating twist of assessing how microarthropods contribute to this key ecosystem process. Microarthropods are tiny insects that live in soil, making a living



From left to right, Clare Aslan, Kevin Grady, and Karen Haubensak, the leadership team for a new ~\$1M USDA research grant about ecosystem restoration.

by eating dead plants: together with soil bacteria and fungi, microarthropods are an important reason that the world is not covered in leaves. Karen has a long history of successful fundraising to support her research, with multiple grants on these and other topics. This year, she teamed up with Kevin Grady from Forestry and Clare Aslan (see photo) to launch an ambitious project designed to identify the plant species best suited for seed production for crisis events as well as for large-scale restoration. They just received a five-year, \$935,000 grant from the U.S. Department of Agriculture to study which plants are most fit for restoring damaged lands and capable of supporting diverse pollinator communities. As Karen describes it, "We want to know which plants support diverse pollinators, produce lots of seeds and perform best in large-scale restoration projects." The goal is to use the right plants in the right combinations, while bolstering native seed production throughout the region.

Yiqi Luo joined Ecosystems from the University of Oklahoma, and brings with him a large lab that works to blend the sciences of measuring and modeling ecosystems. His work uses long-term field experiments as well as their mathematical representation in computer simulations to project what the Earth will be like in the future. Like Andrew, Yiqi has been collaborating with scientists at NAU for years, and his joining Ecosystems has only made that collaboration stronger. This year, Yiqi and his team worked with Victor Leshyk on a project to visualize what mathematical models miss about land ecosystems, generating a platform for exploring what omissions might matter (Figure 2). This led to a large, collaborative grant proposal about how visualization can be a research tool (Figure 3).

Yiqi and his team also hosted a major event this spring, a symposium and workshop called "New Advances in Land Carbon Cycle Modeling," an event that brought experts from around the world to Flagstaff because of the unique expertise in this field represented by faculty at NAU, and because of one bold new idea:



Figure 2. Visualizing the difference between real terrestrial ecosystems and how we model them, mathematically

called the Traceability Framework, which will simplify the math and intensive computation of these ultra-complex models, making them faster, simpler, and easier to understand. The new idea applies some very well-known, old math: it takes series of linear equations, recognizes commonalities in their structures, and converts them to a far simpler matrix form. In lay terms, this means taking a complicated model with lots of independent equations and analyzing all the equations together as one integrated system, rather than one by one. That makes it faster, more efficient, and easier to understand.

The fact that so many experts traveled to this conference is evidence that the idea is gaining traction: scientific experts want to learn how to change the models they work with to be more efficient, and students want to learn, too, so they can apply these powerful tools to their research. The other reason NAU is able to attract such an international cohort are the other Ecosystems faculty scientists who are experts in this area, many of whom participated in the symposium (Deborah Huntzinger, Lifan Jiang, Ted Schuur, Ben Ruddell, Andrew Richardson).

We believe this workshop will exert real influence on ecosystem science and policy in the years ahead. Not only will it generate scientific papers by participants exploring the implications of Yiqi's new modeling ideas, but we hope it will also inspire new versions of the mathematical models that will make simulating the carbon cycle on land faster, more efficient, and more powerful, improving one of the central tools scientists rely upon to understand the carbon cycle in the natural world and how it is changing. How those changes in the carbon cycle affect the Earth system depends on what happens at the land surface, how



Figure 3. How big data, cyberinfrastructure, ecosystem models, and realistic simulation through virtual reality could advance ecosystem science. A concept figure for a \$6M proposal submitted this year to NSF, a collaboration among SES, SICCS, and Ecosystems. It was unsuccessful this year, but we'll try again!

plants and soil microorganisms cycle carbon from the atmosphere into plants and soils and back to the atmosphere as CO₂. These mathematical models help us understand what might happen to the carbon cycle and thus the climate in the future, so policymakers rely on them, as well.



Mariah Carbone also joined Ecosystems as a new core faculty member, coming from Harvard and the University of New Hampshire. She brings to Ecosystems her interest in carbon cycling in plants and soils, and her expertise in carbon isotopes, ecosystem science and physiology to bear on one central question: what is the fate of carbon in terrestrial ecosystems? This topic is fascinating because it spans scales of organization—from the plant cell converting CO₂ to sugar, to the individual microorganism respiring that sugar back to the atmosphere, to the chemical reaction that documents the chance occurrence of a carbon molecule next to a mineral surface in a small corner

of soil by permitting the carbon to persist there, unmodified, for thousands of years. The fate of carbon in terrestrial ecosystems is among the largest uncertainties in feedbacks of ecosystems to the atmosphere and climate, critical for projecting the climate of the future. These topics blend perfectly with the mix of carbon cycle science done at Ecosystems, and add Carbone's intellectual depth in particular areas like plant carbon allocation and the application of ¹⁴C tracers to carbon cycle studies. All of Ecosystems awaits with excitement the arrival of a new Accelerator Mass Spectrometer, an instrument capable of measuring ¹⁴C concentrations in plants, animals, soils, and gases. We also await with samples ready to analyze and new questions to ask. And now, with Mariah as part of the team, we await with new expertise to help us figure the next exciting steps in this science area.

Students and Staff

Ecosystems also recruited new crops of graduate students in FY 18, with twelve who began their programs in August 2017 (4 MS, 8 PhD), and another nine (3 MS, 6 PhD) who visited in February and will begin their studies in Fall 2018. A number of these students were recruited with the help of NAU Presidential Fellowships, and one also won an NSF Graduate Research Fellowship. Over FY 2018, and including students admitted for the fall, 36 graduate students (23 PhD and 13 MS) have major advisors as core Ecosystems faculty members, and an additional 7 are visiting graduate students with Drs. Yiqi Luo and Lifen Jiang. Five postdocs joined Ecosystems in FY 2018 – **Chris Lu** and **Enqing Huo** with the Luo lab, **Tim Rademacher** with the Richardson Lab, and **Bram Stone** and **Junhui Li** with the Hungate and LIMES labs – bringing the total number of Ecosystems postdocs to 14.

Lifen Jiang joined Ecosystems as a Research Associate, and, with Yiqi, she contributes to running all things in the Ecolab. She brings world-class skills in modeling and data assimilation, and was a key organizer of the symposium and workshop in land carbon cycle models. After completing her MS degree studying how drought and herbivorous insects affect tree growth in the north, **Melissa Boyd** transitioned to a Research Specialist position in the Mack Lab, where she oversees technical elements of the group's research in boreal forest ecosystems. **Jim LeMoine** manages the labs for Professors Mariah Carbone and Andrew Richardson. His research interests include terrestrial ecosystem science and global change; terrestrial carbon, nitrogen, and mercury cycling; biosphere-atmosphere interactions; phenology; forest ecology and management; tree physiology; and the use of using isotopes (especially ¹³C, ¹⁴C, and ¹⁵N) to understand biogeochemical cycling. He came to Ecosystems from the University of Michigan, where he'd worked with another group in ecosystem science and biogeochemistry for many years, so he comes to Ecosystems with excellent perspective and experience. **Brian Marbury** was brought on in a split position, half Administrative Associate for all of Ecosystems and half Executive Assistant to the Ecosystems Director, who needs all the help he can get. Brian holds a Bachelor of Science in Political Science and a Masters of Arts in Sustainable Communities. Since 2010, Brian has worked on a variety of applied interdisciplinary research projects on NAU campus, to include: NAU Compost, the Action Research Teams (ARTs), and Community and University Public Inquiry (CUPI). His research interests focus on the political economy of food and agriculture in the United States, social movements, social change, and political theory. Brian keeps things moving on many fronts, and we are delighted to have him as part of the team. **Victor Leshyk** is Ecosystems' Senior Coordinator for Visualizing Discovery. He has been a long-time collaborator with Ecosystems in communicating science through the visual arts, and is now with us full time. This year, we recruited a new Coordinator, a creative bridge builder, writer, and organizer,

to program and coordinate events, translate science, interact and collaborate with our large network on- and off-campus, engage in outreach, and advance the work of the center that expresses the “society” in our name. We are very lucky to have found **Kate Petersen** an experienced science writer and Arizona native, who started with Ecos on 2 July 2018. She will help Ecos and its McAllister program connect and communicate its work with communities on and beyond the Colorado Plateau. Prior to joining Ecos, Kate was a Jones Lecturer in Creative Writing and a Wallace Stegner Fellow at Stanford University. She holds a Master of Fine Arts from the University of Minnesota, and has served as communications coordinator for Community Catalyst in Boston, and as staff writer for the Flinn Foundation. We look forward to working with Kate!

Annual Report: Tables, Spreadsheet, and Appendix

The following pages contain the tables and spreadsheets requested as the main content for our annual report. We appreciate the streamlined new format. Here, we note cases where some data incongruities between our records and the records provided to us by the Office of the Vice President for Research, particularly in the area of funded and submitted grants. Specifically, some of the records provided to us by the OVPR for Table II listed funding amounts for grants that are lower than the actual amounts, especially for the totals crossing multiple years. We expect the reason for this is that the OVPR’s records often including the total funding to date received, such that future years that are part of existing grants may not be included. In these cases, we’ve reported total amounts consistent with our own records. Additionally, some grants that are active, or for which we received notification of an award, were not included in the records provided by the OVPR for Table II. We have listed these in pages that follow as part of Table II, explicitly noting in column B “Not Reported by OSPI!”, so that these are clearly marked. Additionally, some grants that we submitted as Ecos PIs were not included in the information provided by the OVPR for Table III, and the multi-year totals were not reported, as these are not part of the standard record in Cayuse; thus, we have listed these as well.

Research Highlight

Postdoc Marguerite Mauritz led more Ecos research about permafrost, the “always-frozen” deep soil layers of the Arctic, publishing an important paper this year in the journal, *Global Change Biology*. Victor created artwork to accompany the submission (see Figure 4), which always helps promote our work, both to scientists and to lay audiences. Below is a brief summary. This is one of over 90 papers published by Ecos scientists in the peer-reviewed literature during FY 2018. With warmer temperatures, especially in the arctic, more permafrost is exposed to freeze-thaw cycles during the brief Arctic spring and summer, which thaw the uppermost layers and foster a burst of tundra plant growth and pooling meltwater from thawed soil. For millennia, this cycle has re-frozen the soil in winter, with a net gain in permafrost as new plant matter adds to the depth of soil. However, new Ecos research via field warming experiments reveals that recent climate warming can disturb that trend, as warmer seasons allow deeper thaws, with the result that soil microbes can remain active through the winter months in deep layers of soil that do not re-freeze. Alarmingly, this new effect can allow microbes a new schedule of digesting ancient permafrost soil carbon year-round, with the net result that greenhouse gas emissions from active microbes can become consistent enough to exceed the seasonal carbon “drawdown” by tundra plant growth, converting Arctic landscapes into carbon sources rather than carbon sinks. Increased emissions from tundra can then feed back to increased climate warming, further deepening the microbial mobilization of deeper and deeper layers of ancient stored permafrost carbon.

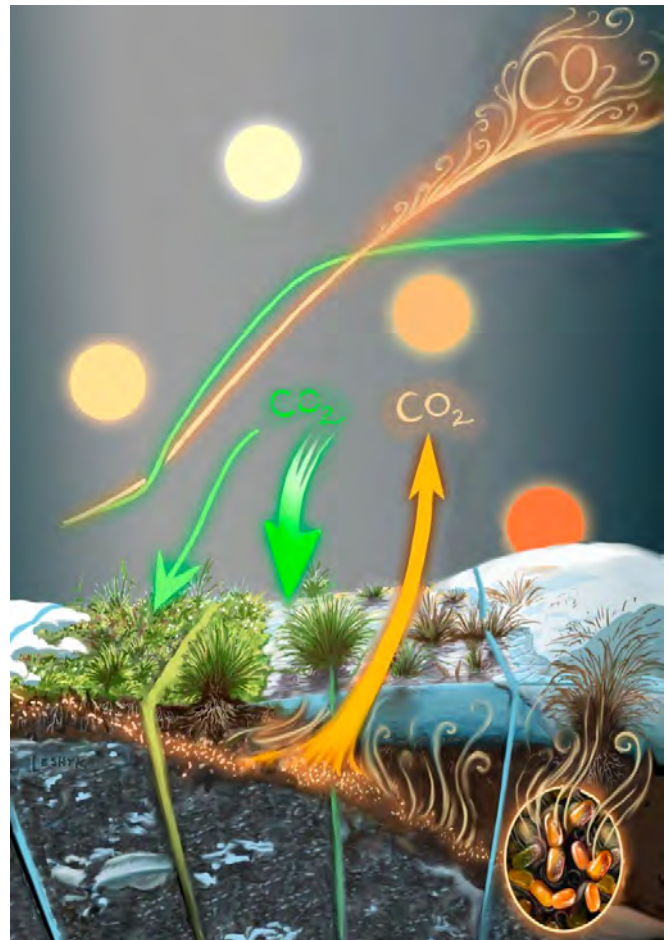
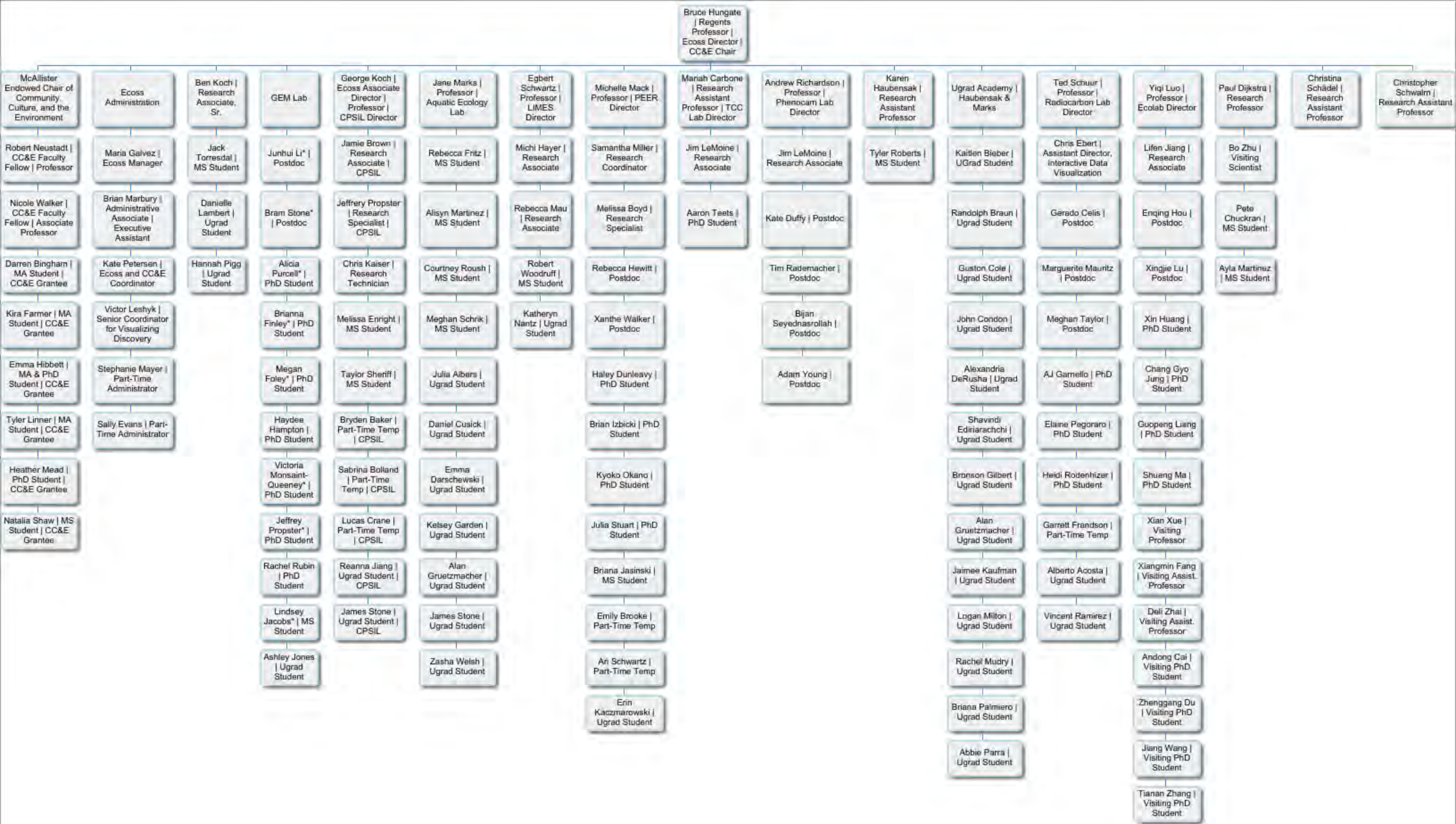


