

KAREN E. FREY

Professor

Graduate School of Geography, Clark University
Worcester, Massachusetts 01610
Phone: (508) 793-7209; Email: kfrey@clarku.edu
<https://wordpress.clarku.edu/kfrey/>

RESEARCH INTERESTS

Climate and Global Environmental Change, Polar Climate Change, Cryospheric Responses and Feedbacks to Climate, Land-Ocean Linkages, Hydrology and Biogeochemistry of Rivers/Estuaries, Permafrost Hydrology and Vegetation Dynamics, Sea Ice and Ecosystem Responses to Sea Ice Variability, Remote Sensing and Geospatial Analysis.

EDUCATION

Ph.D., Geography (2005)

Department of Geography, University of California, Los Angeles: Los Angeles, California

Dissertation title: *Establishing a baseline for West Siberia in scenarios of global change: Climate, land cover and stream biogeochemistry*; Committee members: Laurence Smith (chair), Glen MacDonald, Marilyn Raphael, Steven Margulis

M.A., Geography (2000)

Department of Geography, University of California, Los Angeles: Los Angeles, California

Thesis title: *Controls on Eurasian coastal sea ice formation, melt onset and breakup from ERS scatterometry: Regional contrasts and effects of river influx*; Committee members: Laurence Smith (chair), Glen MacDonald, Yongkang Xue

A.B. magna cum laude in Geological Sciences and with distinction in all subjects (1998)

Department of Earth & Atmospheric Sciences, Cornell University: Ithaca, New York

Honors thesis title: *Measurements of topography using dual-frequency interferometric SAR*; Advisor: Bryan Isacks

PROFESSIONAL EXPERIENCE

Professor, Graduate School of Geography, Clark University (2020–present)

Research Professor, George Perkins Marsh Institute, Clark University (2020–present)

Associate Director, Graduate School of Geography, Clark University (2018–2021)

Associate Professor, Graduate School of Geography, Clark University (2013–2020)

Research Associate Professor, George Perkins Marsh Institute, Clark University (2013–2020)

Assistant Professor, Graduate School of Geography, Clark University (2007–2013)

Research Assistant Professor, George Perkins Marsh Institute, Clark University (2007–2013)

Visiting Scientist, Woods Hole Research Center, now Woodwell Climate Research Center (Sep 2010 – Jan 2011)

Visiting position while on sabbatical leave from Clark University

Assistant Research Scientist, Department of Physical Sciences, Virginia Institute of Marine Science (2006–2007)

Visiting Assistant Professor, Department of Geology, The College of William and Mary (2006–2007)

Research Assistant, Department of Geography, UCLA

Impacts of climate warming on West Siberian peatlands (Summer 2001, Fall 2003 – Summer 2004)

Observations of Eurasian coastal sea ice with satellite-borne radar scatterometry (Fall 1998 – Summer 2000)

Teaching Assistant, Department of Geography, UCLA

Glacier Environments of California's High Sierra (Summer 2003, Summer 2004)

Introduction to Geographic Information Systems (Spring 2001, Summer 2002)

Advanced Geographic Information Systems (Spring 2001)

Research Assistant, Department of Earth & Atmospheric Sciences, Cornell University

Measurements of topography in N. Chile using interferometric synthetic aperture radar (Summer 1997 – Fall 1998)

FELLOWSHIPS AND GRANTS

Grants Awarded (2007–present): \$20,087,421 total; \$3,045,602 awarded directly to Frey (\$953,342 as indirect costs to Clark University)

NASA Carbon Cycle Science (2021 – 2024)

\$870,765

“Remote sensing of river carbon fluxes to the ocean” with A. Stubbins (Lead PI, Northeastern University), K. Frey (co-PI, Clark University), E. Beighley (co-I, Northeastern University), R. Spencer (co-PI, Florida State University), and C. Griffin (co-PI, University of Virginia). Frey portion: \$73,510.

NSF Office of Polar Programs, Arctic Observing Network (AON) Program (2019 – 2024)

\$4,197,688

“Collaborative Research: The Distributed Biological Observatory (DBO)-A Change Detection Array in the Pacific Arctic Region” with J. Grebmeier (Lead PI, University of Maryland Center for Environmental Science), K. Frey (PI, Clark University), L. Cooper (co-PI, University of Maryland Center for Environmental Science), and S. Moore (PI, University of Washington). Frey portion: \$571,649.

NSF Office of Polar Programs, Arctic Observing Network (AON) Program (2017 – 2020)

\$1,234,941

“Collaborative Research: The Distributed Biological Observatory (DBO)-A Change Detection Array in the Pacific Arctic Region” with J. Grebmeier (Lead PI, Chesapeake Biological Laboratory), K. Frey (PI, Clark University), R. Pickart (PI, Woods Hole Oceanographic Institution), L. Cooper (Chesapeake Biological Laboratory), S. Moore (PI, NMML/NOAA), and K. Stafford (PI, University of Washington). Frey portion: \$199,217.

NASA Interdisciplinary Research in Earth Science Program (2014 – 2018)

\$1,394,855

“Observing and Understanding the Impacts of a Thinning and Retreating Sea Ice Cover on Light Propagation, Primary Productivity, and Biogeochemistry in the Pacific Arctic Region” with K. Frey (Lead PI, Clark University), D. Perovich (co-PI, ERDC-CRREL), C. Polashenski (co-I, ERDC-CRREL), B. Light (co-PI, University of Washington), and J. Comiso (co-PI, NASA GSFC). Frey portion: \$313,722.

US Office of Naval Research, Arctic and Global Prediction Program (2013 – 2018)

\$642,610

“Developing Remote Sensing Capabilities for Meter-Scale Sea Ice Properties” with C. Polashenski (Lead PI, ERDC-CRREL), K. Frey (co-PI, Clark University), E. Deeb (co-PI, ERDC-CRREL), and D. Perovich (co-PI, ERDC-CRREL). Frey portion: \$158,598.

NSF Office of Polar Programs, Arctic Observing Network Program (2012 – 2018)

\$2,304,973

“Collaborative Research: The Distributed Biological Observatory (DBO) – A Change Detection Array in the Pacific Arctic Region” with J. Grebmeier (Lead PI, Chesapeake Biological Laboratory), K. Frey (PI, Clark University), R. Pickart (PI, Woods Hole Oceanographic Institution), L. Cooper (Chesapeake Biological Laboratory), and S. Moore (PI, NMML/NOAA). Frey portion: \$201,016.

NSF Office of Polar Programs, Arctic Natural Sciences Program (2012 – 2017)

\$943,326

“Collaborative Research: Investigating the Influence of Sea-Surface Variability on Ice Sheet Mass Balance and Outlet Glacier Behavior using Records from Disko Bugt, West Greenland” with S. Das (Lead PI, Woods Hole Oceanographic Institution), K. Frey (PI, Clark University), M. Evans (PI, Wheaton College), and B. Smith (PI, University of Washington). Frey portion: \$184,872.

US Bureau of Ocean Energy Management and NOAA/PMEL (2012 – 2014)

\$36,980

“Satellite Observations of Sea Ice Variability and Primary Production in the Pacific Sector of the Arctic Ocean” with K. Frey (Lead PI, Clark University). Frey portion: \$36,980.

NSF Office of Polar Programs, Arctic Observing Network Program (2011 – 2017)

\$1,830,728

“Collaborative Research: Toward a Circumarctic Lakes Observation Network (CALON): Multiscale observations of lacustrine systems” with K. Hinkel (Lead PI, University of Cincinnati), K. Frey (PI, Clark University), C. Arp (PI, University of Alaska Fairbanks), and J. Lenters (PI, University of Nebraska-Lincoln). Frey portion: \$76,231.

NSF Office of Polar Programs, Arctic Research and Education Program (2011 – 2017)

\$2,635,000

“Collaborative Research: The Polaris Project II: Amplifying the Impact” with R. Holmes (Lead PI, Woods Hole Research Center), K. Frey (PI, Clark University), S. Zimov (PI, Northeast Science Station, Russia), A. Bunn (PI, Western Washington University), J. Schade (PI, St. Olaf College), and W. Sobczak (PI, College of the Holy Cross). Frey portion: \$93,320. Project Website: <http://www.thepolarisproject.org>.

- NSF Office of Polar Programs, Arctic System Science Program (2011 – 2015)** **\$586,970**
“Collaborative Research: Pacific-Arctic Carbon Synthesis – Transformations, Fluxes, and Budgets” with J. Mathis (Lead PI, University of Alaska, Fairbanks), K. Frey (PI, Clark University), N. Bates (PI, Bermuda Institute of Ocean Sciences), and L. Juranek (PI, University of Washington). Frey portion: \$102,573.
- NASA Cryospheric Sciences Program (2010 – 2015)** **\$736,101**
“The Potential Impacts of Sea Ice Decline and River Discharge Shifts on Biological Productivity in the Chukchi and Beaufort Seas” with K. Frey (Lead PI, Clark University), L. Cooper (co-PI, Chesapeake Biological Laboratory), and J. Grebmeier (co-PI, Chesapeake Biological Laboratory). Frey portion: \$457,799.
- NASA Interdisciplinary Research in Earth Science Program (2010 – 2014)** **\$707,112**
“An Interdisciplinary Study of Recent Ice Sheet Melt, Sea Ice Decline, and Enhanced Ocean Biological Productivity Along the Amundsen Coast, West Antarctica” with S. Das (Lead PI, Woods Hole Oceanographic Institution), K. Frey (co-PI, Clark University), and M. Evans (co-PI, Wheaton College). Frey portion: \$218,046.
- NSF Office of Polar Programs, Arctic Research Support and Logistics Program (2010 – 2012)** **\$21,697**
“Collaborative Research: A Workshop to Draft the Implementation Plan for the Arctic in Rapid Transition (ART) Initiative” with J. Mathis (Lead PI, University of Alaska, Fairbanks) and K. Frey (PI, Clark University). Frey portion: \$3,876.
 Project Website: <http://www.iarc.uaf.edu/ART/>.
- NSF Office of Polar Programs, Arctic Research Support and Logistics Program (2009 – 2010)** **\$47,513**
“Collaborative Research: A Workshop and Science Plan for the Arctic in Rapid Transition (ART) Initiative” with K. Frey (Lead PI, Clark University) and J. Mathis (PI, University of Alaska, Fairbanks). Frey portion: \$9,238.
 Project Website: <http://www.iarc.uaf.edu/ART/>.
- Alaska Satellite Facility Americas ALOS Data Node (2009)** **\$4000 in data**
“InSAR Detection of Icy Permafrost Degradation and Subsequent Land Subsidence in East Siberia” with K. Frey (sole PI, Clark University).
- NSF Office of Polar Programs, Arctic Natural Sciences Program (2007 – 2010)** **\$101,514**
“Impacts of Sea Ice Variability and Polynya Formation on Biological Productivity in the Northern Bering Sea” with K. Frey (sole PI, Clark University). Frey portion: \$101,514.
- NSF International Polar Year and Division of Undergraduate Education (2007 – 2010)** **\$1,611,557**
“Collaborative Research. IPY: The Polaris Project: Rising Stars in the Arctic” with R. Holmes (Lead PI, Woods Hole Research Center), K. Frey (PI, Clark University), S. Zimov (PI, Northeast Science Station, Russia), K. Walter (PI, University of Alaska, Fairbanks), A. Bunn (PI, Western Washington University), S. Chandra (PI, University of Nevada, Reno), J. Schade (PI, St. Olaf College), W. Sobczak (PI, College of the Holy Cross). Frey portion: \$59,441.
 Project Website: <http://www.thepolarisproject.org>.
- Chancellor’s Dissertation Year Fellowship (2004 – 2005)** **\$24,478**
 UCLA, Dept. of Geography. One year of stipend and tuition awarded by the UCLA Graduate Division to students in their final year of graduate school and who are planning to start teaching and research appointments soon after the end of their dissertation fellowship year.
- NSF Office of Polar Programs Grant Supplement (2002 – 2003)** **\$41,042**
 UCLA, Dept. of Geography. Through investigators Laurence Smith, Glen MacDonald, and Andrei Velichko. This study added a component of surface water biogeochemistry to the larger NSF-funded study *“Sensitivity of the West Siberian Lowland to Past and Present Climate.”*
- NASA Earth & Space Science Fellowship (2000 – 2003)** **\$68,000**
 UCLA, Dept. of Geography. Three years of stipend and tuition awarded by the NASA Office of Earth Science for graduate research in global change. Proposal funded was entitled *“Estimation of the Terrestrial Carbon Pool and Hydrological Sensitivity of the West Siberian Lowland.”*
- Geological Society of America Graduate Student Research Grant (2001)** **\$2,400**
 UCLA, Dept. of Geography. Summer support for fieldwork in West Siberia. Proposal was entitled *“Peatland biogeochemistry in the West Siberian Lowland: Implications for potential carbon accumulation.”*