Figure 4. CO₂ release from warming tundra underlain by permafrost.

Center for Ecosystem Science and Society, Annual Report, 2018

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* Indicates representation in multiple labs.

Table 2: Active Resaerch Grant Awards

PI Name	NAU Award #	Project Title	Sponsor	start date	end date	Total Award	Direct FY 2018	Indirect FY 2018	Total FY 2018	Total Actual Award Amount (if different)
a. Grant awards for which the PI is a Center core member										
Dijkstra, Paul										
	A15-0167-002	Exoplanetary Ecosystems: Exploring Life's detectability on che	AZ State University	31 Dec 2014	30 Dec 2019	\$47,369	\$5,319	\$2,363	\$7,681	\$113,228
	A15-0167-003	<i>(same grant as above, different NAU Award #)</i>				\$8,106	\$2,461	\$1,280	\$3,741	
	A18-0146-001	Antarctica as a Model System for Responses of Terrestrial Carbo	Texas Tech University	1 Jan 2018	31 Dec 2019	\$43,537	\$7,556	\$3,329	\$10,884	\$143,166
	A00-2777-005	Role of the soil microbial community in sagebrush (<i>Artemisia tri</i>	US Department of Defense	20 Jun 2013	19 Jun 2018	\$100,000	\$14,032	\$5,640	\$19,672	\$1,519,862
	A00-2777-008	<i>(same grant as above, different NAU Award #)</i>				\$195,411	\$25,877	\$12,565	\$38,442	
	A00-2777-007	<i>(same grant as above, different NAU Award #)</i>				\$277,814	\$170,172	\$86,272	\$256,444	
	A17-0159-001	Transcriptional Networks, Taxon-Specific Growth, Carbon Use	US Department of Agriculture	1 Jun 2017	31 May 2020	\$483,000	\$112,700	\$48,300	\$161,000	
	A17-0055-001	Coastal Wetland Carbon Sequestration in a Warmer Climate	Smithsonian Institute	1 Aug 2016	31 Jul 2018	\$79,000	\$4,331	\$2,252	\$6,583	
	A17-0055-002	<i>(same grant as above, different NAU Award #)</i>				\$78,000	\$47,041	\$24,459	\$71,500	
		<i>Partitioning Flux Between Entner-Doudoroff And Embden-Meyerhof-Parnas Glycolysis In Soil Communities</i>				\$0				
		<i>Stress in Microbial Communities in Response to Changes in Carbon and Nitrogen Availability</i>				\$0				
Haubensak, Karen										
	A17-0058-001	Applied nucleation as a restoration strategy in cheatgrass-invaded	Bureau of Land Management	8 Sep 2016	31 Aug 2019	\$334,502	\$92,917	\$18,583	\$111,501	
Hewitt, Rebecca										
	Not reported by	Tree Growth Determinants in Alaska	National Science Foundation	1 Jun 2018	31 May 2022	\$442,345	-	-		
Hungate, Bruce										
	A00-2820-001	Collaborative Research Dimensions: The Taxonomic, Genomic,	National Science Foundation	1 Jan 2013	31 Dec 2017	\$1,487,750	\$103,137	\$45,638	\$148,775	\$1,489,051
	A00-2820-002	<i>(same grant as above, different NAU Award #)</i>				\$1,301	\$87	\$43	\$130	
	A17-0023-001	Scaling the Microbial Ecology of Soil Carbon	US Department of Energy	15 Aug 2016	31 Aug 2019	\$824,785	\$89,680	\$37,210	\$126,890	\$2,474,530
	A19-0005-001	Microbes Persist: Systems Biology of the Soil Microbiome	Lawrence Livermore National Laboratory	5 Apr 2018	31 Mar 2021	\$150,626	\$8,258	\$4,294	\$12,552	\$434,678
	A18-0179-001	LTREB: Climate Change Multiple Ecosystems	National Science Foundation	1 Jun 2018	31 May 2023	\$449,954	\$5,197	\$2,302	\$7,499	
	Not Reported b	Hot Springs Ecosystems	University of Nevada Las Vegas	1 Jul 2013	30 Jun 2018	\$444,367	\$236	\$88	\$324	
	Not Reported b	Soil Climate Change, quantitative microbial ecology	US Department of Energy	1 Sep 2013	31 Aug 2017	\$1,422,773	-	-	\$0	
	Not Reported b	Climate Change, meta-analyses	US Department of Energy	15 Sep 2013	14 Sep 2017	\$932,746	\$74,245	\$18,449	\$92,694	
	Not Reported b	Nasal Bacterial Ecology and Staphylococcus aureus	George Washington University	1 Jul 2016	31 May 2021	\$144,402	\$9,387	\$4,081	\$13,468	
Koch, Benjamin										
	A16-0135-001	Habitat evaluation to maximize success of spikedace and loach n	AZ Game and Fish Department	7 Mar 2016	6 Mar 2019	\$66,033	\$21,416	\$0	\$21,416	
Koch, George										
	A16-0161-001	Exploratory Research on Metabolic Water in Plants and Soil Mic	National Science Foundation	1 Jun 2016	31 May 2018	\$272,868	\$83,292	\$41,772	\$125,065	
Luo, Yiqi										
	A18-0046-001	Sevilleta LTER Environmental Variability at Dryland Ecotones	National Science Foundation	1 Sep 2017	28 Feb 2018	\$23,434	\$17,029	\$6,405	\$23,434	
	A18-0095-001	Collaborative Research: Grassland Sensitivity to Climate Change	National Science Foundation	15 Aug 2017	31 Dec 2017	\$55,290	\$37,910	\$17,380	\$55,290	
	A18-0090-001	Ecological Forecasting (Spruce and Peatland Responses under C	UT Battelle	11 Oct 2017	31 Mar 2018	\$35,000	\$25,328	\$9,672	\$35,000	\$59,576
	A18-0090-003	<i>(same grant as above, different NAU Award #)</i>				\$24,576	\$12,127	\$6,305	\$18,432	
	A18-0162-001	Reducing Uncertainties in Biogeochemical Interactions through	UT Battelle	16 Apr 2018	30 Apr 2020	\$50,000	\$3,947	\$2,053	\$6,000	\$100,000
	Not Reported b	LTER: Sevilleta (SEV) Site: Climate Variability at Dryland Ecotones		Notified of Award		\$511,694				
	Not Reported b	Training courses on the matrix approach to modeling land carbo	National Science Foundation	1 Jul 2018	30 Jun 2021	\$93,087				
Mack, Michelle										
	A15-0158-001	Post Fire Carbon Siberian Arctic	National Science Foundation	1 May 2015	31 Aug 2017	\$81,774	\$13,767	\$3,579	\$17,346	

	A15-0165-001	Plant acquisition of permafrost N and carbon cycling feedback to	National Science Foundation	1 Jun 2015	31 May 2019	\$754,433	\$125,771	\$62,837	\$188,608	
	A16-0046-002	Mapping and modeling attributes of an arctic-boreal biome shift:	National Aeronautics and Space Admin	19 Aug 2015	18 Aug 2018	\$44,350	\$5,415	\$1,408	\$6,823	\$133,084
	A16-0055-005	Increasing Fire Severity and the Loss of Legacy Carbon from Fo	National Aeronautics and Space Admin	17 Aug 2015	16 Aug 2019	\$308,874	\$64,082	\$11,560	\$75,643	\$897,415
	A16-0055-003	<i>(same grant as above, different NAU Award #)</i>		17 Aug 2015	16 Aug 2019	\$314,944	\$225,883	\$40,608	\$266,491	
	A16-0055-002	<i>(same grant as above, different NAU Award #)</i>		17 Aug 2015	16 Aug 2019	\$308,874	\$40,257	\$7,262	\$47,519	
	A16-0057-001	Collaborative research: Dimensions: Community genomic driver	National Science Foundation	1 Sep 2015	31 Aug 2020	\$196,344	\$31,561	\$7,708	\$39,269	\$499,292
	A16-0057-005	<i>(same grant as above, different NAU Award #)</i>		1 Sep 2015	31 Aug 2020	\$1,663	\$110	\$29	\$139	
	A16-0057-002	<i>(same grant as above, different NAU Award #)</i>		1 Sep 2015	31 Aug 2020	\$98,129	\$26,340	\$6,370	\$32,710	
	A16-0057-003	<i>(same grant as above, different NAU Award #)</i>		1 Sep 2015	31 Aug 2020	\$169,539	\$38,108	\$8,987	\$47,094	
	A16-0175-001	Collaborative Research: Shrub impacts on N inputs and turnover	National Science Foundation	1 Sep 2016	31 Aug 2019	\$135,444	\$15,372	\$7,202	\$22,574	\$394,661
	A17-0185-001	Identifying Indicators of State Change in Alaskan Boreal Ecosyst	US Department of Defense	4 Aug 2017	3 Aug 2019	\$274,270	\$71,885	\$48,794	\$120,679	
	A17-0185-002	<i>(same grant as above, different NAU Award #)</i>		4 Aug 2017	3 Aug 2019	\$110,895	\$32,101	\$16,693	\$48,794	
	A18-0025-001	Collaborative Research: Fire Influences on Forest Recovery and	National Science Foundation	1 Sep 2017	31 Aug 2021	\$255,681	\$35,745	\$17,521	\$53,267	
	A17-0105-001	Plant acquisition of deep nitrogen and the permafrost carbon fee	National Geographic Society	1 Jan 2017	31 Dec 2017	\$20,000	\$10,000	\$0	\$10,000	
Marks, Jane										
	A17-0175-001	Litter Quality and Stream Food Webs: a new paradigm for under	National Science Foundation	1 Aug 2017	31 Jul 2020	\$941,566	\$210,683	\$77,018	\$287,701	
Richardson, Andrew										
	A18-0105-001	UNH-NRSC	University of New Hampshire	1 Jun 2017	30 Sep 2019	\$42,640	\$15,228	\$3,046	\$18,274	
	A18-0034-001	NSFDEB-NERC: Addressing the plant growth source-sink deba	National Science Foundation	15 Aug 2017	31 Jul 2020	\$499,791	\$126,778	\$25,936	\$152,714	
	A18-0033-001	Collaborative Proposal: MSB-FRA: Improved Understanding of	National Science Foundation	15 Aug 2017	31 Jul 2022	\$1,015,095	\$125,796	\$60,305	\$186,101	
	A18-0093-002	Richardson NASA AIST16 Proposal 09/01/17	National Aeronautics and Space Admin	1 Sep 2017	31 Aug 2019	\$81,154	\$24,023	\$9,792	\$33,814	
	A18-0034-002	NSFDEB-NERC: Addressing the plant growth source-sink deba	National Science Foundation	15 Aug 2017	31 Jul 2020	\$22,102	\$6,753	\$0	\$6,753	
	A18-0085-001	Integrated Belowground Greenhouse Gas Flux Measurements ar	Woods Hole Research Center	1 Aug 2017	31 Aug 2018	\$70,902	\$39,470	\$20,524	\$59,994	
	A18-0061-001	LTRE: Long-Term Ecological Research at the Hubbard Brook E	Cary Institute of Ecosystem Studies	15 Aug 2017	28 Feb 2023	\$18,000	\$1,944	\$1,011	\$2,955	\$108,000
	A17-0191-001	Ultracompact Laser Ceilometer for Boundary Layer and Cloud F	Physical Sciences Inc	1 Apr 2017	31 Dec 2017	\$10,470	\$4,592	\$2,388	\$6,980	
	A17-0205-001	NEON PhenoCam Network Proposal to Archive, Process, and	Battelle Memorial Institute	1 Nov 2017	31 Oct 2020	\$214,449	\$38,538	\$9,117	\$47,655	\$557,318
Schuur, Ted										
	A15-0066-011	Collaborative Research:Science Support for the Study of Environ	University of Alaska Fairbanks	1 Sep 2014	31 Jul 2019	\$94,083	\$12,589	\$6,546	\$19,136	1,144,081
	A15-0066-012	<i>(same grant as above, different NAU Award #)</i>	University of Alaska Fairbanks	1 Sep 2014	31 Jul 2019	\$90,195	\$14,271	\$4,074	\$18,345	
	A15-0066-013	<i>(same grant as above, different NAU Award #)</i>	University of Alaska Fairbanks	1 Sep 2014	31 Jul 2019	\$15,000	\$2,007	\$1,044	\$3,051	
	A15-0066-007	<i>(same grant as above, different NAU Award #)</i>	University of Alaska Fairbanks	1 Sep 2014	31 Jul 2019	\$170,745	\$19,469	\$8,988	\$28,458	
	A16-0016-002	Regional Vulnerability of Permafrost Carbon to Climate Change:	US Department of Energy	1 Aug 2015	31 Jul 2018	\$471,329	\$33,552	\$5,725	\$39,277	1,409,666
	A16-0016-003	<i>(same grant as above, different NAU Award #)</i>	US Department of Energy	1 Aug 2015	31 Jul 2018	\$469,856	\$368,970	\$61,731	\$430,701	
	A17-0053-001	Permafrost and Carbon Cycling Monitoring at the 8-Mile Lake P	National Park Service	15 Sep 2016	30 Sep 2021	\$60,000	\$10,045	\$1,758	\$11,803	
	Not reported by	Soil Microbial Communities	University of Oklahoma	16 Jan 2015	31 Aug 2018	\$262,409	\$3,998	\$32	\$4,030	
	Not reported by	Vulcan	Universidad Rey Juan Carlos	1 Jul 2015	30 Jun 2018	\$20,417	-	-	\$0	
	Not reported by	LTREB: Effects of Long-Term Warming on Tundra	NSF	TBD	Notified of Award	~\$450,000				
b. Grant Awards for which co-PI is a Center Core Member						\$16,725,187	\$2,768,785	\$940,328	\$3,709,115	
Mack, Michelle		Resilience and vulnerability of boreal forest habitat across the mi	US Department of Defense	TBD	TBD	\$1,800,000				

Table 3: Pending or Unfunded Proposals	Date Submitted	PROPOSAL_NUMBER	Project Title	PI Name	AWARD_ADMIN_DEPT	College/Unit	SPONSOR	SPONSOR_TYPE	PROPOSAL_TYPE	INSTRUMENT_TYPE	PROJECT_START_DATE	PROJECT_END_DATE	Initial Direct Costs	Initial Indirect Costs	Total Initial Costs	Status	Total Proposal Amount	
a. Pending and unfunded proposals (PI is Center core member)																		
	6 Oct 2017	18-0191	Examining food web dynamics in the Missouri River to elucidate the influence of the Asian carp invasion and tributary inputs on the endangered pallid sturgeon	Koch, B.	Ecosystem Sci & Society Ctr	Col of Engr, For & Nat Sci	South Dakota School of Mines and Technology		New	Grant	1 Mar 2018	28 Feb 2023	\$8,363	\$12,712	\$62,382	Pending	\$62,382	
	16 Oct 2017	18-0222	MSB-ENSA: Developing US Continental Data Assimilation System (US-CDAS) to synthesize multiple data sources toward predicting Land Carbon Sink Potential	Luo, Y.	Ecosystem Sci & Society Ctr	Col of Engr, For & Nat Sci	National Science Foundation University of California San Diego	Federal	New	Grant	1 Jul 2018	30 Jun 2022	\$368,033	\$156,163	\$524,196	Pending	\$2,179,215	
	14 Dec 2017	18-0336	Hope or Hype? The truth about microbiome science in the 21st Century	Hungate, B.	Ecosystem Sci & Society Ctr	Col of Engr, For & Nat Sci	College of University	New	Grant		1 Apr 2018	1 Dec 2018	\$5,000	\$0	\$5,000	Pending	\$5,000	
	19 Jan 2018	18-0397	Ultracompact laser ceilometer for boundary layer and cloud height retrievals	Richardson, A.	School of Informatics, Computing and Cyber Systems	Col of Engr, For & Nat Sci	Physical Sciences Inc	Industry/For-Profit	New	Contract	21 May 2018	20 May 2019	\$2,727	\$1,418	\$4,145	Pending		
	23 Jan 2018	18-0389	Tracing <i>E. coli</i> host jumps between food animals and humans	Hungate, B., Koch, B.	Ecosystem Sci & Society Ctr	Col of Engr, For & Nat Sci	George Washington University	College of University	New	Grant	1 Sep 2018	31 Aug 2023	\$28,250	\$14,690	\$42,940	Pending	\$447,178	
	1 Feb 2018	18-0433	Estimating Active Layer Thickness From Remotely Sensed Surface Deformation	Schuur, E.	Ecosystem Sci & Society Ctr	Col of Engr, For & Nat Sci	National Aeronautics and Space Admin	Federal	New	Grant	1 Sep 2018	31 Aug 2021	\$39,000	\$0	\$39,000	Pending	\$39,000	
	5 Feb 2018	18-0273	MRI: Acquisition of automated graphitization equipment for radiocarbon analysis: Arctic carbon, geochronology, and other applications	Schuur, E.	Ecosystem Sci & Society Ctr	Col of Engr, For & Nat Sci	National Science Foundation	Federal	Resubmission	Grant	1 Aug 2018	31 Jul 2021	\$411,735	\$0	\$411,735	Pending	\$588,987	
	7 Feb 2018	18-0412	Harvard Forest LTER Proposal	Richardson, A.	Ecosystem Sci & Society Ctr	Col of Engr, For & Nat Sci	Harvard University	College of University	New	Grant	1 Jan 2019	31 Dec 2024	\$81,348	\$21,150	\$102,498	Pending	\$102,498	
	1 Mar 2018	18-0471	Adding Fuel to the Fire: Ecosystem consequences of dynamic tundra fire regimes in Arctic Alaska	Mack, M.	Ecosystem Sci & Society Ctr	Col of Engr, For & Nat Sci	University of Alaska Fairbanks	College of University	Preliminary Proposal	SubContract	1 Sep 2018	31 Aug 2021	\$89,251	\$41,365	\$130,616	Pending	\$319,175	
	25 May 2018	18-0646	LTER: Sevilleta (SEV) Site: Climate Variability at Dryland Ecotones	Luo, Y.	Ecosystem Sci & Society Ctr	Col of Engr, For & Nat Sci	University of New Mexico	College of University	New	Grant	1 Jul 2018	30 Jun 2024	\$61,324	\$27,084	\$88,408	Pending	\$549,177	
	29 Jun 2018	18-0721	Permafrost and Carbon Cycling Monitoring at the Eight Mile Permafrost Observatory and Permafrost Index Site in Denali National Park	Schuur, E.	Ecosystem Sci & Society Ctr	Col of Engr, For & Nat Sci	National Park Service	Federal	Supplemental Funding	Cooperative Agreement	30 Aug 2018	1 Jun 2019	\$11,915	\$2,085	\$14,000	Pending	\$14,000	
	31 Jul 2017	18-0032	Collaborative Research: Decomposition, nutrient release and plant-soil feedbacks in the saturated zone of thawing permafrost peatlands	Mack, M.	Ecosystem Sci & Society Ctr	Col of Engr, For & Nat Sci	National Science Foundation	Federal	New	Grant	1 Mar 2018	28 Feb 2021	\$100,067	\$49,586	\$149,653	Unfunded	\$491,969	
	1 Aug 2017	18-0026	COLLABORATIVE research: Controls on microbial carbon use efficiency and turnover with consequences for soil carbon storage	Dijkstra, P.	Ecosystem Sci & Society Ctr	Col of Engr, For & Nat Sci	National Science Foundation	Federal	New	Grant	1 Mar 2018	28 Feb 2021	\$218,515	\$104,019	\$322,534	Unfunded	\$1,009,358	
	1 Aug 2017	17-0719	Linking freeze-thaw induced production of greenhouse gases to microbial communities in permafrost ecosystems	Schaedel, C.	Ecosystem Sci & Society Ctr	Col of Engr, For & Nat Sci	National Science Foundation	Federal	New	Grant	1 Apr 2018	31 Mar 2021	\$261,882	\$80,866	\$342,748	Unfunded	\$764,494	
	16 Oct 2017	18-0223	Collaborative Proposal: MSB-FRA: Macroscale impacts of extended, pan-continental drought: the role of community priming in determining ecosystem response	Luo, Y.	Ecosystem Sci & Society Ctr	Col of Engr, For & Nat Sci	National Science Foundation	Federal	New	Grant	15 Apr 2018	14 Apr 2022	\$83,329	\$43,331	\$126,660	Unfunded	\$528,373	
	14 Nov 2017	18-0248	Seasonal variation in branch hydraulic conductivity in <i>Sequoia sempervirens</i> : the critical link between climate and tree growth	Koch, G.	Ecosystem Sci & Society Ctr	Col of Engr, For & Nat Sci	Save-the-Redwoods League	Non-Profit	New	Grant	15 Jan 2018	15 May 2019	\$23,324	\$0	\$23,324	Unfunded	\$23,324	
	26 Jan 2018	18-0247	CNH-L-Linking the Human and Natural Causes and Consequences of Seafood Fraud	Koch, G.	Ecosystem Sci & Society Ctr	Col of Engr, For & Nat Sci	National Science Foundation	Federal	Resubmission	Grant	1 Sep 2018	31 Aug 2022	\$298,377	\$64,595	\$362,972	Unfunded	\$1,586,298	
	1 Mar 2018	18-0328	Coupled Long-Term Experiment and Model Investigation of the Differential Response of Plants and Soil Microbes in a Changing Permafrost Tundra Ecosystem	Schuur, E.	Ecosystem Sci & Society Ctr	Col of Engr, For & Nat Sci	US Department of Energy	Federal	New	Grant	31 Jul 2018	30 Jul 2021	\$235,002	\$117,079	\$352,081	Unfunded	\$1,000,000	
b. Pending and unfunded proposals (co-PI is Center core member)																		
	4 Oct 2017	18-0047	Climate controls on carbon accumulation and transformation in upland permafrost at millennial scales	Schuur, E. (lead: Kaufman)	School of Earth Science & Environmental Sustainability	Col of Engr, For & Nat Sci	National Science Foundation	Federal	New	Grant	1 Mar 2018	28 Feb 2021	\$153,798	\$79,975	\$233,773	Pending	\$862,341	
	23 Apr 2018	18-0551	Collaborative Research: Expeditions: Advancing Cyberinfrastructure to Enable Next Generation Earth System Forecasting	Luo, Y. (lead: Huntzinger)	School of Earth Science & Environmental Sustainability	Col of Engr, For & Nat Sci	National Science Foundation	Federal	Preliminary Proposal	Grant	1 Jan 2020	31 Dec 2024	\$853,625	\$332,865	\$1,186,490	Pending	\$1,186,490	
	6 Feb 2018	18-0377	Harnessing data and models to understand terrestrial ecosystem dynamic	Richardson, A. (lead: Ogle)	School of Informatics, Computing and Cyber Systems	Col of Engr, For & Nat Sci	National Science Foundation	Federal	New	Grant	1 Aug 2018	31 Jul 2023				Pending	\$2,999,792	
	2 Aug 2017		Responses of desert grassland to experimental extreme precipitation variations	Luo, Y. (lead: Jiang)	Ecosystem Sci & Society Ctr	Col of Engr, For & Nat Sci	National Science Foundation	Federal	New	Grant	1 Jan 2018	31 Dec 2021	\$864,472	\$383,348	\$1,247,820	Unfunded	N/A	
	2 Nov 2017	18-0234	From Awe to Aha; Virtual Reality Learning Arcade for Informal Stem Learning	Hungate, B. (lead: Castillo)	School of Communication	Col of Arts & Letters	National Science Foundation	Federal	Resubmission	Grant	1 May 2018	30 Apr 2021	\$439,788	\$208,098	\$647,886	Unfunded	\$1,966,309	
	14 Nov 2017	18-0268	From microbes to globe - a new framework for exploring the role of microbes in carbon-nutrient coupling and climate feedbacks	Hungate, B., Luo, Y., Leshyk, V. (lead - Huntzinger)	School of Earth Science & Environmental Sustainability	Col of Engr, For & Nat Sci	National Science Foundation	Federal	New	Grant	1 Jun 2018	31 May 2023	\$369,783	\$156,461	\$526,244	Unfunded	\$2,988,487	