- UCLA Center for European and Eurasian Studies Pre-Dissertation/Dissertation Fellowship (2001)** **\$2,100**
 UCLA, Dept. of Geography. Summer support for fieldwork in West Siberia. Proposal was entitled “*Peatland biogeochemistry in the West Siberian Lowland of Arctic Russia: Implications for the global carbon cycle.*”
- NASA/New York Space Grant (1996)** **\$4,000**
 Cornell University, Dept. of Earth & Atmospheric Sciences. Research using Geostationary Observational Environmental Satellite images to estimate the probability of precipitation over the Northern and Southern Patagonia Icefields.
- GE Fund, Faculty for the Future Undergraduate Researcher Fellowship (1995)** **\$4,000**
 Syracuse University, Dept. of Physics. Research using the Palomar Observatory Sky Survey to devise a model for the geometry of the Milky Way Galaxy.

HONORS AND AWARDS

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| Outstanding Graduate Teaching Award | Clark University, 2017–2018 |
| Oliver and Dorothy Hayden Junior Faculty Fellowship
<i>For Excellence in Teaching, Scholarship, and University Engagement</i> | Clark University, 2013–2014 |
| George Perkins Marsh Research Enhancement Award | Clark University, Spring 2013 |
| NASA Group Achievement Award | Contributions to the ICESCAPE Program, 2012 |
| US Coast Guard Arctic Service Medal | 21+ days of duty north of the Arctic Circle, June–July 2011 |
| Young Scientist Scholarship <i>Arctic Science Summit Week</i> | Scholarship to attend ASSW (Seoul, Korea), 2011 |
| US Coast Guard Arctic Service Medal | 21+ days of duty north of the Arctic Circle, June–July 2010 |
| Hodgkins Junior Faculty Award
<i>For Excellence in Research and Teaching</i> | Clark University, 2009–2010 |
| Young Scientist Scholarship <i>Arctic Science Summit Week</i> | Scholarship to attend ASSW (Bergen, Norway), 2009 |
| Exceptional Merit Award | Clark University, 2008 |
| Young Scientist Scholarship <i>Arctic Science Summit Week</i> | Scholarship to attend ASSW (Hanover, NH), 2007 |
| Young Scientist Scholarship <i>Int. Conference on Arctic Research Planning</i> | Scholarship to attend ICARP (Potsdam, Germany), 2006 |
| Young Scientist Scholarship <i>Int. Conference on Arctic Research Planning</i> | Scholarship to attend ICARP (Copenhagen, DK), 2005 |
| Graduate Research Publication Award <i>Most outstanding biophysical pub.</i> | UCLA Department of Geography, 2005 |
| The Society of Woman Geographers Award | Cash prize of \$9500, 2004–2005 |
| Graduate Research Publication Award <i>Most outstanding biophysical pub.</i> | UCLA Department of Geography, 2004 |
| Graduate Research Publication Award <i>Most outstanding biophysical pub.</i> | UCLA Department of Geography, 2003 |
| NASA Earth & Space Science Fellow | Fellowship for graduate stipend/tuition, 2000–2003 |
| Outstanding Student Paper Award <i>Ocean Sciences Section</i> | American Geophysical Union, 2000 |
| Phi Beta Kappa | Cornell University, inducted 1998 |
| Chester Buchanan Award <i>Most outstanding senior in Earth & Atm. Sciences</i> | Cornell University, 1998 |
| Phi Kappa Phi | Cornell University, inducted 1998 |
| Golden Key National Honor Society | Cornell University, inducted 1998 |
| Dean’s List | Cornell University, 1994–1997 |

PUBLICATIONS: BOOKS, REFEREED

- Grebmeier, J. M., J. C. Prisco, R. D’Arrigo, H. W. Ducklow, C. Fleener, **K. E. Frey** & C. Rosa (2011), National Research Council of the National Academies Report: *Frontiers in Understanding Climate Change and Polar Ecosystems*. The National Academies Press: Washington D.C., 84 pp.
- *Nature News* Highlight, 12 January 2011 (vol. 469, p. 145)

PUBLICATIONS: BOOK CHAPTERS, REFEREED

- Michel, C., T. R. Christensen, M. K. Sejr, K. Langley, T. Kikuchi, J. -E., Tremblay, **K. E. Frey** & F. J. Parmentier (in press), Ecosystem Impacts and Feedbacks to Climate. In *2021 Arctic Council/Arctic Monitoring and Assessment Programme (AMAP) Climate Issues of Concern*.
- Gaffey, C., A. Bhardwaj, **K. E. Frey** & L. Estes (in review), Polar and cryosphere remote sensing using sUAS. In *sUAS Applications in Geography*. Springer.
- Frey, K. E.**, J. A. Maslanik, J. Clement Kinney & W. Maslowski (2014), Recent variability in sea ice cover, age, and

thickness in the Pacific Arctic Region. In: Grebmeier, J. M. & W. Maslowski (eds.) *The Pacific Arctic Region: ecosystem status and trends in a rapidly changing environment*. Springer: Dordrecht, pp. 31–64.

PUBLICATIONS: ANNUAL REPORT CONTRIBUTIONS, REFEREED

12. **Frey, K. E.**, J. C. Comiso, L. W. Cooper, J. M. Grebmeier, & L. V. Stock (in review), Arctic Ocean Primary Productivity: The Response of Marine Algae to Climate Warming and Sea Ice Decline, In *Arctic Report Card 2020*, <http://www.arctic.noaa.gov/reportcard>.
11. **Frey, K. E.**, J. C. Comiso, L. W. Cooper, J. M. Grebmeier, & L. V. Stock (2020), Arctic Ocean Primary Productivity: The Response of Marine Algae to Climate Warming and Sea Ice Decline, In *Arctic Report Card 2020*, <http://www.arctic.noaa.gov/reportcard>.
 - Featured by NOAA's *ClimateWatch Magazine*, December 2020 (<https://www.climate.gov/news-features/featured-images/sea-ice-withers-while-phytoplankton-blooms-arctic>)
 - Quoted in *Scientific American* and *Inside Climate News* for 2020 Arctic Report Card contributions
10. **Frey, K. E.**, J. C. Comiso, L. W. Cooper, J. M. Grebmeier, & L. V. Stock (2019), Arctic Ocean Primary Productivity: The Response of Marine Algae to Climate Warming and Sea Ice Decline, In *Arctic Report Card 2019*, <http://www.arctic.noaa.gov/reportcard>.
 - Interviewed by *PBS NewsHour*, *Science News*, and *Global News (Canada)* for 2019 Arctic Report Card contributions
9. **Frey, K. E.**, J. C. Comiso, L. W. Cooper, J. M. Grebmeier, & L. V. Stock (2018), Arctic Ocean Primary Productivity: The Response of Marine Algae to Climate Warming and Sea Ice Decline, In *Arctic Report Card 2018*, <http://www.arctic.noaa.gov/reportcard>.
 - Interviewed by NPR's *On Point*, *PBS NewsHour*, *Axios*, and *Bloomberg BNA* for 2018 Arctic Report Card contributions
8. **Frey, K. E.**, J. C. Comiso, L. W. Cooper, L. B. Eisner, R. R. Grading, J. M. Grebmeier, & J. -É. Tremblay (2017), Arctic Ocean Primary Productivity, In *Arctic Report Card 2017*, <http://www.arctic.noaa.gov/reportcard>.
7. **Frey, K. E.**, J. C. Comiso, L. W. Cooper, R. R. Grading, J. M. Grebmeier, & J. -É. Tremblay (2016), Arctic Ocean Primary Productivity, In *Arctic Report Card 2016*, <http://www.arctic.noaa.gov/reportcard>.
 - Featured by NOAA's *ClimateWatch Magazine*, February 2017 (<https://www.climate.gov/news-features/featured-images/ocean-plant-growth-blooms-springtime-arctic-sea-ice-thins>)
6. **Frey, K. E.**, J. C. Comiso, L. W. Cooper, R. R. Grading, J. M. Grebmeier, & J. -É. Tremblay (2015), Arctic Ocean Primary Productivity, In *Arctic Report Card 2015*, <http://www.arctic.noaa.gov/reportcard>.
5. **Frey, K. E.**, J. C. Comiso, L. W. Cooper, R. R. Grading, J. M. Grebmeier, S. -I. Saitoh & J. -É. Tremblay (2014), Arctic Ocean Primary Productivity, In *Arctic Report Card 2014*, <http://www.arctic.noaa.gov/reportcard>.
4. **Frey, K. E.**, K. R. Arrigo & W. J. Williams (2012), Arctic Ocean Primary Productivity and Nutrient Distributions. In *Arctic Report Card 2012*, <http://www.arctic.noaa.gov/reportcard>.
 - Featured by NOAA's *ClimateWatch Magazine*, December 2012 (<https://www.climate.gov/news-features/features/melt-pond-skylights-enable-massive-under-ice-bloom-arctic>)
3. Grebmeier, J. M., R. S. Pickart, C. J. Ashjian, L. W. Cooper, **K. E. Frey**, J. He, M. Itoh, M. Kedra, T. Kikuchi, S. E. Moore, J. Nelson & S. Vagle (2012), Ecosystem Observations in Barrow Canyon: A Focus for the International Distributed Biological Observatory. In *Arctic Report Card 2012*, <http://www.arctic.noaa.gov/reportcard>.
2. **Frey, K. E.** & S. E. Moore (2012), [The Arctic] Arctic Ocean Marine Ecosystem Response to Changing Sea Ice and Ocean Conditions. In *State of the Climate in 2011, Bulletin of the American Meteorological Society* 93 (7), S146–S147.
1. **Frey, K. E.**, K. R. Arrigo & R. R. Grading (2011), Arctic Ocean Primary Productivity. In *Arctic Report Card 2011*, <http://www.arctic.noaa.gov/reportcard>.
 - Featured by NOAA's *ClimateWatch Magazine*, December 2011 (<https://www.climate.gov/news-features/features/sea-ice-declines-boost-arctic-phytoplankton-productivity>)