Authors	Title	Journal	Volume	Pages	DOI	Date
Table 4: Research Publications						
a. Publications for which an Author is a Center Core Member. If there is multiple representation, Center Core Members = *, Affiliates = ^, and Staff, Postdocs, Students = +						
Wilson, CH., Caughlin, TT., Rifai, SW., Boughton, EH., Mack, M.* , Flory, SL.	Multi-decadal time series of remotely sensed vegetation improves prediction of soil carbon in a subtropical grassland	Ecological Applications	Volume 27, Issue 5	1646-1656	https://doi.org/10.1002/cap.1557	1 Jul 2017
Prevéy, J., Vellend, M., Rüger, N., Hollister, RD., Bjorkman, AD., Myers-Smith, IH., Elmendorf, SC., Clark, K., Cooper, EJ., Elberling, B., Fosaa, AM., Henry, GHR., Høye, TT., Jónsdóttir, IS., Klanderud, K., Lévesque, E., Mauritz, M., Molau, U., Natali, SM., Oberbauer, SF., Panchen, ZA., Post, E., Rumpf, S., Schmidt, NM., Schuur, E.* , Semenchuk, PR., Troxler, T., Welker, JM., Rixen, C.	Greater temperature sensitivity of plant phenology at colder sites: implications for convergence across northern latitudes	Global Change Biology	Volume 23, Issue 7	2660-2671	https://doi.org/10.1111/gcb.13619	1 Jul 2017
Rubin, RL., van Groenigen, KJ., Hungate BA.*	Plant growth promoting rhizobacteria are more effective under drought: a meta-analysis	Plant and Soil	Volume 416, Issue 1-2	309-323	doi: 10.1007/s11104-017-3199-8	1 Jul 2017
Kim, JS., Kug, JS., Jeong, SJ., Huntzinger, D., Michalak, AM., Schwalm C.* , Wei, Y., Schaefer, K.	Reduced North American terrestrial primary productivity linked to anomalous Arctic warming	Nature Geoscience	Volume 10	572 - 576	doi:10.1038/ngeo2986	10 Jul 2017
Alexander, H., Mack, M.*	Gap regeneration within mature deciduous forests of Interior Alaska: Implications for future forest change	Forest Ecology and Management	Volume 396	35-43	https://doi.org/10.1016/j.foreco.2017.04.005	15 Jul 2017
Koch, B., Hungate, BA.* , Price, L.	Food-animal production and the spread of antibiotic resistance: the role of ecology	Frontiers in Ecology and the Environment	Volume 15, Issue 6	309-318	https://doi.org/10.1002/fec.1505	1 Aug 2017
Schwalm, CR.* , Anderegg, WRL., Michalak, AM., Fisher, JB., Biondi, F., Koch, GW.* , Litvak, M., Ogle, K., Shaw, JD., Wolf, A., Huntzinger, DN., Schaefer, K., Cook, R., Wei, Y., Fang, Y., Hayes, D., Huang, M., Jain, A., Tian, H.	Global patterns of drought recovery	Nature	Volume 548	202-205	doi:10.1038/nature23021	9 Aug 2017
Price, L., Hungate, BA.* , Koch, B., Davis, G., Liu, C.	Colonizing opportunistic pathogens (COPs): The beasts in all of us	PLOS Pathogens	Volume 13, Issue 8	e1006369	https://doi.org/10.1371/journal.ppat.1006369	10 Aug 2017
McLaughlan, KK., Gerhart, LM., Battles, JJ., Craine, JM., Elmore, AJ., Higuera, PE., Mack, M.* , McNeil, BE., Nelson, DM., Pederson, N., Perakis, SS.	Centennial-scale reductions in nitrogen availability in temperate forests of the United States	Scientific Reports	Volume 7, Article 7856	N/A	doi:10.1038/s41598-017-08170-z	10 Aug 2017
Robinson, NP., Allred, BW., Jones, MO., Moreno, A., Kimball, JS., Naugle, DE., Erickson, TA., Richardson, AD.*	A Dynamic Landsat Derived Normalized Difference Vegetation Index (NDVI) Product for the Conterminous United States	Remote Sensing	Volume 9, Issue 8	863	doi:10.3390/rs9080863	21 Aug 2017
Mauritz, M., Bracho, R., Celis, G., Hutchings, J., Natali, SM., Pegoraro, E., Salmon, VG., Schädel, C., Webb, EE., Schuur, E.*	Nonlinear CO2 flux response to 7 years of experimentally induced permafrost thaw	Global Change Biology	Volume 23, Issue 9	3646-3666	https://doi.org/10.1111/gcb.13661	1 Sep 2017
Strauss, J., Schirmer, L., Grosse, G., Fortier, D., Hugelius, G., Knoblauch, C., Romanovsky, V., Schädel, C., Schneider von Deimling, T., Schuur, E.* , Shmelev, D., Ulrich, M., Vermeeva, A.	Deep Yedoma permafrost: A synthesis of depositional characteristics and carbon vulnerability	Earth-Science Reviews	Volume 172	75-86	https://doi.org/10.1016/j.earscirev.2017.07.007	1 Sep 2017
Walker, XJ., Mack, M.* , Johnstone, JF.	Predicting Ecosystem Resilience to Fire from Tree Ring Analysis in Black Spruce Forests	Ecosystems	Volume 20, Issue 6	1137-1150	10.1007/s10021-016-0097-5	1 Sep 2017
McHugh, TA., Compson, Z., van Gestel, N., Hayer, M., Ballard, L., Haverty, M., Hines, J., Irvine, N., Krassner, D., Lyons, T., Musta, EJ., Schiff, M., Zint, P., Schwartz, E.*	Climate controls prokaryotic community composition in desert soils of the southwestern United States	FEMS Microbiology Ecology	Volume 93, Issue 10	N/A	https://doi.org/10.1093/femsec/fix116	11 Sep 2017
van Groenigen, JW., Van Kessel, C., Hungate, BA.* , Oenema, O., Powlson, DS., van Groenigen, KJ.	Response to the Letter to the Editor Regarding Our Viewpoint "Sequestering Soil Organic Carbon: A Nitrogen Dilemma"	Environmental Science & Technology	Volume 51, Issue 20	11503-11504	DOI: 10.1021/acs.est.7b04554	29 Sep 2017
van Groenigen, KJ., Osenberg, CW., Terrer, C., Carrillo, Y., Dijkstra, F., Heath, J., Nie, M., Pendall, E., Phillips, RP., Hungate BA.*	Faster turnover of new soil carbon inputs under increased atmospheric CO2	Global Change Biology	Volume 23, Issue 10	4420-4429	https://doi.org/10.1111/gcb.13752	1 Oct 2017
D'Antonio, CM., Yelenik, SG., Mack, M.*	Ecosystem vs. community recovery 25 years after grass invasions and fire in a subtropical woodland	Journal of Ecology	Volume 105, Issue 6	1462 - 1474	https://doi.org/10.1111/1365-2745.12855	20 Oct 2017
Donlan, JC., Luque, GM., Wilcox, C., Gelcich, S., Koch, GW.* , Hungate, BA.*	Research on Seafood Fraud Deserves Better	Conservation Letters	Volume 10, Issue 6	783-785	https://doi.org/10.1111/conl.12356	1 Nov 2017
Ma, S. Jiang, J., Huang, Y., Shi, Z., Wilson, RM., Ricciuto, D., Sebestyen, SD., Hanson, PJ., Luo, Y.	Data-Constrained Projections of Methane Fluxes in a Northern Minnesota Peatland in Response to Elevated CO2 and Warming	Journal of Geophysical Research: Biogeosciences	Volume 122, Issue 11	2841-2861	https://doi.org/10.1002/2017JG003932	1 Nov 2017
Feng, W., Liang, J., Hale, LE., Jung, CG., Chen, J., Zhou, J., Xu, M., Yuan, M., Wu, L., Bracho, R., Pegoraro, E., Schuur, E.* , Luo, Y.*	Enhanced decomposition of stable soil organic carbon and microbial catabolic potentials by long-term field warming	Global Change Biology	Volume 23, Issue 11	4765-4776	https://doi.org/10.1111/gcb.13755	1 Nov 2017

Jiang, Y., van Groenigen, KJ., Huang, S., Hungate, BA.* , van Kessel, C., Hu, S., Zhang, J., Wu, L., Yan, X., Wang, L., Chen, J., Hang, X., Zhang, Y., Horwath, WR., Ye, R., Linquist, BA., Song, Z., Zheng, C., Deng, A., Zhang, W.	Higher yields and lower methane emissions with new rice cultivars	Global Change Biology	Volume 23, Issue 11	4728-4738	https://doi.org/10.1111/gcb.13737	1 Nov 2017
Zhou, S., Bofu Y., Schwalm, CR.* , Ciaia, P., Zhang, Y., Fisher, JB., Michalak, AM., Wang, W., Poulter, B., Huntzinger, D.* , Niu, S., Mao, J., Jain, A., Ricciuto, DM., Shi, X., Ito, A., Wei, Y., Huang, Y., Wang, G.	Response of Water Use Efficiency to Global Environmental Change Based on Output From Terrestrial Biosphere Models	Global Biogeochemical Cycles	Volume 31, Issue 1	1639-1655	https://doi.org/10.1002/2017GB005733	1 Nov 2017
Yu, C., Hui, D., Deng, Q., Dzantor, EK., Fay, PA., Shen, W., Luo, Y.*	Responses of switchgrass soil respiration and its components to precipitation gradient in a mesocosm study	Plant and Soil	420	105-117	0.1007/s11104-017-3370-2	7 Nov 2017
Jiang, L., Shi, Z., Xia, J., Liang, J., Lu, X., Wang, Y., Luo, Y.*	Transient Traceability Analysis of Land Carbon Storage Dynamics: Procedures and Its Application to Two Forest Ecosystems	Journal of Advances in Modeling Earth Systems	Volume 9, Issue 8	2822-2835	https://doi.org/10.1002/2017MS001004	8 Nov 2017
Wilcox, KR., Tredennick, AT., Koerner, SE., Grman, E., Hallett, LM., Avolio, M., La Pierre, KJ., Houseman, GR., Isbell, F., Johnson, DS., Alatalo, JM., Baldwin, AH., Bork, EW., Boughton, EH., Bowman WD., Britton, AJ., Cahill, JF., Collins, SL., Du, G., Eskelinen, A., Gough, L., Jentsch, A., Kern, C., Klanderud, K., Knapp, AK., Kreyling, J., Luo, Y.* , McLaren, JR., Megonigal, P., Onipchenko, V., Prev�y, J., Price, JN., Robinson, CH., Sala, OE., Smith, ME., Soudzilovskaia, NA., Souza, L., Tilman, D., White, SR., Xu, Z., Yahdjian, L., Yu, Q., Zhang, P., Zhang, Y.	Asynchrony among local communities stabilises ecosystem function of metacommunities	Ecology Letters	Volume 20	1534-1545	10.1111/ele.12861	1 Dec 2017
Yan, Y., Zhou, X., Jiang, L. Luo, Y.*	Effects of carbon turnover time on terrestrial ecosystem carbon storage	Biogeosciences	Volume 14, Issue 23	5441-5454	http://dx.doi.org/10.5194/bg-14-5441-2017	4 Dec 2017
Klosterman, S., Richardson, AD.*	Observing Spring and Fall Phenology in a Deciduous Forest with Aerial Drone Imagery	Sensors	Volume 17, Issue 12	2852	doi:10.3390/s17122852	8 Dec 2017
Brown, LA., Dash, J., Ogotu, BO., Richardson, AD.*	On the relationship between continuous measures of canopy greenness derived using near-surface remote sensing and satellite-derived vegetation products	Agricultural and Forest Meteorology	Volume 247	280-292	https://doi.org/10.1016/j.agrformet.2017.08.012	15 Dec 2017
Terrer, C., Vicca, S., Stocker, BD., Hungate, BA.* , Phillips, RP., Reich, PB., Finzi, AC., Prentice, IC.	Ecosystem responses to elevated CO2 governed by plant-soil interactions and the cost of nitrogen acquisition	New Phytologist	Volume 217, Issue 2	507-522	https://doi.org/10.1111/nph.14872	1 Jan 2018
Yuan, MM., Zhang, J., Xue, K., Wu, L., Deng, Y., Deng, J., Hale, L., Zhou, X., He, Z., Yang, Y., Van Nostrand, JD., Schuur, E.* , Konstantinidis, KT., Penton, CR., Cole, JR., Tiedje, JM., Luo, Y.* , Zhou, J.	Microbial functional diversity covaries with permafrost thaw-induced environmental heterogeneity in tundra soil	Global Change Biology	Volume 24, Issue 1	297-307	https://doi.org/10.1111/gcb.13820	1 Jan 2018
Holdo, RM., Nippert, JB., Mack, M.*	Rooting depth varies differentially in trees and grasses as a function of mean annual rainfall in an African savanna	Oecologia	Volume 186, Issue 1	269-280	https://doi.org/10.1007/s00442-017-4011-4	1 Jan 2018
Melvin, AM., Celis, G., Johnstone, JF., McGuire, AD., Genet, H., Schuur, E.* , Rupp, T., Mack, M.*	Fuel-reduction management alters plant composition, carbon and nitrogen pools, and soil thaw in Alaskan boreal forest	Ecological Applications	28	146-161	https://doi.org/10.1002/eap.1636	3 Jan 2018
Hungate, BA.* , Schwartz, E.* , Mau, R., Marks, JC.*	QUANTITATIVE SUBSTRATE UTILIZATION IN MICROBIAL ECOLOGY USING STABLE ISOTOPE PROBING	FPO	United States Patent Application	20180002745	http://www.freepatentsonline.com/y2018/0002745.html	4 Jan 2018
Niu, S., Classen, A., Luo, Y.	Functional traits along a transect	Functional Ecology	Volume 32, Issue 1	4-9	https://doi.org/10.1111/1365-2435.13023	8 Jan 2018
Tong, X., Brandt, M., Yue, Y., Horion, S., Wang, K., De Keersmaecker, W., Tian, F., Schurgers, G., Xiao, X., Luo, Y.* , Chen, C., Myneni, R., Shi, Z., Chen, H., Fensholt, R.	Increased vegetation growth and carbon stock in China karst via ecological engineering	Nature Sustainability	Volume 1, Issue 1	44-50	doi:10.1038/s41893-017-0004-x	8 Jan 2018
Hufkens, K., Basler, D., Milliman, T., Melaas, EK., Richardson, AD.*	An integrated phenology modelling framework in R.	Methods in Ecology and Evolution	9	1276-1285	https://doi.org/10.1111/2041-210X.12970	17 Jan 2018
Sih, D., Davidson, EA., Chenc, M., Savaged KE., Richardson, AD.* , Keenan, TF., Hollinger, DY.	Merging a mechanistic enzymatic model of soil heterotrophic respiration into an ecosystem model in two AmeriFlux sites of northeastern USA	Agricultural and Forest Meteorology	Volume 252	155-166	https://doi.org/10.1016/j.agrformet.2018.01.026	18 Jan 2018
Koch B., McHugh T., Hayer M., Schwartz E.* , Blazewicz S., Dijkstra, P.* , van Bestel N., Marks JC.* , Mau R., Morrissey E., Pett-Ridge J., Hungate BA.*	Estimating taxon-specific population dynamics in diverse microbial communities	Ecosphere	9	e02090	https://doi.org/10.1002/ecs2.2090	29 Jan 2018
Wymore, A., Salpas, E., Casaburi, G., Liu, CM., Price, L., Hungate, BA.* , McDowell, W., Marks, JC.*	Effects of plant species on stream bacterial communities via leachate from leaf litter	Hydrobiologia	Volume 807, Issue 1	131-144	https://doi.org/10.1007/s10750-017-3386-x	1 Feb 2018