65. Santiago, M. I.* & **K. E. Frey** (2021), Assessment of empirical and semi-analytical algorithms using MODIS-Aqua for representing in-situ chromophoric dissolved organic matter (CDOM) in the Bering, Chukchi, and western Beaufort Seas of the Pacific Arctic region. *Remote Sensing*, 13(18), 3673, <https://doi.org/10.3390/rs13183673> (14 pp.).
64. Wegner Koch, C., L. W. Cooper, R. J. Woodland, J. M. Grebmeier, **K. E. Frey**, R. Stimmelmayer, C. Magen & T. A. Brown (2021), Female Pacific walrus (*Odobenus rosmarus divergens*) show greater partitioning of sea ice organic carbon than males: Evidence from ice algae trophic markers. *PLoS ONE*, 16(8), e0255686, <https://doi.org/10.1371/journal.pone.0255686> (24 pp.).
63. Stolpmann, L., C. Coch, A. Morgenstern, J. Boike, M. Fritz, U. Herzsuh, K. Stoof-Leichsenring, Y. Dvornikov, B. Heim, J. Lenz, A. Larsen, K. Walter Anthony, B. Jones, **K. E. Frey** & G. Grosse (2021), First Pan-Arctic Assessment of Dissolved Organic Carbon in Lakes of the Permafrost Region. *Biogeosciences*, 18, 3917–3936, <https://doi.org/10.5194/bg-18-3917-2021> (20 pp.).
62. York, A. V.* , **K. E. Frey**, S. Jamali & S. B. Das (2020), Change points detected in decadal and seasonal trends of outlet glacier terminus positions across central West Greenland. *Remote Sensing* 12(21), 3651, <https://doi.org/10.3390/rs12213651> (25 pp.).
61. York, A. V.* , **K. E. Frey** & L. N. C. Young* (2020), Changes at the Edge: Trends in sea ice, ocean temperature, and ocean color at the Northwest Atlantic/Southern Arctic interface. *Annals of Glaciology*, 1–15, <https://doi.org/10.1017/aog.2020.66> (15 pp.).
60. Wegner Koch, C., L. W. Cooper, J. M. Grebmeier, **K. E. Frey** & T. A. Brown (2020), Ice algae resource utilization by benthic macro- and megafaunal communities on the Pacific Arctic shelf determined through lipid biomarker analysis. *Marine Ecology Progress Series* 651, 23–43, <https://doi.org/10.3354/meps13476> (21 pp.).
59. Wegner Koch, C. E., L. W. Cooper, T. A. Brown, C. L. Lalande, **K. E. Frey** & J. M. Grebmeier (2020), Seasonal latitudinal variations in sea ice algae deposition in the Northern Bering and Chukchi Seas determined by algal biomarkers. *PLoS ONE* 15(4): e0231178. <https://doi.org/10.1371/journal.pone.0231178> (31 pp.).
58. Grebmeier, J. M., S. E. Moore, L. W. Cooper & **K. E. Frey** (2019), The Distributed Biological Observatory: A Change Detection Array in the Pacific Arctic. *Deep Sea Research Part II: Topical Studies in Oceanography* 162, <https://doi.org/10.1016/j.dsr2.2019.05.005> (7 pp.).
57. Sturdivant, E. J.** , **K. E. Frey** & F. Urban (2019), Snowmelt detection from QuikSCAT and ASCAT satellite radar scatterometer data across the Alaskan North Slope. *GIScience and Remote Sensing* 56(1), <https://doi.org/10.1080/15481603.2018.1493045> (22 pp.).
56. Grebmeier, J. M., **K. E. Frey**, L. W. Cooper & M. Kędra (2018), Trends in Benthic Macrofaunal Populations, Seasonal Sea Ice Persistence, and Bottom Water Temperatures in the Bering Strait Region. *Oceanography* 31(2), <https://doi.org/10.5670/oceanog.2018.224> (17 pp.).
55. Neeley, A. R.* , L. A. Harris, **K. E. Frey** (2018), Unraveling phytoplankton community dynamics in the northern Chukchi and western Beaufort seas amid climate change. *Geophysical Research Letters* 45, <https://doi.org/10.1029/2018GL077684> (9 pp.). (Cover Feature Article)
54. Griffin, C. G.* , J. W. McClelland, **K. E. Frey**, G. Fiske & R. M. Holmes (2018), Quantifying CDOM and DOC in Major Arctic Rivers During Ice-Free Conditions using Landsat TM and ETM+ Data. *Remote Sensing of Environment* 209, 395–409 (15 pp.).
53. Odell, S. D.* , A. Bebbington, **K. E. Frey** (2018), Mining and Climate Change: A Review and Framework for Analysis. *The Extractive Industries and Society* 5, 201–214, <https://doi.org/10.1016/j.exis.2017.12.004> (14 pp.).
52. Shake, K. L.* , **K. E. Frey**, D. G. Martin & P. E. Steinberg (2017), (Un)frozen spaces: Exploring the role of sea ice in the marine socio-legal spaces of the Bering and Beaufort seas. *Journal of Borderland Studies*. doi:10.1080/08865655.2017.1340847 (15 pp.).

51. Hinkel, K. M., C. D. Arp, A. Townsend-Small, **K. E. Frey** (2017), Can Deep Groundwater Influx be Detected from the Geochemistry of Thermokarst Lakes in Arctic Alaska? *Permafrost and Periglacial Processes*, doi:10.1002/ppp.1895 (6 pp.).
50. Strong, A. L., K. E. Lowry, Z. W. Brown, M. M. Mills, G. L. van Dijken, R. S. Pickart, L. W. Cooper, **K. E. Frey**, R. Benner, C. G. Fichot, J. T. Mathis, N. R. Bates & K. R. Arrigo (2016), Mass balance estimates of carbon export in different water masses of the Chukchi Sea shelf. *Deep Sea Research Part II: Topical Studies in Oceanography*, <http://dx.doi.org/10.1016/j.dsr2.2016.05.003> (12 pp.).
49. Piper, M., C. Benitez-Nelson, **K. E. Frey**, M. Mills & S. Pal (2016), Dissolved and particulate phosphorus distributions and elemental stoichiometry throughout the Chukchi Sea. *Deep Sea Research Part II: Topical Studies in Oceanography*, <http://dx.doi.org/10.1016/j.dsr2.2016.05.009i> (12 pp.).
48. Logvinova, C. L. **, **K. E. Frey** & L. W. Cooper (2016), The role of sea ice melt in the distribution of chromophoric dissolved organic matter in the Chukchi and Beaufort seas. *Deep Sea Research Part II: Topical Studies in Oceanography*, <http://dx.doi.org/10.1016/j.dsr2.2016.04.017i> (15 pp.).
47. Cooper, L. W., **K. E. Frey**, C. L. Logvinova**, D. M. Biasatti & J. M. Grebmeier (2016), Variations in the proportions of melted sea ice and runoff in surface waters of the Chukchi Sea: A retrospective analysis, 1990–2012, and analysis of the implications of melted sea ice in an under-ice bloom. *Deep Sea Research Part II: Topical Studies in Oceanography*, <http://dx.doi.org/10.1016/j.dsr2.2016.04.014> (8 pp.).
46. Schade, J. D., E. C. Seybold, T. Drake, W. V. Sobczak, **K. E. Frey**, R. M. Holmes & N. Zimov (2016), Variation in summer nitrogen and phosphorus uptake among Siberian headwater streams. *Polar Research* 35, 24571, <http://dx.doi.org/10.3402/polar.v35.24571> (10 pp.).
45. **Frey, K. E.**, W. V. Sobczak, P. J. Mann & R. M. Holmes (2016), Optical properties and bioavailability of dissolved organic matter along a flow-path continuum from soil pore waters to the Kolyma River mainstem, East Siberia. *Biogeosciences* 13, 2279–2290, doi:10.5194/bg-13-2279-2016 (12 pp.).
44. Ray, G. C., G. L. Hufford, J. E. Overland, I. Krupnik, J. McCormick-Ray, **K. E. Frey** & E. Labunski (2016), Decadal Bering Sea Seascape Change: Consequences for Pacific Walrus and Indigenous Hunters. *Ecological Applications* 26, 24–41, doi:10.1890/15-0430 (18 pp.).
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PUBLICATIONS: EDITED VOLUMES

Grebmeier, J. M., S. E. Moore, L. W. Cooper & **K. E. Frey**, eds. (2019), *The Distributed Biological Observatory: A Change Detection Array in the Pacific Arctic Region*. Deep Sea Research Part II: Topical Studies in Oceanography, Volume 162, 218 pp.

PUBLICATIONS: OTHER, NON-REFEREED

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11. Pickart, R. S., G. W. K. Moore, T. J. Weingartner, S. L. Danielson & **K. E. Frey** (2013), Physical Drivers of the Chukchi, Beaufort, and Northern Bering Seas. *Interagency Arctic Research Policy Committee (IARPC) white paper for conceptual ecosystem model discussion/workshop at the White House*, Washington DC, April 2013.
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3. **Frey, K. E.** (2005), Establishing a baseline for West Siberia in scenarios of global change: Climate, land cover and stream biogeochemistry. *Doctoral dissertation*, 237 pp., University of California, Los Angeles.
2. **Frey, K. E.** (2000), Controls on Eurasian coastal sea ice formation, melt onset, and breakup from ERS scatterometry: Regional contrasts and effects of river influx. *Masters thesis*, 67 pp., University of California, Los Angeles.
1. **Frey, K. E.** (1998), Measurements of topography using dual-frequency interferometric SAR. *Senior honors thesis*, 68 pp., Cornell University.

PUBLICATIONS: IN REVIEW/IN PREPARATION

*Ph.D. student author, **M.S./M.A. student author, ***B.A. student author

Clement Kinney, J., W. Maslowski, R. Osinski, Y. Lee, C. Goethel, **K. E. Frey** & A. Craig (in revision), On the variability of the Bering Sea Cold Pool and implications for the biophysical environment.

Frey, K. E., S. L. Berman^{***}, C. G. Griffin^{*}, R. M. Holmes & N. Zimov (in prep.), Carbon storage in thermokarst lake waters near Cherskiy, Northeast Siberia.

Frey, K. E., L. N. C. Young^{*}, J. C. Comiso, L. V. Stock, J. M. Grebmeier & L. W. Cooper (in prep.), Trends in sea ice cover, sea surface temperature, and chlorophyll biomass across a marine distributed biological observatory in the Pacific Arctic region.

Frey, K. E. & B. Light (in prep.), Light transmittance through melt-season sea ice in the Chukchi and Beaufort seas.

Gaffey, C. B.^{*}, **K. E. Frey**, L. W. Cooper & J. M. Grebmeier (in review), Phytoplankton bloom stage estimated from chlorophyll pigments suggests delayed summer production in low sea ice years in the northern Bering Sea.

Griffin, C. G.^{*}, **K. E. Frey**, R. M. Holmes & J. W. McClelland (in review), Decadal-scale dissolved organic matter concentrations and fluxes across the pan-Arctic from satellite remote sensing.

Himmelberger, A.^{***}, **K. E. Frey** & F. Sangermano (in revision), Applying Landscape Fragmentation Analysis to Icescape Environments: Potential Impacts for the Pacific Walrus.

Kurek M. R., **K. E. Frey**, F. Guillemette, D. C. Podgorski, A. Townsend-Small, C. D. Arp, A. M. Kellerman & R. G. M. Spencer (in revision), Trapped Under Ice: Seasonal and spatial dynamics of dissolved organic matter compositions in tundra lakes.

Light, B., **K. E. Frey** & R. Carns (in prep.), Radiative transfer modeling to estimate the impacts of light transmittance through Arctic sea ice on upper ocean heating.

Young, L. N. C., **K. E. Frey** & J. Rogan (in prep.), Satellite-based observations of sea ice melt ponding across the Distributed Biological Observatory in the Pacific Arctic region

INVITED SEMINARS AND PRESENTATIONS

Florida State University: Alpine & Polar Biogeochemistry Seminar (March 5, 2021)
Brown University: Arctic Seminar (October 19, 2019)
Polar Marine Science Gordon Research Conference: Lucca (Barga), Italy; Discussion Leader/Presenter (March 19, 2019)
Interagency Arctic Research Policy Committee (IARPC) Collaborations (March 21, 2018)
Coastal & Estuarine Research Federation (CERF) 24th Biennial Conference: Providence, RI (November 8, 2017)
Panelist at the Wheaton Summit for Women in STEM: Wheaton College, Norton MA (April 8, 2017)
Clark University Climate Change Teach-In (March 23, 2016)
Synthesis of Arctic Research (SOAR) Science Workshop: Anchorage, Alaska (March 14, 2012)
Distributed Biological Observatory Workshop/Pacific Arctic Group Meeting: Sidney, British Columbia (November 15, 2011)
TOS/ASLO/AGU Ocean Sciences Meeting: Portland, Oregon (February 22, 2010)
American Geophysical Union Meeting: San Francisco, California (December 17, 2009)
College of the Holy Cross: Department of Biology (October 27, 2009)
Clark University Board of Trustees (May 1, 2009)
Nobel Peace Prize Forum (Northfield, Minnesota): Honoring the IPCC (March 6–7, 2009)
Carleton College: Department of Biology (March 4, 2009)
Clark University: George Perkins Marsh Institute (February 26, 2009)
University of Massachusetts Amherst: Department of Geosciences (February 20, 2009)
Association of American Geographers Annual Meeting: Boston, Massachusetts (April 16, 2008)
Boston University: Department of Geography and Environment (October 19, 2007)
UNH: Complex Systems Research Center, Institute for the Study of Earth, Oceans, and Space (September 21, 2007)
University of Virginia: Department of Environmental Sciences (February 15, 2007)
World Affairs Council (Norfolk, VA): Great Decisions Lecture on Climate Change (January 20, 2007)
Geological Society of America Annual Meeting: Philadelphia, Pennsylvania (October 24, 2006)
University of California, Irvine: Department of Earth System Science (March 28, 2006)
Virginia Institute of Marine Science: Department of Physical Sciences (March 23, 2006)
Dartmouth College: Department of Earth Sciences (February 23, 2006)
The College of William and Mary: Department of Geology (February 15, 2006)
University of California, Los Angeles: Department of Geography (April 29, 2005)

SELECTED CONFERENCE PRESENTATIONS

^{*}Ph.D. student author, ^{**}M.S./M.A. student author, ^{***}B.A. student author

Grebmeier, J. M., L. W. Cooper, C. L. Goethel, C. W. Koch, **K. E. Frey** & S. E. Moore. Ecosystem Changes in the Pacific Arctic: A Decade into the Distributed Biological Observatory Approach. *2021 Alaska Marine Science Symposium*. 26–28 January 2021.

Cooper, L., J. Grebmeier, R. Cooper, C. Gaffey, C. Goethel, J. Maisch, S. Sandy, P. Shipton, **K. E. Frey**, S. Danielson & K. Iken. Late Season Observations in the Northern Bering and Chukchi Seas: Initial results from an October 2020 research cruise. *2021 Alaska Marine Science Symposium*. 26–28 January 2021.

Frey, K. E., B. Light, L. W. Cooper & J. M. Grebmeier. Light transmittance and potential solar heating of the ocean water column following record low sea ice extents across the Distributed Biological Observatory in the Pacific Arctic Region. *2020 Polar Technology Conference*. Boulder, Colorado, 10–12 March 2020.

Frey, K. E., B. Light, A. R. Neeley, L. W. Cooper & J. M. Grebmeier. Light transmittance and potential solar heating of the ocean water column following record low sea ice extents across the Distributed Biological Observatory in the Pacific Arctic Region. *AGU Ocean Sciences Meeting 2020*. San Diego, California, 16–21 February 2020.

Young, L. N. C.^{*}, **K. E. Frey** & M. T. Kavanaugh. Phytoplankton Community Structure across a Distributed Biological Observatory in the Pacific Arctic Region. *AGU Ocean Sciences Meeting 2020*. San Diego, California, 16–21 February 2020.

Frey, K. E., M. I. Santiago^{*}, L. N. C. Young^{*}, J. M. Grebmeier & L. W. Cooper. Light transmittance through the ocean water column following record low sea ice extents across a Distributed Biological Observatory in the Pacific Arctic Region. *2019 Arctic Science Summit Week*. Arkhangelsk, Russia, 22–30 May 2019.

- Himmelberger, A.**, **K. E. Frey** & F. Sangermano. Investigating the Fragmentation of Pacific Walrus Sea-Ice Habitat in the Wainwright and Saint Lawrence Island Regions of Alaska using Landsat Satellite Data. *2019 Association of American Geographers Annual Meeting*. Washington, DC, 6–10 April 2019.
- Goethel, C. L., L. M. Swam, J. M. Grebmeier, L. W. Cooper & **K. E. Frey**. Tracking benthic bivalve population shifts: Changes in recruitment and dominant size classes of *Macoma calcaria* and *Nuculana sp.* in the northern Bering Sea from 1998–2015. *Polar Marine Science Gordon Research Conference*. Lucca (Barga), Italy, 17–22 March 2019.
- Goethel, C. L., L. M. Swam, J. M. Grebmeier, L. W. Cooper & **K. E. Frey**. Tracking benthic bivalve population shifts: Changes in recruitment and dominant size classes of *Macoma calcaria* and *Nuculana sp.* in the northern Bering Sea from 1998–2015. *2019 Alaska Marine Science Symposium*. Anchorage, Alaska, 28 January – 1 February 2019.
- Frey, K. E.**, M. I. Santiago*, L. N. C. Young*, J. M. Grebmeier, L. W. Cooper. Light transmittance through the ocean water column following record low sea ice extents across a Distributed Biological Observatory in the Pacific Arctic Region. *2018 Fall American Geophysical Union Meeting*. Washington, DC, 10–14 December 2018.
- Santiago, M. I.* , **K. E. Frey**, F. Guillemette, K. L. Shake, J. M. Grebmeier, L. W. Cooper & R. G. Spencer. Multi-year estimates of chromophoric dissolved organic matter (CDOM) distribution in the Pacific Arctic Region. *2018 Fall American Geophysical Union Meeting*. Washington, DC, 10–14 December 2018.
- Young, L. N. C.* & **K. E. Frey**. Analysis of Meltpond Distribution on Sea Ice across a Distributed Biological Observatory in the Pacific Arctic Region using MODIS Satellite Imagery, 2000–2018. *2018 Fall American Geophysical Union Meeting*. Washington, DC, 10–14 December 2018.
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- Frey, K. E.**, C. L. Wood*, L. D. Trusel*, L. W. Cooper & J. M. Grebmeier, Optical properties of ocean waters beneath melt-season first-year sea ice in the Chukchi Sea. *2010 Fall American Geophysical Union Meeting*. San Francisco, California, 13–17 December 2010.
- Griffin, C. G.***, **K. E. Frey**, J. Rogan & R. M. Holmes, Late summer variability of dissolved organic matter in the Kolyma River observed using satellite imagery. *2010 Fall American Geophysical Union Meeting*. San Francisco, California, 13–17 December 2010.
- Denfeld, B. A. **, **K. E. Frey**, E. B. Bulygina, T. Drake, R. M. Holmes, J. D. Schade, W. V. Sobczak & N. Zimov, Carbon processing in the Kolyma River Watershed and the role it plays in CO₂ outgassing. *2010 Fall American Geophysical Union Meeting*. San Francisco, California, 13–17 December 2010.
- Zapatka, B. **, **K. E. Frey**, K. M. Barrett & J. Rogan, Using aerial and satellite-borne radar data and ground-based measurements to assess soil moisture characteristics in the Anaktuvuk River Fire, Alaska. *2010 Fall American Geophysical Union Meeting*. San Francisco, California, 13–17 December 2010.
- Wegner, C., A. Forest, M. Forwick, **K. E. Frey**, J. T. Mathis, C. Michel, A. Nikolopoulos, M. O'Regan, I. Peeken & M. Reigstad, Arctic in Rapid Transition (ART): Integrating priorities for Arctic marine science over the next decade. *2010 Fall American Geophysical Union Meeting*. San Francisco, California, 13–17 December 2010.
- Polashenski, C., D. K. Perovich, K. Claffey, **K. E. Frey**, L. D. Trusel* & C. Wood*, The fresh meltwater in the sea ice system. *2010 Fall American Geophysical Union Meeting*. San Francisco, California, 13–17 December 2010.
- Chandra, S., J. Heslop***, W. V. Sobczak, J. D. Schade, V. Spektor, R. M. Holmes, A. G. Bunn, E. B. Bulygina, K. M. Walter Anthony, **K. E. Frey**, N. Zimov & S. A. Zimov, Nutrient limitation of a thermokarst lake and large river ecosystem in the Kolyma River basin (Russia). *2010 Fall American Geophysical Union Meeting*. San Francisco, California, 13–17 December 2010.
- Heslop, J.***, S. Chandra, W. V. Sobczak, V. Spektor, A. Davydova, R. M. Holmes, E. B. Bulygina, J. D. Schade, **K. E. Frey**, A. G. Bunn, K. M. Walter Anthony, S. A. Zimov & N. Zimov, Quantifying Carbon Bioavailability in Northeast Siberian Soils. *2010 Fall American Geophysical Union Meeting*. San Francisco, California, 13–17 December 2010.
- Grebmeier, J. M., L. W. Cooper, **K. E. Frey** & S. E. Moore, Pacific Arctic Sector: Biological and ecosystem response to climate warming. *Second International Symposium on Arctic Research*. Tokyo, Japan, 7–9 December 2010.