Zhou, X., Xu, X., Zhou, G., Luo, Y.*	Temperature sensitivity of soil organic carbon decomposition increased with mean carbon residence time: Field incubation and data assimilation	Global Change Biology	Volume 24, Issue 2	810-822	https://doi.org/10.1111/gcb.13994	1 Feb 2018
Luo, Z., Wang, E., Feng, W., Luo, Y.* , Baldock, J.	The importance and requirement of belowground carbon inputs for robust estimation of soil organic carbon dynamics: Reply to Keel et al. (2017)	Global Change Biology	24	e397-e398	10.1111/gcb.13949	1 Feb 2018
Rasmussen, C., Heckman, K., Wieder, WR., Keiluweit, M., Lawrence, CR., Berhe, AA., Blankinship, JC., Crow, S., Druhan, JL., Hicks Pries, CE., Marin-Spiotta, E., Plante, AF., Schädel, C., Schimel, JP., Sierra, CA., Thompson, A., Wagai, R.	Beyond clay: towards an improved set of variables for predicting soil organic matter content	Biogeochemistry	Volume 137, Issue 3	297-306	https://doi.org/10.1007/s10533-018-0424-3	3 Feb 2018
Morrissey, E., Mau, R., Schwartz E.* , Koch, B., Hayer, M., Hungate, BA.*	Taxonomic patterns in the nitrogen assimilation of soil prokaryotes	Environmental Microbiology	Volume 20, Issue 3	1112-1119	https://doi.org/10.1111/1462-2920.14051	6 Feb 2018
Hui, D., Yu, C., Deng, Q., Dzanter, EK., Zhou, S., Dennis, S., Sauve, R., Johnson, TL., Fay, PA., Shen, W., Luo, Y.*	Effects of precipitation changes on switchgrass photosynthesis, growth, and biomass: A mesocosm experiment	PLoS ONE	13	e0192555	10.1371/journal.pone.0192555	8 Feb 2018
Truettner, C., Anderegg, W., Biondi, F., Koch, GW.* , Ogle, K., Schwalm, CR.* , Litvak, M., Shaw, JD., Ziaco, E.	Conifer radial growth response to recent seasonal warming and drought from the southwestern USA	Forest Ecology and Management	N/A	N/A	https://doi.org/10.1016/j.foreco.2018.01.044	14 Feb 2018
Walker, XJ., Baltzer, JL., Cumming, SG., Day, NJ., Johnstone, JF., Rogers, BM., Solvik, K., Turetsky, MR., Mack, M.*	Soil organic layer combustion in boreal black spruce and jack pine stands of the Northwest Territories, Canada	International Journal of Wildland Fire	Volume 27, Issue 2	125-134	https://doi.org/10.1071/WF17095	14 Feb 2018
Lee, MS., Hollinger, DY., Keenan, TF., Ouimette, AP., Ollinger, S., Richardson, AD.*	Model-based analysis of the impact of diffuse radiation on CO2 exchange in a temperate deciduous forest	Agricultural and Forest Meteorology	Volume 249	377-389	https://doi.org/10.1016/j.agrformet.2017.11.016	15 Feb 2018
Toda, M., Richardson, AD.*	Estimation of plant area index and phenological transition dates from digital repeat photography and radiometric approaches in a hardwood forest in the Northeastern United States	Agriculture and Forest Meteorology	Volume 249	457-466	https://doi.org/10.1016/j.agrformet.2017.09.004	15 Feb 2018
Xin, Q., Dai, Y., Li, X., Liu, X., Gong, P., Richardson, AD.*	A steady-state approximation approach to simulate seasonal leaf dynamics of deciduous broadleaf forests via climate variables	Agricultural and Forest Meteorology	Volume 249	44-56	https://doi.org/10.1016/j.agrformet.2017.11.025	15 Feb 2018
Klosterman, S., Melaas, E., Wang, J., Martinez, A., Frederick, S., O'Keefe, J., Orwig, DA., Wang, Z., Sun, Q., Schaaf, C., Friedl, M., Richardson, AD.*	Fine-scale perspectives on landscape phenology from unmanned aerial vehicle (UAV) photography	Agricultural and Forest Meteorology	Volume 248	397-407	https://doi.org/10.1016/j.agrformet.2017.10.015	15 Feb 2018
van Gestel, N., Shi, Z., Van Groenigen, KJ., Osenberg, CW., Andresen, LC., Dukes, JS., Hovenden, MJ., Luo, Y.* , Michelsen, A., Pendall, E., Reich, PB., Schuur, E.* , Hungate, BA.*	Predicting soil carbon loss with warming	Nature	Volume 554, issue 7693	E4	doi:10.1038/nature25745	21 Feb 2018
Gibson, CA., Koch, B., Compson Z., Hungate, BA.* , Marks, JC.*	Ecosystem responses to restored flow in a travertine river	Freshwater Science	Volume 37, Issue 1	169-177	https://doi.org/10.1086/696614	1 Mar 2018
Teubner, IE., Forkel, M., Jung, M., Liu, YY., Miralles, DG., Parinussa, R., van der Schalie, R., Vreugdenhil, M., Schwalm, CR.* , Tramontana, G., Camps-Valls, G., Dorigo, WA.	Assessing the relationship between microwave vegetation optical depth and gross primary production	International Journal of Applied Earth Observation and Geoinformation	Volume 65	79-91	https://doi.org/10.1016/j.jag.2017.10.006	1 Mar 2018
Huang, Y., Lu, X., Shi, Z., Lawrence, D., Koven, CD., Xia, J., Du, Z., Kluzek, E., Luo, Y.*	Matrix approach to land carbon cycle modeling: A case study with the Community Land Model	Global Change Biology	Volume 24, Issue 3	1394-1404	https://doi.org/10.1111/gcb.13948	1 Mar 2018
Sabo, JL., Caron, M., Doucett, R., Dibble, KL., Ruhí, A., Marks, JC.* , Hungate, BA.* , Kennedy, TA.	Pulsed flows, tributary inputs and food-web structure in a highly regulated river	Journal of Applied Ecology	N/A	N/A	https://doi.org/10.1111/1365-2664.13109	2 Mar 2018
Zhang, X., Jayavelu, S., Liu A., Friedl, MA., Henebry, GM., Liu, Y., Schaaf, CB., Richardson, AD.* , Gray, J.	Evaluation of land surface phenology from VIIRS data using time series of PhenoCam imagery	Agricultural and Forest Meteorology	Volume 256-257	137-149	https://doi.org/10.1016/j.agrformet.2018.03.003	4 Mar 2018
Hou, E., Chen, C., Luo, Y.* , Zhou, G., Kuang, Y., Zhang, Y., Heenan, M., Lu, X., Wen, D.	Effects of climate on soil phosphorus cycle and availability in natural terrestrial ecosystems	Global Change Biology	N/A	N/A	https://doi.org/10.1111/gcb.14093	5 Mar 2018
Zhou, S., Liang, J., Lu, X., Li, Q., Jiang, L., Zhang, Y., Schwalm, CR.* , Fisher, JB., Tjiputra, J., Sitch, S., Ahlström, A., Huntzinger, DN., Huang, Y., Wang, G., Luo, Y.*	Sources of Uncertainty in Modeled Land Carbon Storage within and across Three MIPs: Diagnosis with Three New Techniques	Journal of Climate	Volume 31, Issue 7	2833-2851	https://doi.org/10.1175/JCLI-D-17-0357.1	12 Mar 2018
Richardson, AD.* , Hufkens, K., Milliman, T., Aubrecht, DM., Chen, M., Gray, JM., Johnston, MR., Keenan, TF., Klosterman, ST., Kosmala, M., Melaas, EK., Friedl, MA., Frohling, S.	Tracking vegetation phenology across diverse North American biomes using PhenoCam imagery	Scientific Data	5	Article 180028	doi:10.1038/sdata.2018.28	13 Mar 2018
Mau, RL., Dijkstra, P.* , Schwartz, E.* , Koch, B., Hungate, BA.*	Warming induced changes in soil carbon and nitrogen influence priming responses in four ecosystems	Applied Soil Ecology	Volume 124	110-116	https://doi.org/10.1016/j.apsoil.2017.10.034	13 Mar 2018

Du, Z., Weng, E., Xia, J., Jiang, L.+, Luo, Y.* , Zhou, X.	Carbon-nitrogen coupling under three schemes of model representation: Traceability analysis	Geosci. Model Dev. Discuss	N/A	N/A	10.5194/gmd-2018-41	15 Mar 2018
Ceballos-Nunez, V., Richardson, AD.* Sierra, CA.	Ages and transit times as important diagnostics of model performance for predicting carbon dynamics in terrestrial vegetation models	Biogeosciences	Volume 15	1607–1625	https://doi.org/10.5194/bg-15-1607-2018	16 Mar 2018
Christiansen, CT., Mack, M.* , DeMarco, J., Grogan, P.	Decomposition of Senesced Leaf Litter is Faster in Tall Compared to Low Birch Shrub Tundra	Ecosystems	N/A	1-16	https://doi.org/10.1007/s10021-018-0240-6	16 Mar 2018
Du, L., Mickle, N., Zou, Z., Huang, Y., Shi, Z., Jiang, L.+, McCarthy, HR., Liang, J., Luo, Y.*	Global patterns of extreme drought-induced loss in land primary production: Identifying ecological extremes from rain-use efficiency	Science of The Total Environment	628-629	611–620	10.1016/j.scitotenv.2018.02.114	16 Mar 2018
McGuire, AD., Lawrence, DM., Koven, C., Clein, JS., Burke, E., Chen, G., Jafarov, E., MacDougall, AH., Marchenko, S., Nicolsky, D., Peng, S., Rinke, A., Ciais, P., Gouttevin, I., Hayes, DJ., Ji, D., Krinner, G., Moore, JC., Romanovsky, V., Schädel, C.* , Schaefer K, Schuur E.* , Zhuang Qianlai	Dependence of the evolution of carbon dynamics in the northern permafrost region on the trajectory of climate change	PNAS	201719903	N/A	https://doi.org/10.1073/pnas.1719903115	21 Mar 2018
Jiang, J., Huang, Y., Ma, S., Stacy, M., Shi, Z., Ricciuto, DM., Hanson, PJ., Luo, Y.*	Forecasting Responses of a Northern Peatland Carbon Cycle to Elevated CO2 and a Gradient of Experimental Warming	Journal of Geophysical Research: Biogeosciences	N/A	N/A	https://doi.org/10.1002/2017JG004040	25 Mar 2018
Compton Z., Hungate, BA.* , Whitham, T., Koch, GW.* , Dijkstra, P.* , Siders, A.+, Wojtowicz, T., Jacobs, R., Rakestraw, D., Allred, K., Sayer, C., Marks, JC.*	Linking tree genetics and stream consumers: Isotopic tracers elucidate controls on carbon and nitrogen assimilation.	Ecology	N/A	N/A	DOI: 10.1002/ecy.2224	30 Mar 2018
Shi, Z., Lin, Y., Wilcox, KR., Souza, L., Jiang, L.+, Jiang, J., Jung, CG., Xu, X., Yuan, M., Guo, X., Wu, L., Zhou, J., Luo, Y.*	Successional change in species composition alters climate sensitivity of grassland productivity	Global Change Biology			10.1111/gcb.14333	31 Mar 2018
Richardson, AD.* , Hufkens, K., Milliman, T., Frolking, S.	Intercomparison of phenological transition dates derived from the PhenoCam Dataset V1.0 and MODIS satellite remote sensing	Scientific Reports	Volume 8	Article 5679	doi:10.1038/s41598-018-23804-6	9 Apr 2018
Zhang, T., Luo, Y.* , Chen, HYH., Ruan, H.	Responses of litter decomposition and nutrient release to N addition: A meta-analysis of terrestrial ecosystems.	Applied Soil Ecology	128	35-42	https://doi.org/10.1016/j.apsoil.2018.04.004	9 Apr 2018
Papp, K., Hungate, BA.* , Schwartz, E.*	Comparison of Microbial Ribosomal RNA Synthesis and Growth through Quantitative Stable Isotope Probing with H218O	Applied and environmental microbiology	Volume 84, Issue 4	N/A	doi: 10.1128/AEM.02441-17	15 Apr 2018
Lei, L., Xia, J., Li, X., Huang, K., Zhang, A., Chen, S., Weng, E., Luo, Y.* , Wan, S.	Water response of ecosystem respiration regulates future projection of net ecosystem productivity in a semiarid grassland	Agricultural and Forest Meteorology	Volume 252	175-191	https://doi.org/10.1016/j.agrformet.2018.01.020	15 Apr 2018
Guo, JS., Hungate, BA.* , Kolb, TE., Koch, GW.*	Water source niche overlap increases with site moisture availability in woody perennials.	Plant Ecology	219	719-735	https://doi.org/10.1007/s11258-018-0829-z	17 Apr 2018
Zou, J., Tobin, B., Luo, Y.* , Osborne, B.	Differential responses of soil CO2 and N2O fluxes to experimental warming.	Agricultural and Forest Meteorology	259	11-22	https://doi.org/10.1016/j.agrformet.2018.04.006	25 Apr 2018
Walker, X., Rogers, B., Baltzer, J., Cumming, S., Day, N., Goetz, S., Johnstone, J., Schuur, E.* , M. Turetsky, Mack, M.*	Cross-scale controls on carbon emissions from boreal megafires	Global Change Biology	N/A	N/A	https://www.ncbi.nlm.nih.gov/pubmed/29697169	26 Apr 2018
Cai, A., Liang, G., Zhang, X., Zhang, W., Li, L., Rui, Y., Xu, M., Luo, Y.*	Long-term straw decomposition in agro-ecosystems described by a unified three-exponentiation equation with thermal time	Science of the total environment	636	699-708	https://doi.org/10.1016/j.scitotenv.2018.04.303	1 May 2018
Stephens, JJ., Black, TA., Passal, RS., Nestic, Z., Grant, NJ., Barr, AG., Helgason, WD., Richardson, AD.* , Johnson, MS., Christen, A.	Effects of forest tent caterpillar defoliation on carbon and water fluxes in a boreal aspen stand	Agricultural and Forest Meteorology	Volume 253/254	176-189	https://doi.org/10.1016/j.agrformet.2018.01.035	1 May 2018
Lu, X., Vitousek, PM., Mao, Q., Gilliam, FS., Luo, Y.* , Zhou, G., Zou, X., Bai, E., Scalnon, TM., Hou, E., Mo, J.	Plant acclimation to long-term high nitrogen deposition in an N-rich tropical forest.	Proceedings of the National Academy of Sciences	NA	NA	https://doi.org/10.1073/pnas.1720777115	1 May 2018
Forbes, WL., Mao, J., Jin, M., Kao, SC., Fu, W., Shi, X., Ricciuto, DM., Thornton, PE., Ribes, A., Wang, Y., Piao, S., Zhao, T., Schwalm, CR.* , Hoffman, FM., Fischer, JB., Ito, A., Poulter, B., Fang, Y., Tian, H., Jain, AK., Hayes, DJ.	Contribution of environmental forcings to US runoff changes for the period 1950–2010	Environmental Research Letters	13	NA	https://doi.org/10.1088/1748-9326/aabb41	4 May 2018
Alexander, HD., Natali, SM., Loranty, MM., Ludwig, SM., Spektor, VV., Davydov, S., Zimov, N., Trujillo, I., Mack, M.*	Impacts of increased soil burn severity on larch forest regeneration on permafrost soils of far northeastern Siberia	Forest Ecology and Management	Volume 417	144-153	https://doi.org/10.1016/j.foreco.2018.03.008	15 May 2018
Klosterman, S., Hufkens, K., Richardson, AD.*	Later springs green-up faster: the relation between onset and completion of green-up in deciduous forests of North America	International Journal of Biometeorology			https://doi.org/10.1007/s00484-018-1564-9	16 May 2018
Jean, M., Mack, M.* , Johnstone, JF.	Spatial and temporal variation in moss-associated dinitrogen fixation in coniferous- and deciduous-dominated Alaskan boreal forests	Plant Ecology	219	837-851	https://doi.org/10.1007/s11258-018-0838-y	17 May 2018
Huang, Y., Stacy, M., Jiang, J., Sundi, N., Ma, S., Saruta, V., Jung, CG., Shi, Z., Xia, J., Hanson, PJ., Ricciuto, D., Luo, Y.*	Realized ecological forecast through interactive Ecological Platform for Assimilating Data into model (EcoPAD)	Geoscientific Model Development Discussions			10.5194/gmd-2018-76	25 May 2018