Das, S., **K. Frey** & I. Joughin, Ruminations on the history and role of sea-surface variability in West Antarctic Ice Sheet (WAIS) behavior. *2010 West Antarctic Ice Sheet Workshop*. Raystown, PA, 22–25 September 2010.

Criscitello, A.* , S. Das, B. Medley, I. Joughin, H. Conway, M. Evans, **K. Frey**, Physical and chemical stratigraphy of snow pits on the West Antarctic Ice Sheet: Preliminary implications for sea-ice reconstruction. *2010 West Antarctic Ice Sheet Workshop*. Raystown, PA, 22–25 September 2010.

Panday, P. K.* & **K. E. Frey**, Detection of the timing and intensity of snowmelt in the Hindu Kush-Himalaya using QuikSCAT (2000–2008). *2010 Association of American Geographers Meeting*. Washington, DC, 14–18 April 2010.

Denfeld, B. A.** & **K. E. Frey**, Impacts of watershed characteristics on the biogeochemistry of the Kolyma River basin, Northeast Siberia. *2010 Association of American Geographers Meeting*. Washington, DC, 14–18 April 2010.

Griffin, C. G.***, **K. E. Frey** & J. R. Rogan, Modeling dissolved organic matter in northeastern Siberian lakes and rivers using Landsat TM and ETM+ satellite imagery. *2010 Association of American Geographers Meeting*. Washington, DC, 14–18 April 2010.

Frey, K. E., J. Mathis, C. Michel, A. Nikolopoulos, M. O'Regan, M. Reigstad & C. Wegner, The Arctic in Rapid Transition (ART) Initiative: Integrating Priorities for Arctic Marine Science Over the Next Decade. *2010 State of the Arctic Meeting*. Miami, Florida, 16–19 March 2010.

Moore, S. E., J. M. Grebmeier, J. E. Overland, **K. E. Frey** & R. Gradinger, Linking Biology to Physics in an Arctic Ocean Observing System. *2010 State of the Arctic Meeting*. Miami, Florida, 16–19 March 2010.

Denfeld, B. A.***, **K. E. Frey**, E. B. Bulygina, A. Bunn, S. Chandra, S. Davydov, R. M. Holmes, J. Schade, W. Sobczak, V. Spektor & S. Zimov, Impacts of Watershed Characteristics on the Biogeochemistry of the Kolyma River Basin, Northeast Siberia. *2010 State of the Arctic Meeting*. Miami, Florida, 16–19 March 2010.

Drake, T.***, E. Seybold***, J. Schade, E. Bulygina, A. Bunn, S. Chandra, S. Davydov, **K. Frey**, R. Holmes, W. Sobczak, V. Spektor & S. Zimov, Transient Storage, Discharge, and Nutrient Uptake in Streams of the Kolyma River Basin. *2010 State of the Arctic Meeting*. Miami, Florida, 16–19 March 2010.

Griffin, C. G.***, **K. E. Frey**, E. B. Bulygina, A. Bunn, S. Chandra, S. Davydov, R. M. Holmes, J. Schade, W. Sobczak & V. Spektor, Modeling Dissolved Organic Matter in Northeastern Siberian Lakes and Rivers Using Landsat TM and ETM+ Satellite Imagery. *2010 State of the Arctic Meeting*. Miami, Florida, 16–19 March 2010

Heslop, J.***, V. Spektor, N. Torgovkin***, S. Chandra, R. Holmes, E. Bulygina, A. Bunn, **K. Frey**, J. Schade, W. Sobczak, S. Zimov, N. Zimov & S. Davydov. Comparison of Three Permafrost Profiles along a Small Subwatershed in North Siberia. *2010 State of the Arctic Meeting*. Miami, Florida, 16–19 March 2010.

Hough, M. A.***, **K. Frey**, W. Sobczak, A. Bunn, E. Bulygina, S. Chandra, S. Davydov, R. Holmes, J. Schade, V. Spektor & S. Zimov, Potential Impacts of Permafrost Degradation on Carbon Storage of Peat Soils in the Kolyma River Basin, East Siberia. *2010 State of the Arctic Meeting*. Miami, Florida, 16–19 March 2010.

Seybold, E.***, T. Drake***, J. Schade, E. Bulygina, A. Bunn, S. Chandra, S. Davydov, **K. Frey**, R. Holmes, W. Sobczak, V. Spektor & S. Zimov, Assessing Biogeochemical Cycling and Transient Storage of Surface Water in Eastern Siberian Streams Using Short-Term Solute Additions. *2010 State of the Arctic Meeting*. Miami, Florida, 16–19 March 2010.

Spektor, V., E. Bulygina, A. Bunn, S. Chandra, S. Davydov, **K. Frey**, R. Holmes, J. Schade, W. Sobczak & A. Falina***, On Genesis of the Lower Kolyma Edoma Based on New AMS 14C Dates from Duvanny Yar. *2010 State of the Arctic Meeting*. Miami, Florida, 16–19 March 2010.

Zapatka, B. J.***, & **K. E. Frey**, Using Landsat and Radar Satellite Data to Assess Burn Severity of Two Fires in East Siberia Using a Differenced Normalized Burn Ratio Approach. *2010 State of the Arctic Meeting*. Miami, Florida, 16–19 March 2010.

INVITED: Frey, K. E., L. W. Cooper, J. M. Grebmeier & P. K. Panday*, Impacts of recent sea ice variability on biological productivity in the Pacific Arctic sector. *2010 Ocean Sciences Meeting*. Portland, Oregon, 22–26 February 2010.

Grebmeier, J. M., S. E. Moore, **K. E. Frey**, R. J. Nelson, L. W. Cooper, The Pacific Arctic sector: Biological and ecosystem response to climate warming. *2010 Ocean Sciences Meeting*. Portland, Oregon, 22–26 February 2010.

INVITED: Frey, K. E. Impacts of permafrost degradation on the riverine delivery of organic matter, inorganic nutrients, and major ions to the Arctic Ocean. *2009 Fall American Geophysical Union Meeting*. San Francisco, California, 14–18 December 2009.

Frey, K. E., E. B. Bulygina, A. Bunn, S. Chandra, S. Davydov, R. M. Holmes, J. Schade, W. Sobczak, V. Spektor & S. Zimov, Ultraviolet-visible absorption spectra of chromophoric dissolved organic matter (CDOM) in waters throughout the Kolyma River basin, East Siberia. *2009 Fall American Geophysical Union Meeting*. San Francisco, California, 14–18 December 2009.

Bulygina, E. B., S. Davydov, A. Davydova, **K. Frey**, L. Russell-Roy**, A. Bunn, S. Chandra, J. Schade, W. Sobczak, V. Spektor, S. Zimov & R. M. Holmes, Application of absorption spectrophotometry to the study of the seasonal dynamics of dissolved organic matter in Arctic streams. *2009 Fall American Geophysical Union Meeting*. San Francisco, California, 14–18 December 2009.

Schade, J. D., E. Seybold***, T. Drake***, K. Bulygina, A. Bunn, S. Chandra, S. Davydov, **K. Frey**, R. M. Holmes, W. Sobczak, V. Spektor & S. Zimov, Assessing biogeochemical cycling and transient storage of surface water in eastern Siberia using short-term solute additions. *2009 Fall American Geophysical Union Meeting*. San Francisco, California, 14–18 December 2009.

Sobczak, W. V., E. Bulygina, A. Bunn, S. Chandra, **K. Frey**, R. M. Holmes, J. Schade, V. Spektor, N. Zimov & S. Zimov, Bioavailability of organic matter in aquatic environments throughout Siberia's Kolyma River watershed during summer baseflow. *2009 Fall American Geophysical Union Meeting*. San Francisco, California, 14–18 December 2009.

Bozeman, M.**, **K. Frey**, R. Eastman & J. Rogan, Greenland ice sheet melt dynamics revealed from Seasonal Trend Analysis of QuikSCAT image time series. *The Arctic Freshwater Budget International Symposium*, Nuuk, Greenland, 25–27 August 2009.

Frey, K. E. Impacts of terrestrial permafrost degradation on biogeochemical fluxes to the Arctic Ocean. *2009 Arctic Science Summit Week Symposium*, Bergen, Norway, 23–28 March 2009.

Frey, K. E., L. W. Cooper, J. M. Grebmeier & P. K. Panday*, Impacts of recent sea ice decline on biological productivity in the northern Bering and Chukchi Seas. *2009 Arctic Science Summit Week Symposium*, Bergen, Norway, 23–28 March 2009.

Grebmeier, J. M., L. W. Cooper, **K. E. Frey**, M. Janout & J. E. Lovvorn, Organic carbon export and benthic population dynamics with changing ice conditions in the northern Bering Sea. *2009 Arctic Science Summit Week Symposium*, Bergen, Norway, 23–28 March 2009.

Bozeman, M.**, R. Eastman & **K. Frey**, Satellite-derived QuikSCAT radar scatterometer time series of Greenland ice sheet melt (2000–2007). *2009 Association of American Geographers Meeting*. Las Vegas, Nevada, 22–27 March 2009.

Panday, P. K.* , H. N. Bulley, U. Haritashya, **K. Frey** & J. Rogan, Supra-glacial lake classification in the Sagarmatha region of Nepal Himalaya. *2009 Association of American Geographers Meeting*. Las Vegas, Nevada, 22–27 March 2009.

Cooper, L. W., M. Janout, **K. E. Frey**, R. Pirtle-Levy, J. M. Grebmeier, & J. R. Lovvorn, Progression of the spring bloom in the northern Bering Sea and transmission of particulates to the sea floor. *Alaska Marine Science Symposium*, Anchorage, Alaska, 19–23 January 2009.

Frey, K. E., L. W. Cooper & J. M. Grebmeier, Recent trends in sea ice-associated phytoplankton blooms in the northern Bering and Chukchi Seas. *2008 Fall American Geophysical Union Meeting*. San Francisco, California, 15–19 December 2008.

Holmes, R. M., J., Beld, E. Bulygina, A. Bunn, S. Chandra, **K. Frey**, J. Schade, V. Spektor, W. Sobczak, K. Walter & S. Zimov, The Polaris Project: Rising Stars in the Arctic. *2008 Fall American Geophysical Union Meeting*. San Francisco, California, 15–19 December 2008.

Willis, K. S.***, K. R. Abbott***, E. Bulygina, **K. E. Frey**, R. M. Holmes & J. D. Schade, Biogeochemical characteristics of Siberia's Kolyma River watershed in relation to climate warming and permafrost degradation. *2008 Fall American Geophysical Union Meeting*. San Francisco, California, 15–19 December 2008.

Cooper, L. W., M. Janout, J. M. Grebmeier, **K. E. Frey**, R. Pirtle-Levy & J. R. Lovvorn, Progression of the spring bloom in the northern Bering Sea and transmission of particulates to the sea floor. *2008 ASLO Ocean Sciences Meeting*, Orlando, Florida, 2–7 March 2008.

INVITED: Frey, K. E., L. W. Cooper & J. M. Grebmeier, A shift in the northern Bering Sea carbon sink: Linkages between spring phytoplankton blooms and seasonal sea ice retreat. *2008 Association of American Geographers Meeting*. Boston, Massachusetts, 15–19 April 2008.

Frey, K. E., L. W. Cooper & J. M. Grebmeier, Satellite-derived distribution of surface chlorophyll biomass and its relation to variability in sea ice cover in the northern Bering Sea. *2007 Fall American Geophysical Union Meeting*. San Francisco, California, 10–14 December 2007.

Frey, K. E., L. W. Cooper & J. M. Grebmeier, Impacts of sea ice variability on biological productivity in the northern Bering Sea. *2007 Arctic Science Summit Week Symposium*. Hanover, New Hampshire, 14–20 March 2007.

INVITED: Frey, K. E. & L. C. Smith, Impacts of warming on carbon cycling in northern peatlands. *2006 Geological Society of America Annual Meeting*. Philadelphia, Pennsylvania, 22–25 October 2006.

Frey, K. E., D. I. Siegel & L. C. Smith, Effects of permafrost degradation on the river transport of solutes to the Kara Sea. *2005 Fall American Geophysical Union Meeting*. San Francisco, California, 5–9 December 2005.

Frey, K. E., L. C. Smith & D. I. Siegel, Predicted increases in river transport of carbon and solutes from West Siberia to the Arctic Ocean. *Second International Conference on Arctic Research Planning*. Copenhagen, Denmark, 10–12 November 2005.

Frey, K. E. Field-based research in West Siberia 1999–2001: Logistics and lessons learned. *NSF Russian American Initiative for Land-Shelf Environments (RAISE) Workshop for Facilitating U.S. and Russian Research Collaborations in the Arctic*. St. Thomas, U.S. Virgin Islands, 11–16 June 2005.

Frey, K. E. & L. C. Smith, Impacts of warming and permafrost degradation on the export of carbon and solutes from West Siberia to the Arctic Ocean. *3rd Annual NSF Arctic System Science (ARCSS) Freshwater Initiative (FWI) All-Hands Meeting*. Seattle, Washington, 1–3 June 2005

Frey, K. E. & L. C. Smith, Amplified carbon release from vast West Siberian peatlands by 2100. *2004 Fall American Geophysical Union Meeting*. San Francisco, California, 13–17 December 2004.

Frey, K. E. & L. C. Smith, Increased release of carbon from West Siberian peatlands by 2100. *First Symposium for the Earth System Scholars Network (a NASA-sponsored symposium)*. Adelphi, Maryland, 27–29 September 2004.

Frey, K. E. & L. C. Smith, Dissolved organic carbon in peatland watersheds of West Siberia. *34th Annual International Arctic Workshop 2004*. Institute of Arctic & Alpine Research. Boulder, Colorado, 11–13 March 2004.

Frey, K. E., L. C., Smith, G. M. MacDonald, O. Borisova, K. Kremenetski & A. Velichko, Dissolved organic carbon export from West Siberian peatlands. *2002 Fall American Geophysical Union Meeting*. San Francisco, California, 6–10 December 2002.

Frey, K. E., L. C. Smith, G. M. MacDonald, A. Velichko, O. Borisova & K. Kremenetski, Surface water biogeochemistry of West Siberian peatlands and linkages to carbon accumulation and export. *NSF Arctic System Science (ARCSS) Program All Hands Workshop*. Seattle, Washington, 20–23 February 2002.

Frey, K. E., L. C. Smith, G. M. MacDonald, A. A. Velichko, O. K. Borisova & K. V. Kremenetski, Peatland and river water biogeochemistry of the West Siberian Plain. *2001 Fall American Geophysical Union Meeting*. San Francisco, California, 10–14 December 2001.

Frey, K. E., L. C. Smith, G. M. MacDonald, A. Velichko, O. Borisova, K. Kremenetski, Surface water biogeochemistry of West Siberia: Implications for carbon accumulation. *International Field Symposium, West Siberian Peatlands and Carbon Cycle: Past and Present*. Noyabrsk, Russia, 18–22 August 2001.

Frey, K. E., L. C. Smith & D. E. Alsdorf, Observations of Russian coastal sea ice dynamics from temporal ERS scatterometer data. *2000 Fall American Geophysical Union Meeting*. San Francisco, California, 15–19 December 2000.

Frey, K. E., L. C. Smith & D. E. Alsdorf, Effects of arctic Eurasian runoff on coastal sea ice from ERS scatterometry. 1999 Fall American Geophysical Union Meeting. San Francisco, California, 13–17 December 1999.

Frey, K. E., B. L. Isacks, D. E. Alsdorf & J. S. Yu, Measurements of topography using dual-frequency interferometric SAR. 1998 Fall American Geophysical Union Meeting. San Francisco, California, 6–10 December 1998.

FIELD EXPERIENCE

- Summer 2021:** Measurements of biogeochemical and optical parameters onboard the *Canadian Coast Guard Cutter (CCGS) Sir Wilfrid Laurier* icebreaker in the Bering and Chukchi Seas, 2021 Distributed Biological Observatory (DBO) Program
- Summer 2019:** Measurements of biogeochemical and optical parameters onboard the *Canadian Coast Guard Cutter (CCGS) Sir Wilfrid Laurier* icebreaker in the Bering and Chukchi Seas, 2019 Distributed Biological Observatory (DBO) Program
- Summer 2018:** Measurements of biogeochemical and optical parameters onboard the *Canadian Coast Guard Cutter (CCGS) Sir Wilfrid Laurier* icebreaker in the Bering and Chukchi Seas, 2018 Distributed Biological Observatory (DBO) Program
- Summer 2012:** Collecting samples for lake biogeochemical parameters across the Alaskan North Slope (CALON Project)
- Summer 2012:** Sampling for land-ocean carbon/nutrient linkages in Cherskiy, East Siberia (Polaris Project II)
- Summer 2011:** Measurements of biogeochemical parameters and sea ice properties onboard the *US Coast Guard Cutter Healy* icebreaker in the Chukchi and Beaufort Seas, NASA ICESCAPE Mission (HLY1101)
- Summer 2010:** Measurements of biogeochemical parameters and sea ice properties onboard the *US Coast Guard Cutter Healy* icebreaker in the Chukchi and Beaufort Seas, NASA ICESCAPE Mission (HLY1001)
- Summer 2009:** Sampling for land-ocean carbon/nutrient linkages in Cherskiy, East Siberia (Polaris Project I)
- Summer 2008:** Sampling for land-ocean carbon/nutrient linkages in Cherskiy, East Siberia (Polaris Project I)
- Spring 2008:** Measurements of biological productivity and sea ice cover onboard the *US Coast Guard Cutter Healy* icebreaker in the northern Bering Sea (HLY0801)
- Spring 2007:** Measurements of biological productivity and sea ice cover onboard the *US Coast Guard Cutter Healy* icebreaker in the northern Bering Sea (HLY0702)
- Spring 2006:** Measurements of biological productivity and sea ice cover onboard the *US Coast Guard Cutter Healy* icebreaker in the northern Bering Sea (HLY0601)
- Summer 2004:** Teaching assistant for the UCLA field course *Glacier Environments of California's High Sierra*
- Fall 2003:** Hydrological impacts of the October 2003 wildfires in the San Bernardino Mountains, Southern California (Ph.D. candidacy exam, field portion)
- Summer 2003:** Teaching assistant for the UCLA field course *Glacier Environments of California's High Sierra*
- Summer 2001:** Peat coring, stream/river water sampling and ground-truthing of satellite data in southern West Siberia
- Spring 2001:** Field mapping, surveying and ground-truthing of remotely sensed data (LIDAR, InSAR) on the post-jökulhlaup outwash plain of Skeiðarársandur, Iceland
- Summer 2000:** Peat coring, stream/river water sampling and ground-truthing of satellite data in northern West Siberia
- Summer 1999:** Peat coring, stream/river water sampling and ground-truthing of satellite data in central West Siberia
- Summer 1997:** Field mapping in the Precordilleran Andes, Argentina (Cornell University summer field course)

NATIONAL/INTERNATIONAL POLAR SCIENCE PLANNING ACTIVITIES

Positions Held:

- *Marine Working Group Vice Chair (member elected), International Arctic Science Committee (2020–present)*
- *Marine Working Group Member, International Arctic Science Committee (2016–present), one of two US members appointed by the National Academy of Sciences (<http://iasc.info/>)*
- *Diversity, Equity, and Inclusion Mentor, Association of Polar Early Career Scientists (APECS) (2019–present)*
- *International Arctic Science Committee (IASC) Medal Committee (2019–present, Chair 2020–present)*
- *2020 Polar Technology Conference Organizing Committee Member (2019–2020), sponsored by the National Science Foundation and the Arctic Research Consortium of the U.S. (ARCUS)*
- *Interagency Arctic Research Policy Committee (IARPC) Marine Ecosystems Team Member (2016–present), which seeks to further the IARPC 5-year Arctic Research Plan released by the Executive Office of the President in December 2016 (<http://www.iarpccollaborations.org/index.html>)*
- *Science Steering Committee Member, Distributed Biological Observatory Program (2011–present), a change detection array program in the Pacific Arctic marine region (<http://www.arctic.noaa.gov/dbo/>)*

- *The National Academies/National Research Council Committee Member* for Arctic Matters: Understanding How the Arctic is Changing and What it Means for People and Places Around the Globe (2014–2016)
- *Interagency Arctic Research Policy Committee (IARPC) Distributed Biological Observatory (DBO) Team Member* (2012–2016), which will develop a five-year DBO plan for federally sponsored research in the Arctic, bridging 13 agencies, departments, and offices across the federal government
- *UNOLS Arctic Icebreaker Coordinating Committee (AICC) Member* (2009–2016), one of eight elected committee members serving as the liaison group between the NSF, US Coast Guard, and general arctic science community (<http://www.unols.org/committees/aicc/index.html>)
- *Executive Committee Member*, Arctic Ocean Sciences Board Arctic in Rapid Transition Initiative (2009–2014), (<http://www.iarc.uaf.edu/en/ART>)
- *The National Academies/National Research Council Committee Member on the Workshop: Frontiers in Understanding Climate Change and Polar Ecosystems* (2010–2011)
- *Management Committee Member*, Arctic Ocean Sciences Board New Research Generation Project (2008–2009)
- *Roundtable Member*, Arctic Ocean Sciences Board ICARP II Marine Group (2007–2009)

Meeting Session Coordination:

- *Seasonal Sea Ice and Snow Under Change: Using in Situ Measurements, Remote Sensing, and Modeling to Understand Processes and Properties Across Scales*, Fall American Geophysical Union Meeting (Washington DC: December 2018), session co-convener
- *Impacts of Changing Seasonality on Arctic Systems and an Arctic in Rapid Transition*, Fall American Geophysical Union Meeting (San Francisco, California: December 2011), session co-chair
- *Ecosystem Responses to Climate Change: Past, Present and Future*, Arctic Science Summit Week (Seoul, Korea: March 2011), session co-chair
- *Challenges in Arctic System Studies*, State of the Arctic Meeting (Miami, Florida: March 2010), session co-chair
- *Coastal Environments as a link between Land and Sea in the Arctic*, Arctic Science Summit Week (Bergen, Norway: March 2009), session co-chair

Workshop Involvement and Other Science Planning Activities:

- *Arctic Science Summit Week* (Lisbon, Portugal/virtual due to the COVID-19 pandemic: 19–23 March 2021), participant/IASC working group member
- *Arctic Science Summit Week* (Akureyri, Iceland/virtual due to the COVID-19 pandemic: 27 March – 2 April 2020), participant/IASC working group member
- *Distributed Biological Observatory Data Workshop* (Seattle, WA: 22–23 January 2020), participant/plenary presenter
- *Arctic Science Summit Week* (Arkangelsk, Russia: 22–30 May 2019), participant/IASC working group member
- *Synoptic Arctic Survey (SAS) Open Planning Workshop* (Woods Hole, MA: 15 May 2019), participant
- *Arctic Science Summit Week* (Davos, Switzerland: 15–23 June 2018), participant/IASC working group member
- *Arctic Science Summit Week* (Prague, Czech Republic: 31 March – 7 April 2017), participant/IASC working group member
- *Arctic-COLORS (Arctic-COastal Land Ocean inteRactions) Open Community Workshop* (Woods Hole, MA: 28–29 July 2016), invited participant
- *Second Distributed Biological Observatory Data Workshop* (Seattle, WA: 29–31 October 2014), invited participant and plenary presenter
- *Distributed Biological Observatory Data Workshop* (Seattle, WA: 27 February – 1 March 2013), invited participant and plenary presenter
- *Pacific Marine Arctic Regional Synthesis (PacMARS) Workshop* (Seattle, WA: 10–11 December 2012: Sponsored by the North Pacific Research Board), invited participant and plenary presenter
- *Arctic-Boreal Vulnerability Experiment (ABOVE) Workshop* (Boulder, Colorado: 13–15 June 2012: Sponsored by NASA to address recommendations and further evaluate the feasibility of an expanded Arctic-Boreal field-based research experiment), invited participant
- *Synthesis of Arctic Research Science Workshop* (Anchorage, Alaska: 14–16 March 2012: Sponsored by the US Bureau of Ocean Energy Management), invited participant and plenary presenter
- *Distributed Biological Observatory Workshop* (Sidney, British Columbia: 15–16 November 2011: Sponsored by NOAA and the Pacific Arctic Group), invited participant and plenary presenter
- *The Legacy and Lessons of the International Polar Year 2007–2008 Workshop* (Leesburg, Virginia, 15–16 June 2011: Sponsored by the National Academies/National Research Council), invited participant
- *Arctic Science Summit Week* (Seoul, Korea: March 2011), participant
- *Distributed Biological Observatory Workshop* (Seoul, Korea: 27 March 2011), invited participant and plenary presenter

- *Arctic in Rapid Transition Implementation Workshop* (Winnipeg, Canada, 18–20 October 2010: Sponsored by NSF and IASC to help develop an implementation plan that integrates, updates, and develops priorities for internationally-coordinated Arctic Marine Science activities for the next decade), co-organizer and participant
- *Frontiers in Understanding Climate Change and Polar Ecosystems Workshop* (Cambridge, Maryland, 24–25 August 2010: Sponsored by the National Academies/National Research Council), committee member and participant
- *Arctic in Rapid Transition Initiation Workshop* (Fairbanks, Alaska, 7–9 November 2009: Sponsored by NSF, IASC, and IARC to help develop a science plan that integrates, updates, and develops priorities for internationally-coordinated Arctic Marine Science activities for the next decade), co-organizer and participant
- *Bering Strait Environmental Observations Workshop* (Pack Forest, WA, 12–14 May 2009: Sponsored by NSF, NOAA, and AOOS to help specify instrumentation and observation infrastructure that is appropriate to support a cohesive set of marine environmental observation systems in the Bering Strait region), invited participant
- *Biological Response to Reduced Sea Ice in the Pacific Arctic Region Workshop* (Seattle, WA, 6–8 May 2009: Sponsored by NOAA as part of the international Pacific Arctic Group (PAG) post-International Polar Year synthesis effort), invited participant
- *Arctic Science Summit Week* (Bergen, Norway: March 2009), participant
- *Arctic Science Summit Week* (Hanover, New Hampshire: March 2007), participant and plenary presenter
- *Second International Conference on Arctic Research Planning (ICARP II)* (Potsdam, Germany: November 2006), invited participant
- *Second International Conference on Arctic Research Planning (ICARP II)* (Copenhagen, Denmark: November 2005), invited participant
- *Russian American Initiative for Land-Shelf Environments (RAISE) Workshop for Facilitating U.S. and Russian Research Collaborations in the Arctic* (11–16 June 2005, St. Thomas, U.S. Virgin Islands: Sponsored by NSF), invited participant and plenary presenter

SELECTED MEDIA AND PUBLIC OUTREACH

- Quoted in *Scientific American* (<https://www.scientificamerican.com/article/three-signs-a-new-arctic-is-emerging/>, 9 December 2020) and *Inside Climate News* (<https://insideclimatenews.org/news/08122020/annual-report-card-marks-another-disastrous-year-for-the-arctic/>, 8 December 2020) for research contributions to the 2020 Arctic Report Card.
- Interviewed for and quoted in December 2019 for contributions (as a lead author) to the 2019 Arctic Report Card, including *PBS NewsHour* (<https://www.pbs.org/newshour/science/2019-arctic-report-card-warns-of-california-sized-algal-blooms-and-imperiled-livelihoods/>); *Science News* (<https://www.sciencenews.org/article/arctic-report-card-how-poor-environmental-health-affects-everyday-life/>); and *Global News/Canada* (<https://globalnews.ca/news/6277736/arctic-entering-green-climate/>).
- Arctic ecosystem and sea ice research in the Bering Sea highlighted in the *Science News for Students* article “Disappearing sea ice could disrupt Arctic’s food web?” intended for middle school students (<https://www.sciencenewsforstudents.org/article/disappearing-sea-ice-could-disrupt-arctics-food-web>), 14 March 2019; *Science News Educator Guide* (18 page educator guide and student activity guide based on this article and research) was additionally developed and sent to more than 4,000 participating high school teachers to use in their curriculum, 16 March 2019.
- Featured guest on NPR’s *On Point* program (carried by 338 NPR stations nationwide), speaking about Arctic climate change research and the 2018 Arctic Report Card (<https://www.wbur.org/onpoint/2018/12/13/arctic-warming-rapid-unraveling-climate>), 13 December 2018
- Interviewed for and/or quoted in ~34+ national and international media outlets in December 2018 for contributions (as a lead author) to the 2018 Arctic Report Card, including the *Associated Press* (<https://www.apnews.com/0b32aa853aa7417d9e4bba4d2e5893c8>; subsequently picked up by *The Washington Post*, *The New York Times*, *ABC News*, etc.), *PBS NewsHour* (<https://www.pbs.org/newshour/science/the-arctic-is-experiencing-its-most-unprecedented-transition-in-history-heres-why>), *The Atlantic* (<https://www.theatlantic.com/science/archive/2018/12/north-pole-faces-unprecedented-climate-future-nasa-says/577915/>), *The Japan Times* (<https://www.japantimes.co.jp/news/2018/12/12/world/science-health-world/arctics-record-warming-driving-broad-change-environment-noaa-study/#.XDY7NM17m5M>), and *Axios* (<https://www.axios.com/the-arctic-is-unraveling-global-warming-sea-ice-melt-0a0467a2-ad82-4741-8bbe-9e2072b71efc.html>), among others.
- Appointment to the International Arctic Science Committee highlighted in *GoLocalWorcester.com* (<http://www.golocalworcester.com/news/clark-geographer-named-to-international-arctic-science-committee>), 6 April 2017
- Presented Arctic sea ice/marine biology research to all high school students at *Bancroft School* (Worcester, MA), 22 April 2013