Liang J., Xia J., Shi Z., Jiang L., Ma S., Lu X., Mauritz M., Natali S., Pegoraro E., Penton C., Plaza C., Salmon V., Celis G., Cole J., Konstantinidis K., Tiedje J., Zhou J., Schuur E.* , Luo, Y.*	Biotic responses buffer warming-induced soil organic carbon loss in Arctic tundra.	Global Change Biology	NA	NA	https://doi.org/10.1111/gcb.14325	26 May 2018
Chen, J., Luo, Y.* , Xia, J., Zhou, X., Niu, S., Shelton, S., Guo, W., Liu, S., Dai, W., Cao, J.	Divergent responses of ecosystem respiration components to livestock exclusion on the Qinghai Tibetan Plateau	Land Degradation & Development	29	1726-1737	10.1002/ldr.2981	1 Jun 2018
Shi, Z., Crowell, S., Luo, Y.* , Moore, B. III	Model structures amplify uncertainty in predicted soil carbon responses to climate change	Nature Communications	9	2171	10.1038/s41467-018-04526-9	4 Jun 2018
Zheng, M., Zhang, W., Luo, Y.* , Li, D., Wang, S., Huang, J., Lu, X., Mo, J.	Stoichiometry controls asymbiotic nitrogen fixation and its response to nitrogen inputs in a nitrogen-saturated forest	Ecology			10.1002/ecy.2416	12 Jun 2018
Zou, J., Tobin, B., Luo, Y.* , Osborne, B.	Response of soil respiration and its components to experimental warming and water addition in a temperate Sitka spruce forest ecosystem	Agricultural and Forest Meteorology	260-261	204-215	https://doi.org/10.1016/j.agrformet.2018.06.020	21 Jun 2018
Siders, AC., Compson, ZG., Hungate, BA.* , Dijkstra, P.* , Koch, GW.* , Wymore, AS., Grandy, AS., Marks, JC.*	Litter identity affects assimilation of carbon and nitrogen by a shredding caddisfly	Ecosphere	N/A	N/A	https://doi.org/10.1002/ecs2.2340	10 Jul 2018
Watkins, J.E., Mack, M.*	$\delta^{15}\text{N}$ Natural abundance and nitrogen use strategies of the gametophytes and sporophytes of tropical ferns	American Fern Journal	N/A	N/A	N/A	N/A
b. Peer-reviewed publications with Center affiliates as author						
b. Peer-reviewed publications with Center postdoctoral scholars as author						
Ochoa-Hueso, R., Eldridge, DJ., Delgado-Baquerizo, M., Soliveres, S., Bowker, MA., Gross, N., Bagousse-Pinguet, L., Quero, JL., García-Gómez, M., Valencia, E., Arredondo, T., Beinticincin, L., Bran, D., Cea, A., Coaguila, D., Dougill, AJ., Espinosa, CI, Gaitán, J., Guuroh, RT., Guzman, E., Gutiérrez, JR., Hernández, RM., Huber-Sannwald, E., Jeffries, T., Linstädter, A., Mau, RL.+ , Moneris, J., Prina, A., Pucheta, E., Stavi, I., Thomas, AD., Zaady, E., Singh, BK., Maestre, FT.	Soil fungal abundance and plant functional traits drive fertile island formation in global drylands	Journal of Ecology	Volume 106, Issue 1	242-253	https://doi.org/10.1111/1365-2745.12871	1 Jan 2018

Table 5: Other Publications

Author	Publication	Publication	Date
a. Other Publications by Center core members			
Schuur, Ted	IPCC Special Report on the Ocean and Cryosphere in a Changing Climate	IPCC Special Report on the Ocean and Cryosphere in a Changing Climate	2018
b. Other publications by Center affiliates			
Huntzinger, Deborah	"Changes in land cover and terrestrial biogeochemistry." In: Climate Science Special Report: A Sustained Assessment Activity of the U.S. Global Change Research Program	National Assessment Report	1 Nov 2017
Huntzinger, Deborah	"Future of the North American Carbon Cycle." In: 2nd State of the Carbon Cycle Report (SOCCR-2). A report by the Office of Science and Technology Policy and the Subcommittee on Global Change Research	National Assessment Report	Spring 2018
Huntzinger, Deborah	"Overview of the global carbon cycle." In: 2nd State of the Carbon Cycle Report (SOCCR-2). A report by the Office of Science and Technology Policy and the Subcommittee on Global Change Research	National Assessment Report	Spring 2018

Table 6: Tech Transfers
Nothing to report

Table 7: Outreach

Event	Date	Center participant	Title	Link
a. Outreach led by Center Core Members				
<i>Career mentoring</i>				
Women and Science, US Forest Service Regional Headquarters	26 Apr 2018	Michelle Mack	Fire and Ice: my career in the Arctic	
Science Communication	Fall 2017/ Spring 2018	Bruce Hungate, Christina Schädel, Marguerite Mauritz	Science Communication Challenge (http://ecoss.nau.edu/no-word-communication/)	
Carbon Cycle Science Workshop & Symposium	20-26 May 2018	Yiqi Luo, Lifan Jiang	International Symposium and Workshop, New Advances in Land Carbon Cycle Modeling	
<i>Citizen Science</i>				
Oak Creek Stream monitoring	17 Feb 2018	Jane Marks	Freshwater science expertise for water quality monitoring	
<i>News Stories</i>				
Discover Magazine	15 May 2018	Christina Schädel, Ted Schuur	"Something stirs: What will happen as permafrost thaws?"	http://discovermagazine.com/2018/jun/something-stirs
EOS	13 Mar 2018	Ted Schuur	"Understanding High-Altitude Methane in a Warming Climate"	https://eos.org/project-updates/understanding-high-latitude-methane-in-a-warming-climate
Hakai Magazine	4 Apr 2018	Ted Schuur	reprint of: High Country News, "A look into a climate-altered Alaska"	https://www.hakaimagazine.com/features/impermanence-permafrost/
High Country News	19 Feb 2018	Ted Schuur	"A look into a climate-altered Alaska"	https://www.hcn.org/issues/50.3/a-look-into-a-climate-altered-alaska
Inside Science News	16 Feb 2018	Ted Schuur	"Global Warming's Frozen Giant"	https://www.insidescience.org/news/global-warmings-frozen-giant
KJZZ radio interview	20 Jul 2017	Ben Koch, Bruce Hungate, Lance Price	"Researcher Looks at How Bacteria Could Impact Food Sources"	http://kjzz.org/content/507556/researcher-looks-how-bacteria-could-impact-food-sources
NAU News	30 Jan 2018	Ben Koch, Paul Dijkstra, Bruce Hungate, Jane Marks, Egbert Schwartz, Michaela Hayer, Rebecca Mau	"Which microbes matter most? NAU scientists develop technique for measuring bacterial growth rates"	http://news.nau.edu/bacterial-growth-rates/
NAU News	4 Apr 2018	Christina Schädel, Ted Schuur	"NAU's Permafrost Carbon Network study links climate policy to reduced effects of emissions from thawing soil"	http://news.nau.edu/permafrost-emissions-thawing-soil/
NAU News	7 Feb 2018	Christopher Schwalm	"NAU ecosystem scientist's study finds more frequent droughts may endanger ecosystem resiliency"	http://news.nau.edu/land-carbon-sink/
NAU News	1 Aug 2017	Bruce Hungate	"NAU researcher collaborates on study of HIV risk factors in men"	http://news.nau.edu/hiv/
NAU News	8 Dec 2017	Bruce Hungate, Christina Schädel, Paul Dijkstra	"NAU researchers join Department of Energy project to study the soil microbiome and its effect on carbon persistence"	http://news.nau.edu/carbon-persistence/
NAU News	10 Jan 2018	Jane Marks	"Mentoring Makes a Difference"	http://news.nau.edu/mentoring/
NAU News	17 Jan 2018	Michelle Mack	"NAU scientists lead DoD project to assess environmental impact of changing climate on boreal forests"	http://news.nau.edu/mack-goetz-boreal-forest/
NAU News	13 Mar 2018	Andrew Richardson	"PhenoCam network harnesses big data to predict impact of warmer climate on ecosystem productivity and carbon cycling"	http://news.nau.edu/andrew-richardson-phenocam/
NAU News	6 Sep 2017	Ted Schuur	"NAU ecologist selected to be lead author on report on cryosphere, dangers of its thawing"	http://news.nau.edu/cryosphere-report/
NAU News	17 May 2018	Xanthe Walker, Michelle Mack, Ted Schuur, Scott Goetz	"NAU scientists publish first estimate of carbon emissions from 2014 mega-fires in Canada's boreal forests"	http://news.nau.edu/mega-fires-canadas-boreal-forests/
NAU News	27 Feb 2018	Yiqi Luo	"NAU's Yiqi Luo Selected As Ecological Society of America Fellow"	http://news.nau.edu/yiqi-luo/
NAU photo shoot	20 Apr 2018	Jane Marks, Ben Koch, Rebecca Fritz, Courtney Roush, Meghan Schnrik, & Ecosystem undergraduates	Leaf Paradigm field experiment	
NAU photo shoot	24 May 2018	Mariah Carbone, Jim Le Moine	Researcher profile	
NewsWise	27 Mar 2018	Ted Schuur, Christina Schädel	reprint of: NAU news, "NAU's Permafrost Carbon Network study links climate policy to reduced effects of emissions from thawing soil"	https://www.newswise.com/articles/permafrost-carbon-network-study-links-climate-policy-to-reduced-effects-of-emissions-from-thawing-soil
Science Daily, Phys.Org	31 Jan 2018	Ben Koch, Hayer, Mau, van Gestel, Morrissey, McHugh, Schwartz, Dijkstra, Hungate, Marks...	reprint of: NAU news, "Which microbes matter most? NAU scientists develop technique for measuring bacterial growth rates"	https://www.sciencedaily.com/releases/2018/01/180131093643.htm
Science Magazine News Story	7 Jul 2017	Ted Schuur, Scott Goetz	"NASA armada targets thaw in Arctic soil"	http://science.sciencemag.org/content/357/6346/12.full
Sega.nau.edu	13 Mar 2018	Andrew Richardson	"Sega Joins National PhenoCam "Plant Spy Ring" -- You Can Join Too!"	https://sega.nau.edu/node/401
Springer Nature	14 Mar 2018	Andrew Richardson	"Tracking vegetation phenology with the PhenoCam Network"	https://researchdata.springernature.com/users/82876-andrew-richardson/posts/31207-tracking-vegetation-phenology-with-the-phenocam-network
Washington Post	1 Mar 2018	Ted Schuur	"Ancient carbon is coming from arctic soil. It might be fine, but it might be terrible."	https://www.washingtonpost.com/news/energy-environment/wp/2018/03/01/ancient-carbon-is-coming-from-arctic-soil-it-might-be-fine-but-it-might-be-terrible-2/?utm_term=.c7eb92cbd0ff

Table 7: Outreach	Event	Date	Center participant	Title	Link
	Wired	22 Feb 2018		reprint of: High Country News, "A look into a climate-altered Alaska"	https://www.wired.com/story/permafrost-experiments-mimic-alaskas-climate-changed-future/
	Illustrated Press Release	18 Mar 2018	Victor Leshyk, Andrew Richardson	Phenocam Network	
	Illustrated Press Release	18 Aug 2017	Victor Leshyk, Christopher Schwalm	Droughts and Ecosystem Resiliency	
Public Events, School Outreach					
	Arctic Encounter Symposium	19 Apr 2018		Christina Schädel	Display of a permafrost core
	Flagstaff Festival of Science	27 Sep 2017		Bruce Hungate	Engineering the Climate: Can We? Should We?
	Science on Tap	18 Jan 2018		Bruce Hungate	Culture and Climate on the Colorado Plateau
	Lecture to AP Environmental Sciences Class	28 Mar 2018		Bruce Hungate	Geoengineering the Climate: How? Why?
	Scientist in the Classroom	25 Jan 2018	Marguerite Mauritz, Jessica Guo, Ben Koch, Christina Schädel		Ice and a changing climate
	Scientists in the Classroom	10 May 2018	Ben Koch, Christina Schaedel, Kym Samuels-Crow, Haley Dunleavy		Decomposition and root symbiont data collection
Undergraduate Engagement & Mentoring					
	Service	NAU CEFNS UGRADS	27 Apr 2018	Ben Koch, Christina Schädel, Drew Peltier	NAU UGRADS judging
	Research Experience	Fall	2017/Spring		Lab assistant - Habitat evaluation to improve the success of Spikedace and Loach Minnow repatriation
		Fall	2017/Spring	Koch, B.J. Lab: Danielle Lambert	Lab assistant - Habitat evaluation to improve the success of Spikedace and Loach Minnow repatriation
		Fall	2017/Spring	Koch, B.J. Lab: Katelyn Gilkey	Lab assistant - Habitat evaluation to improve the success of Spikedace and Loach Minnow repatriation
		Fall	2017/Spring	LIMES Lab: Katheryn Nantz	Lab assistant
		Fall	2017/Spring	LIMES Lab: Zach Strong	Lab assistant
		Fall	2017/Spring	Mack Lab: Abby Borro	Lab assistant - Effects of experimental warming on foliar P concentrations at Toolik Lake, AK
		Fall	2017/Spring	Mack Lab: Chance Nelson	Lab assistant - Legacy C project
		Fall	2017/Spring	Mack Lab: Devyn Webb	Lab assistant - Moss dimensions project
		Fall	2017/Spring	Mack Lab: Elyanna Juarez	Lab assistant - BNZ LTER
		Fall	2017/Spring	Mack Lab: Harlan Tso	Lab assistant - Legacy C project
		Fall	2017/Spring	Mack Lab: Jessica Griego	Lab assistant - Legacy C project
		Fall	2017/Spring	Mack Lab: Krystal Vazquez	Lab assistant - Snow shrub project
		Fall	2017/Spring	Mack Lab: Makenna Hopwood	Lab assistant - BNZ LTER
		Fall	2017/Spring	Mack Lab: Ryann Whealy	Lab assistant - foliar N:P ratios
		Fall	2017/Spring	Mack Lab: Talon Perkins	Lab assistant - Deep roots project
		Fall	2017/Spring	Mack Lab: Victoria Sierra	Lab assistant - Deep roots project
		Fall	2017/Spring	Mack Lab: Viri Quinonez	Lab assistant - Deep roots project
		Fall	2017/Spring	Schuur Lab: Alberto Acosta	Lab assistant

Table 7: Outreach	Event	Date	Center participant	Title	Link
		Fall 2017/Spring 2018	Schuur Lab: Lauren Mendoza	Lab assistant	
		Fall 2017/Spring 2018	Schuur Lab: Vincent Ramirez	Lab assistant	
<i>Undergraduate Academy</i>		Fall 2017/Spring 2018	Alicia Purcell and Bruce Hungate Lab: Shavdi Edirachchi	Lab assistant - A comparison and quantification of microbial abundances in ponderosa pine versus mixed conifer soils in Northern Arizona	
		Fall 2017/Spring 2018	Amy Whipple Lab: Brianna Palmiero	Lab assistant - Southwestern white pines under climate change: understanding how water intake patterns could force migration or cause local extinction	
		Fall 2017/Spring 2018	Egbert Schwartz Lab: John Condon	Lab assistant - Examining relationships among permafrost thawing, ammonia oxidizing bacterial abundance, and nitrogen availability using quantitative PCR	
		Fall 2017/Spring 2018	George Koch Lab: Jay Braun	Lab assistant - Production of metabolic water by microbes in dry soils	
		Fall 2017/Spring 2018	George Koch Lab: Logan Milton	Lab assistant - Production of metabolic water by microbes in dry soils	
		Fall 2017/Spring 2018	Jane Marks Lab: Alan Gruetzmacher	Lab assistant - Aquatic insects, microbes, and leaf decomposition: understanding trophic dynamics in Arizona stream systems	
		Fall 2017/Spring 2018	Jane Marks Lab: Rachel McFadden- Mudry	Lab assistant - Aquatic insects, microbes, and leaf decomposition: understanding trophic dynamics in Arizona stream systems	
		Fall 2017/Spring 2018	Jane Marks Lab: Zasha Welsh	Lab assistant - Aquatic insects, microbes, and leaf decomposition: understanding trophic dynamics in Arizona stream systems	
		Fall 2017/Spring 2018	Karen Haubensak Lab: Guston Coleman	Lab assistant - Examining relationships among leaf traits and arthropod abundance across a range of sagebrush populations	
		Fall 2017/Spring 2018	Karen Haubensak Lab: Jaimee Kaufman	Lab assistant - Examining relationships among leaf traits and arthropod abundance across a range of sagebrush populations	
		Fall 2017/Spring 2018	Koch, B.J. Lab: Hannah Pigg	Lab assistant - Ecology of Lakes & Streams	
		Fall 2017/Spring 2018	Mack Lab: Abbie Para AK	Lab assistant - Effects of increased thaw depth on foliar P concentrations of Eriophorum vaginatum at Eight Mile Lake,	
		Fall 2017/Spring 2018	Paul Dijkstra Lab: Alex DeRushia	Lab assistant - Examining anaerobic soils' response to drying under climate change	
		Fall 2017/Spring 2018	Rebecca Best Lab: Kaitlen Bieber	Lab assistant - Describing trait distribution of freshwater benthic macroinvertebrates under changing climatic conditions	

b. Outreach Efforts Led by Center Affiliates

c. Outreach Efforts Led by Center Staff, Postdoctoral Researchers, and Students

<i>News Stories</i>	NAU photo shoot	30 Mar 2018	Ben Koch, Jack Torresdal, Rebecca Fritz	Quantifying spikedace & loach minnow habitat	
	Illustrated Press Release	5 Jul 2017	Victor Leshyk, Ben Koch	NAU ecologist finds tracking bacterial movement between humans, animals key to understanding antibiotic resistance	
	Illustrated Press Release	1 Feb 2018	Victor Leshyk, Ben Koch	QSIP	
	Illustrated Press Release	27 May 2018	Victor Leshyk, Xanthe Walker	Canadian Boreal Forest Fire Emissions	
<i>Public Events, School Programs</i>	Science on Tap	12 Jul 2017	Victor Leshyk	Accurate Passion: Meaning and Metaphor in Scientific Art	
	Scientists in the Classroom	12 Mar 2018	Haley Dunleavy, Marguerite Mauritz, Jack Torresdal, Buck Sanford	Roots and their Symbionts	
	Flagstaff Festival of Science	23 Sep 2017	Jessica Guo, Marguerite Mauritz, Alicia Purcell, Bri Finley, Meghan Schrik, Julia Stuart, Chris Kaiser	Science in the Park	
	5th Annual Flagstaff Community STEM Celebration	5 Mar 2018	Samantha Miller, Marguerite Mauritz, Ben Koch, Adam Siders, AJ Garnello, Bri Finley	Educational booth with nature-themed activities for kids	

Table 7: Outreach	Event	Date	Center participant	Title	Link
	Climate Change Presentation to Elementary School STEM	8 Sep 2017	Anthony Garnello	Climate Change presentation to Killip Elementary	http://www.flagstaffstemcity.com/blog/5th-graders-tackle-climate-change
	SEGA trip w/ Flagstaff HS and Grand Canyon Trust	14 Sep 2017	Drew Peltier Ben Koch, Rebecca Fritz, Jack Torresdal, Courtney Roush, Meghan Shrik	Tree ring science on the Colorado Plateau	
	Scientists in the Classroom	13 Oct 2017	Ben Koch, Marguerite Mauritz, Bri Finley	Freshwater Ecosystems	
	Scientists in the Classroom	30 Nov 2017	Rebecca Mau, Michaela Hayer, Alicia Purcell	Decomposition field experiment	http://www.flagstaffstemcity.com/blog/6th-graders-and-ecoss-partner-on-field-studies
	Scientists in the Classroom	12 Dec 2017	Ben Koch, Marguerite Mauritz, Bri Finley	Hands-on DNA extraction	
	Scientists in the Classroom	26 Feb 2018	Ben Koch, Marguerite Mauritz, Bri Finley	The Biology of Soil	
	Flinn Foundation Bioscience Roadmap Luncheon	10 Apr 2018	Bobby Woodruff	Bioscience student outreach/program update/student testimonials	
	Elementary School Science Fair Judge	13 Apr 2018	Ben Koch	Judging Kindergarten through 4th grade Science Projects for Flagstaff Junior Academy's Annual Science Fair	
	SEEDS regional field trip	3-Nov to 5-Nov 2017	Jessica Guo	Field trip to the University of Arizona's Mt. Lemmon Sky School & Biosphere	
	iCREATE	Aug 2017 - Jun 2018	Bobby Woodruff	iCREATE Bioscience high school class	
	<i>Science Communication</i> Science Illustration Course (BIO 698)	Spring 2018 Fall 2017/Spring 2048	Victor Leszyk CPSIL Lab: Bryden Baker	Introduction to Science Visualization Lab assistant	
	<i>Undergraduate Engagement & Mentoring</i>	2017/Spring 2049	CPSIL Lab: Sabrina Bolland	Lab assistant	
	<i>Research Experience</i>	Fall 2017/Spring 2050	CPSIL Lab: Reanna Jiang	Lab assistant	
		Fall 2017/Spring 2051	CPSIL Lab: James Stone	Lab assistant	
		Fall 2017/Spring 2052	CPSIL Lab: Stacy Jefferys	Lab assistant	

Table 8: Awards and Honors Employee Recognized Area of Award and Honor Organization Additional Information

a. Center Core Members

Andrew Richardson	Highly Cited Researcher	Clarivate Analytics	In scientific research, citation indicates impact: highly cited researchers are those whose papers are the most highly cited in their field. Globally, there are ~3000 scientists who meet the bar. NAU employs two, one a core member of Ecosystems, and one an affiliate member.
Ben Koch & Victor Leshyk	Logo Competition	Society for Freshwater Sciences	In Ecosystems' continuing quest to merge science and art, Ben and Victor created the new logo for SFS. Victor was featured at the society's annual meeting for an invited talk about "Accurate Passion: The Didactic Emergence of Science Through Art"
Bruce Hungate	Appointed, Vice-Chair	Biological and Environmental Research Adv	The Department of Energy's program in Biological and Environmental Research administers ~\$600 million per year in research funding. Bruce is now vice-chair of the committee enabled by the Federal Advisory Committee Act (FACA) to advise this committee in its strategic direction.
Bruce Hungate	Frances B. McAllister Endowed Chair	Community, Culture, and Environment	NAU selected Bruce to serve in this role to enable the arts, cultural, scientific, and environmental institutions of the Colorado Plateau to meet the long term needs of the communities they serve.
Michelle Mack	Executive Board, LTER Network	National Science Foundation	NSF's Long-Term Ecological Research Network spans 28 sites around the world, gathering critical long-term data about ecosystems from the tropics to the tundra. Michelle was selected to be part of the board that oversees the network's activities and long-term direction.
Michelle Mack	US Representative	International Arctic Science Committee	Based on her long-term research excellence in arctic ecosystems, Michelle was selected to represent the US on this committee which facilitates international cooperation in arctic research.
Ted Schuur	Lead Author	Intergovernmental Panel on Climate Change	The IPCC is the leading international body for the assessment of climate change, from the fundamental science, to impacts, to mitigation and adaptation. As lead author, Ted is recognized for his career contributions to the science of climate change.
Yiqi Luo	Fellow	Ecological Society of America	Election as fellow is a high honor in the society. Yiqi was elected for fundamental contributions to ecosystem dynamics, theory of carbon and nitrogen cycles, and pioneering approaches in ecological research.

b. Center Affiliate Members

Greg Caporaso	Highly Cited Researcher	Clarivate Analytics	Along with Andrew Richardson (see above), Greg Caporaso was also recognized as a highly cited researcher, in part due to his development of QIIME, a bioinformatics tool used globally in microbial ecology.
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c. Center Graduate Students

Jack Torresdal	Honorable Mention, Graduate Research Fellowship	National Science Foundation	Jack's proposed research on fish ecology earned him an honorable mention for this year's competition, an honor in this highly competitive program.
Julia Stuart	Outstanding Student Poster	American Geophysical Union	Julia's poster about nitrogen fixation in arctic mosses stood out for its clarity, novelty, and scientific importance at the cutting edge of biogeochemistry.
Megan Foley	Winner, Graduate Research Fellowship	National Science Foundation	Megan will begin the PhD program with Ecosystems this fall as an NSF graduate student fellow, a very high honor. She will work in the area of quantitative microbial ecology and biogeochemistry.
Rachel Rubin	People's Choice	3MRP Competition, NAU	Rachel enthralled the audience at this year's three minute research competition, and her presentation was the favorite among the audience of several hundred attendees.
Melissa Enright	Finalist	3MRP Competition, NAU	Through words and art, Lissy explained cutting edge research about how water moves through plants, earning a spot in the finals for the 3MRP.

Appendix 1: Talks and Posters Given

<i>Author</i>	<i>Title</i>	<i>Venue</i>	<i>Date</i>	<i>Talk or Poster</i>	<i>Invited?</i>
Andrew Richardson	Enhancement of photosynthetic uptake by diffuse radiation: A model-data fusion analysis for the Bartlett AmeriFlux tower.	Hubbard Brook Cooperator's Meeting	1 Jul 2017	Talk	Y
Bruce Hungate	Multi-Omics and the Microbial Ecology of Element Cycling in Ecosystems	Keynote Speaker, Multi-Omics for Microbiomes Conference, Pacific Northwest National Laboratory	1 Jul 2017	Talk	Y
Bruce Hungate	Understanding the Chemistry of Our Planet	American Chemical Society, President's Symposium	1 Aug 2017	Talk	Y
Christopher Schwalm, William R. L. Anderegg, Anna M. Michalak, Joshua B. Fisher, Franco Biondi, George W. Koch, Marcy E. Litvak, Kiona Ogle, John D. Shaw, Adam Wolf, Deborah Huntzinger, Kevin Schaefer, Yaxing Wei, Yuanyuan Fang, Daniel J. Hayes, Maoyi Huang, Atul Jain and Hanqin Tian	What drives drought recovery? A global perspective	Annual Meeting of the Ecological Society of America, Portland Oregon	1 Aug 2017	Talk	N
Drew M. P. Peltier, Jessica S. Guo, Kimberly E. Samuels-Crow, Larissa Yocom-Kent, Yao Liu, William R. L. Anderegg, Michael Fell, George W. Koch and Kiona Ogle	Differential growth responses of pinyon and juniper during El Niño and La Niña periods	Annual Meeting of the Ecological Society of America, Portland Oregon	1 Aug 2017	Talk	N
George Koch & Egbert Schwartz	Metabolic Water Production by Soil Microorganisms	Annual Meeting of the Ecological Society of America, Portland Oregon	1 Aug 2017	Talk	N
Kimberly E. Samuels-Crow ¹ , Yao Liu ¹ , Drew M. P. Peltier ² , Jeffrey M. Welker ³ , William R. L. Anderegg ⁴ , George W. Koch ⁵ and Kiona Ogle	Variability in foundation tree species water sources across an elevation gradient in the semiarid Southwest	Annual Meeting of the Ecological Society of America, Portland Oregon	1 Aug 2017	Talk	N
Bruce Hungate	Geoengineering the Climate: Can We? Should We?	Flagstaff Festival of Science, Northern Arizona University	1 Sep 2017	Talk	Y
Michelle Mack	Fire and ice: Effects of forest regeneration the carbon dynamics of Alaskan boreal forests	Chinese Academy of Sciences, Beijing, China	1 Sep 2017	Talk	Y
Christina Schädel	Global Greenhouse gas release from permafrost	AAAS Headquarters, Washington, DC	27 Sep 2017	Talk	Y

Andrew Richardson	Phenology, climate change and ecosystem processes: What we are learning from the PhenoCam network	University of California, Santa Barbara, Biogeosciences Seminar Series, Santa Barbara CA	1 Oct 2017	Talk	Y
Bruce Hungate	Toward Quantitative Microbial Ecology	Graduate Student Invited Speaker, University of Colorado, Boulder, Department of Ecology and Evolutionary Biology	1 Oct 2017	Talk	Y
Michelle Mack	Identifying Indicators of State Change and Forecasting Future Vulnerability in Alaskan Boreal Ecosystems.	Plenary Talk, SERDP, Department of Defense, Annual Symposium, Washington D.C.	1 Nov 2017	Talk	Y
Andrew Richardson	Phenology, climate change and ecosystem processes: What we are learning from the PhenoCam network	University of Hawai'i at Mānoa, Geography Department, Mānoa HI	1 Dec 2017	Talk	Y
XJ Walker, JL Baltzer, S Cumming, N Day, SJ Goetz, JF Johnstone, BM Rogers, MR Turetsky, MC Mack	Carbon combustion in boreal black spruce and jack pine stands of the Northwest Territories, Canada	AGU	1 Dec 2017	Talk	N
Julia Stuart	Plant, microbiome, and biogeochemistry: moss-associated nitrogen fixation in Alaska	AGU	1 Dec 2017	Poster	N
Melissa Boyd	Impacts of climate and insect defoliators on productivity and function of trembling aspen in Alaskan boreal forests	AGU	11 Dec 2017	Talk	N
Briana Jasinski, Michelle Mack, Edward Schuur, Marguerite Mauritz, Xanthe Walker	Shifting foliar N:P ratios with experimental soil warming in tussock tundra	AGU	12 Dec 2017	Poster	N
Christina Schädel et al.	Divergent patterns of experimental and model derived variables of tundra ecosystem carbon exchange in response to arctic warming	New Orleans, LA (AGU Fall Meeting)	13 Dec 2017	Talk	Y
Yiqi Luo, Jianyang Xia, Anders Ahlström, Sha Zhou, Yuanyuan Huang, Zheng Shi, Yingping Wang, Zhenggang Du, and Xingjie Lu	Matrix approach to uncertainty assessment and reduction for modeling terrestrial carbon cycle	New Orleans, LA (AGU Fall Meeting)	13 Dec 2017	Talk	Y
Yiqi Luo, Yuanyuan Huang, Jiang Jiang, Shuang Ma, Vova Saruta, Guopeng Liang, Paul J Hanson, Daniel M Ricciuto, Alex Milcu, Jacques Roy	Integration of research infrastructures and ecosystem models toward development of predictive ecology	New Orleans, LA (AGU Fall Meeting)	13 Dec 2017	Talk	Y
Shuang Ma, Yuanyuan Huang, Mark Stacy, Jiang Jiang, Nilutpal Sundi, Daniel M Ricciuto, Paul J Hanson, and Yiqi Luo	EcoPAD, an interactive platform for near real-time ecological forecasting by assimilating data into model	New Orleans, LA (AGU Fall Meeting)	14 Dec 2017	Talk	Y

Finley, B.K., E. Schwartz, B.J. Koch, P. Dijkstra, and B.A. Hungate	Soil mineral assemblage influences on microbial communities and carbon cycling under fresh organic matter input	AGU	14 Dec 2017	Talk	N
Hewitt, R. E., D. L. Taylor, H. Genet, A. D. McGuire, and M. C. Mack	The role of deep nitrogen and dynamic rooting profiles on vegetation dynamics and productivity in response to permafrost thaw and climate change in Arctic tundra	AGU	14 Dec 2017	Talk	N
Shuang Ma, Yuanyuan Huang, Jiang Jiang, Daniel M Ricciuto, Paul J Hanson, and Yiqi Luo	Acclimation of methane production weakens ecosystem response to climate warming in a northern peatland	New Orleans, LA (AGU Fall Meeting)	14 Dec 2017	Talk	N
Haley Dunleavy, Michelle Mack	Long-term warming and fertilization shifts rates of ectomycorrhizal nutrient cycling in arctic tundra	AGU	14 Dec 2017	Poster	N
Lifen Jiang, Zheng Shi, Jianyang Xia, Junyi Liang, Xingjie Lu, Ying Wang, Yiqi Luo	Transient traceability analysis of land carbon storage dynamics: procedures and its application to two forest ecosystems	New Orleans, LA (AGU Fall Meeting)	15 Dec 2017	Talk	N
Chang Gyo Jung, Lifen Jiang, and Yiqi Luo	Ecosystem response to climatic variables – air temperature and precipitation: How can these variables alter plant productions in C - grass dominant ecosystem?	New Orleans, LA (AGU Fall Meeting)	15 Dec 2017	Poster	N
Guopeng Liang, Kevin Wilcox, Jennifer Rudgers, Marcy E Litvak, Seth D Newsome, Scott L Collins, William Pockman, and Yiqi Luo	Modeled Carbon Cycle Responses to Altered Precipitation Amount and Interannual Variation in Desert Grassland	New Orleans, LA (AGU Fall Meeting)	15 Dec 2017	Poster	N
Xingjie Lu, Zhenggang Du, Edward Schuur, and Yiqi Luo	Investigate the plant biomass response to climate warming in permafrost ecosystem using matrix-based data assimilation	New Orleans, LA (AGU Fall Meeting)	15 Dec 2017	Poster	N
Andrew Richardson	Phenology, climate change and ecosystem processes: What we are learning from the PhenoCam network	Northern Arizona University, Biological Sciences Department, Flagstaff AZ	1 Jan 2018	Talk	Y
Bruce Hungate	Climate and Culture on the Colorado Plateau	Science on Tap, Flagstaff AZ	1 Jan 2018	Talk	Y
Michelle Mack	Ecosystem consequences of increasing fire severity in the Arctic-boreal region	NASA Arctic-Boreal Vulnerability Science Team Meeting, Seattle, WA	1 Jan 2018	Talk	Y
Paul Dijkstra	Understanding Microbial Stress Responses in Soil Using Metagenomes and Metatranscriptomes	USDA-NIFA	18 Jan 2018	Poster	N
Andrew Richardson	Phenology, climate change and ecosystem processes: What we are learning from the PhenoCam network	University of Arizona, School of Natural Resources and the Environment, Tucson AZ	1 Feb 2018	Talk	Y
Bruce Hungate	The Microbial Ecology of the Soil Carbon Cycle	University of California, Santa Barbara, Biogeosciences Seminar Series, Santa Barbara CA	1 Feb 2018	Talk	Y

Jack Torresdal, Benjamin J. Koch	Evaluating spikedace and loach minnow habitat in Arizona streams	Joint Annual Meeting of the Arizona and New Mexico Chapters of the Wildlife Society and American Fisheries Society	2 Feb 2018	Talk	N
Yiqi Luo et al.	Unified Formula for Land Biogeochemical Models	NCAR Working Group Meeting (Boulder, CO)	7 Feb 2018	Talk	N
Hewitt, R. E., D. L. Taylor, H. Genet, A. D. McGuire, and M. C. Mack	The role of deep nitrogen and dynamic rooting profiles on vegetation dynamics and productivity in response to permafrost thaw and climate change in Arctic tundra	Arctic LTER meeting	13 Feb 2018	Talk	Y
Haley Dunleavy, Michelle Mack	Long-term warming and fertilization shifts rates of ectomycorrhizal nutrient cycling in arctic tundra	Arctic LTER meeting	14 Feb 2018	Poster	N
Paul Dijkstra	Analysis of Microbial Stress Responses in Soil Using Metagenome and Metatranscriptome Analysis	DOE-Genomics	18 Feb 2018	Poster	N
Paul Dijkstra	Reconstructing Metabolism from Position-Specific CO ₂ Production and Incorporation	DOE-Genomics	18 Feb 2018	Poster	N
Alicia M. Purcell, Michaela Hayer, Benjamin J. Koch, Rebecca L. Mau, Egbert Schwartz, Bruce A. Hungate	Field Measurements of Taxon Specific Microbial Growth in Soil at Two Elevation Gradient Sites Using Quantitative Stable Isotope Probing (qSIP)	Department of Energy Genomic Sciences Program Annual PI Meeting, Washington, D.C.	25 Feb 2018	Poster	N
Ember M. Morrissey, Rebecca Mau, Xiaojun Liu, Benjamin J. Koch, Jennifer Pett-Ridge, Steve Blazewicz, Xavier Mayali, Kirsten Hofmockel, Egbert Schwartz, Paul Dijkstra, Bruce A. Hungate	Are the activities of microbial taxa consistent across ecosystems?	Department of Energy Genomic Sciences Program Annual PI Meeting, Washington, D.C.	25 Feb 2018	Poster	N
Lisa Kunza, Becky Bixby, Erin Hotchkiss, Benjamin Koch, Amy Krist, Justin Murdock, Jonathan O'Brien, D. Waterman, Jeff Wesner, T. St. Clair, L. Totten, C. Chapman	Examining food web dynamics in the Missouri River to identify the influence of habitat complexity and Asian Carp invasion on endangered Pallid Sturgeon	2018 Missouri River Natural Resources Conference, Nebraska City, Nebraska	1 Mar 2018	Talk	N
Hewitt, R. E., D. L. Taylor, H. Genet, A. D. McGuire, and M. C. Mack	The roles of plant roots, mycorrhizal fungi, and uptake of deep nitrogen in the permafrost carbon feedback to warming climate	ECOSS seminar	29 Mar 2018	Talk	N
Jane Marks	Can we restore a river after 100 years of disturbance?	European Geosciences Meeting	1 Apr 2018	Talk	Y
Paul Dijkstra	Microbial Carbon-Use Efficiency Through a Mist of Maintenance	European Geosciences Meeting	1 Apr 2018	Talk	Y
Kiona Ogle	Nitrogen Fixation in Response to Elevated CO ₂ : A Bayesian Meta-Analysis	European Geosciences Meeting	1 Apr 2018	Talk	N

Bruce Hungate	Taxon-specific microbial carbon use efficiency	European Geosciences Meeting	1 Apr 2018	Poster	Y
Victor Leshyk	Accurate Passion	European Geosciences Meeting	18 Apr 2018	Talk	N
Christina Schädel	Introduction to Permafrost	Arctic Encounter Symposium	20 Apr 2018	Talk	Y
Andrew Richardson	Phenology, climate change and ecosystem processes: What we are learning from the PhenoCam network	University of New Mexico, Department of Biology, Albuquerque NM	1 May 2018	Talk	Y
Andrew Richardson	Phenology, climate change and ecosystem processes: What we are learning from the PhenoCam network	USDA-ARS, Jornada Experimental Range, Las Cruces NM	1 May 2018	Talk	Y
Andrew Richardson	Effects of experimental treatments on vegetation phenology at SPRUCE. May 2018.	Effects of experimental treatments on vegetation phenology at SPRUCE. SPRUCE Project "All Hands" Meeting, Minneapolis MN	1 May 2018	Talk	Y
Benjamin Koch, Rebecca Fritz, Michaela Hayer, Egbert Schwartz, Bruce Hungate, Jane Marks	A Gut Feeling: The Effects of Leaf Litter Type on the Active Microbiome of a Shredding Caddisfly	Annual Meeting of the Society for Freshwater Science, Detroit, MI	1 May 2018	Talk	N
Jane Marks, Mary Power, Jennifer Pett-Ridge, Xavier Mayali, Peter Weber, Bruce Hungate	Can a Small Blue-Green Endosymbiont Fix Enough Nitrogen to Support a Four Level Food Chain?	Annual Meeting of the Society for Freshwater Science, Detroit, MI	1 May 2018	Talk	N
Michaela Hayer, Rebecca Fritz, Bruce Hungate, Benjamin Koch, Egbert Schwartz, Jane Marks	Bacterial and Fungal Species Respond Differently to Leaf Litter Type: Applications of Quantitative Stable Isotope Probing (qSIP)	Annual Meeting of the Society for Freshwater Science, Detroit, MI	1 May 2018	Talk	N
Courtney Roush, Meghan Schrik, Benjamin Koch, Egbert Schwartz, Paul Dijkstra, Jane Marks, Adam Wymore	Rates and Pathways of Element Loss from Leaf Litter: The Microbes	Annual Meeting of the Society for Freshwater Science, Detroit, MI	1 May 2018	Poster	N
Jack Torresdal, Rebecca Fritz, Jane Marks, Benjamin Koch	Quantifying Biotic and Abiotic Habitat Features to Guide Repatriation of Southwestern Native Fishes	Annual Meeting of the Society for Freshwater Science, Detroit, MI	1 May 2018	Poster	N
Meghan Schrik, Benjamin Koch, Courtney Roush, Adam Siders, Jane Marks	Rates and Pathways of Element Loss from Leaf Litter: Invertebrate Assemblages	Annual Meeting of the Society for Freshwater Science, Detroit, MI	1 May 2018	Poster	N
Zasha Welsh, Rachel Mudry, Alan Gruetzmacher, Rebecca Fritz, Adam Siders, Jane Marks	Rates and Pathways of Element Loss from Leaf Litter: Large Detritivores	Annual Meeting of the Society for Freshwater Science, Detroit, MI	1 May 2018	Poster	N
George Koch	Water-soil-microbe interactions in unsaturated systems	Biosphere 2	16 May 2018	Talk	Y
Victor Leshyk, Benjamin Koch, Bruce, Hungate, Jane Marks	A Virtual Diorama of Nutrient Spiralling	Annual Meeting of the Society for Freshwater Science, Detroit, MI	20 May 2018	Talk	Y

Hewitt, R. E., H. Genet, D. L. Taylor, A. D. McGuire, and M.C. Mack	The effects of deep nitrogen and root traits on Arctic vegetation dynamics	Polar 2018	21 Jun 2018	Talk	Y
Michelle Mack	Identifying Indicators of State Change and Forecasting Future Vulnerability in Alaskan Boreal Ecosystems	SERDP, Department of Defense, Webinar.	29 Jun 2018	Talk	Y
Paul Dijkstra	Frontiers in Microbial Ecology: growth and metabolism in soil	Biogeomon	17 Aug 2018	Talk	Y
Paul Dijkstra	Studying Microbial Stress in Soil Ecosystems	Multi-omics for microbiomes: EMSL Integration	17 Aug 2018	poster	N
Paul Dijkstra	Microbial Biosynthesis and Energy Metabolism in Soils: New Insights from Position-Specific Metabolic Modeling and Next Generation Sequencing	SSSA	17 Nov 2018	Talk	Y
Marguerite Mauritz	Tundra ecosystem respiration is dominated by recent C inputs, masking contributions from old and more decomposed substrates	AGU Fall Meeting	1 Dec 2018	Poster	N
Paul Dijkstra	Myth of maintenance and other metabolic memes – What do we really know about microbial metabolism?	LLNL	17 Dec 2018	Talk	Y
Paul Dijkstra	Limited roles for microbial communities in restoration of sagebrush ecosystems after cheatgrass invasion in the Western US	SERDP	17 Dec 2018	Poster	Y