- Presented sea ice optics NASA ICESCAPE research for the public with the *American Museum of Natural History* (New York City), 9 April 2013
- The 2012 Arctic Report Card entry, Arctic Ocean Primary Productivity and Nutrient Distributions (Frey et al., 2012), was featured by NOAA's *ClimateWatch Magazine* (December 2012, seen at <http://www.climatewatch.noaa.gov/article/2012/melt-pond-skylights-enable-massive-under-ice-bloom-in-arctic>)
- Presented a talk on Arctic marine biology/biogeochemistry research to high school Environmental Science students at *Milton Academy* (Milton, MA), 25 October 2012
- For contributions to the NOAA 2011 Arctic Report Card, participated in a live webinar and Q&A session with reporters from the *Associated Press*, *Reuters*, *ClimateWire*, etc., which was reported on by *Nature News* (1 December 2011, seen at http://blogs.nature.com/news/2011/12/the_arctics_new_normal_1.html), among multiple other news outlets
- The 2011 Arctic Report Card entry, Arctic Ocean Primary Production (Frey et al., 2011), was featured by NOAA's *ClimateWatch Magazine* (December 2011, seen at <http://www.climatewatch.noaa.gov/article/2011/sea-ice-declines-boost-arctic-phytoplankton-productivity>)
- Published sea ice optics research (Frey et al., 2011) was featured in *Optics & Photonics Focus* magazine (December 2011, seen at <http://www.opfocus.org/index.php?topic=story&v=15&s=7>)
- Featured in a Q&A by the *NASA blog* for participation in the NASA ICESCAPE mission (13 July 2011, seen at http://blogs.nasa.gov/cm/blog/icescape/posts/post_1310624142845.html)
- Interviewed by *Alaska Public Radio* for participation in the NASA ICESCAPE mission (28 June 2011, heard at <http://www.alaskapublic.org/2011/06/28/nasa-wraps-up-icescape-mission/>)
- Interviewed by *Alaska Public Radio* for Distributed Biological Observatory research and participation in Arctic Science Summit Week in Seoul, Korea (14 April 2011, heard at <http://www.alaskapublic.org/2011/04/14/observatory-offers-new-glimpse-of-northern-seas/>)
- NASA-funded West Antarctic research highlighted in the *Worcester Telegram and Gazette* (27 February 2011, seen at <http://www.telegram.com/article/20110227/NEWS/102270486/1101/local>)
- Featured in "Digging the Ice" in the *Worcester Telegram and Gazette* (19 May 2010, seen at <http://www.telegram.com/article/20100519/NEWS/5190419/1101>)
- Photographs of northern Bering Sea walrus published in *Highlights for Children* magazine (April 2010 issue)
- The NSF-funded Polaris Project and Clark University student featured by Andrew Revkin, *The New York Times* (24 July 2009, seen at <http://dotearth.blogs.nytimes.com/2009/07/24/a-postcard-from-the-pleistocene/>)
- The NSF-funded Polaris Project featured by the *Worcester Telegram and Gazette* "College Town" section (26 July 2009, seen at <http://www.telegram.com/article/20090726/NEWS/907260462>)
- Two talks given via satellite to teachers and the general public for "Polar Weekend" at the *Carnegie Museum of Natural History* (Pittsburg, PA) about impacts of Siberian climate warming while in the field in E. Siberia (10/11 July 2009)
- Featured in "On the Job" in the *Worcester Telegram and Gazette* (8 June 2009, seen at <http://www.telegram.com/article/20090608/BUSINESS01/906080334>)
- Featured as "Scientist of the Day" on the *International Polar Year blog* for northern Bering Sea research (March 2009, seen at http://www.ipy.org/index.php?ipy/detail/more_than_frozen_water)
- Research highlighted and interviewed in a four-part *NOVA* special entitled "On Thin Ice in the Bering Sea" (released February 2009, seen at <http://www.pbs.org/wgbh/nova/extremeice/thinice.html>)
- The NSF-funded Polaris Project and Clark University featured in the *Worcester Telegram and Gazette* (December 2008, seen at <http://www.telegram.com/article/20081202/NEWS/812020397>)
- The Polaris Project featured in Clark University's *ClarkNews* magazine (July 2008, seen at <http://libref.clarku.edu/alumni/clarknews/summer08/siberia.cfm>)
- Several photographs of the northern Bering Sea published in multiple *The New York Times* print and online publications (e.g., <http://www.nytimes.com/2008/05/20/science/20count.html?fta=y>)
- Contributed to talks at the *Museum of the Aleutians* to the general public in Unalaska, Alaska presenting research in the northern Bering Sea (March 2008)
- Several photographs of the northern Bering Sea on large-format display at a children's exhibition on Arctic climate change entitled "Polar Perspectives" at the *Liberty Science Museum* in Jersey City, New Jersey (July–November 2007)
- *Geotimes* featured West Siberian carbon research in "Carbon leaching out of Siberian peat" (5 July 2005, seen at http://www.geotimes.org/july05/NN_arcticpeatCO2.html)
- *The Discovery Channel* featured West Siberian carbon research in "Thawing Siberia Triggers Global Warming Alarm" (21 June 2005, seen at <http://dsc.vip.ashb.att.discovery.com/news/briefs/20050620/carbon.html>)

SELECTED COLLABORATIONS WITH CLARK UNIVERSITY MARKETING AND COMMUNICATIONS

- *In 15th Arctic Report Card. Prof. Karen Frey documents changes impacting base of Arctic's food web* (December 10, 2020): <https://clarknow.clarku.edu/2020/12/10/in-15th-arctic-report-card-prof-karen-frey-documents-changes-impacting-base-of-arctics-food-web/>
- *Clark geography researcher experiences a 'changing Arctic' on recent expedition* (November 20, 2020): <https://clarknow.clarku.edu/2020/11/20/clark-geography-researcher-experiences-a-changing-arctic-on-recent-expedition/>
- *Aandishah Tehzeeb Samara '21 investigates the cloudy forecast in the Arctic* (November 9, 2020): <https://clarknow.clarku.edu/2020/11/09/aandishah-tehzeeb-samara-21-investigates-the-cloudy-forecast-in-the-arctic/>
- *Sussman Fund supports graduate scholars' environmental research* (October 27, 2020): <https://clarknow.clarku.edu/2020/10/27/sussman-fund-supports-graduate-scholars-environmental-research/>
- *Sophie Spiliotopoulos helps break the (disappearing) ice on Arctic research trip* (September 19, 2019): <https://clarknow.clarku.edu/2019/09/19/sophie-spiliotopoulos-helps-break-the-disappearing-ice-on-arctic-research-trip/>
- *Geographer Karen Frey joins fellow polar scientists to issue global warning* (December 21, 2018): <https://clarknow.clarku.edu/2018/12/21/geographer-karen-frey-joins-fellow-polar-scientists-to-issue-global-warning/>
- *Study of Arctic algae 'puts a microscope up to climate change'* (October 3, 2018): <https://clarknow.clarku.edu/2018/10/03/study-of-arctic-algae-puts-a-microscope-up-to-climate-change/>
- *National Academy of Sciences appoint Clark geographer to international Arctic group* (April 4, 2017): <https://clarknow.clarku.edu/2017/04/04/national-academy-of-sciences-appoints-clark-geographer-to-international-arctic-group/>
- *Antarctica or bust: Clark's southernmost research* (June 1, 2016): <https://clarknow.clarku.edu/2016/06/01/antarctica-or-bust-clarks-southernmost-research/>
- *Clark geographers' new study projects melting of Antarctic ice shelves will intensify* (October 12, 2015): <https://clarknow.clarku.edu/2015/10/12/clark-geographers-new-study-projects-melting-of-antarctic-ice-shelves-will-intensify/>
- *Clark geographer receives NASA grant to study the impacts of sea-ice thinning and retreat in the Pacific Arctic* (December 29, 2014): <https://clarknow.clarku.edu/2014/12/29/clark-geographer-receives-nasa-grant-to-study-the-impacts-of-sea-ice-thinning-and-retreat-in-the-pacific-arctic/>
- *Clark University geography program earns prestigious Sussman Foundation support for Ph.D. student researchers* (April 4, 2014): <https://clarknow.clarku.edu/2014/04/04/clark-university-geography-program-earns-prestigious-sussman-foundation-support-for-ph-d-student-researchers/>
- *Clark University scientists report first satellite-based quantifications of Antarctic ice sheet surface melt* (December 3, 2013): <https://clarknow.clarku.edu/2013/12/03/clark-university-scientists-report-first-satellite-based-quantifications-of-antarctic-ice-sheet-surface-melt/>
- *Back to the Arctic: Clark University student researchers embark on polar science expeditions* (June 19, 2013): <https://clarknow.clarku.edu/2013/06/19/back-to-the-arctic-clark-university-student-researchers-embark-on-polar-science-expeditions/>
- *Geographer Karen Frey receives Arctic science research grants* (October 16, 2012): <https://clarknow.clarku.edu/2012/10/16/geographer-karen-frey-receives-arctic-science-research-grants/>
- *Back to Siberia! Clark professor and students embark on 'Polaris Project'* (June 27, 2012): <https://clarknow.clarku.edu/2011/12/01/frey-contributes-to-arctic-report-card-joins-live-media-briefing/>
- *ICESCAPE scientists announce stunning discovery under Arctic ice* (June 8, 2012): <https://clarknow.clarku.edu/2012/06/08/icescape-scientists-announce-stunning-discovery-under-arctic-ice/>
- *Frey contributes to Arctic Report Card; joins live media briefing* (December 1, 2011): <https://clarknow.clarku.edu/2012/06/27/back-to-siberia-clark-professor-and-students-embark-on-polaris-project/>
- *Students spending July in Siberia with Polaris Project research team* (July 18, 2011): <https://clarknow.clarku.edu/2011/07/18/students-spending-july-in-siberia-with-polaris-project-research-team/>
- *Clark scientist to lead NASA research on sea ice in Arctic* (April 15, 2011): <https://clarknow.clarku.edu/2011/04/15/clark-scientist-to-lead-nasa-research-on-sea-ice-in-arctic/>
- *Summer in Siberia: Clark research expedition heads for the Arctic* (July 9, 2009): <https://clarknow.clarku.edu/2009/07/09/summer-in-siberia-clark-research-expedition-heads-for-the-arctic/>

PROFESSIONAL AFFILIATIONS

American Association for the Advancement of Science (member, 2007–present)
American Geophysical Union (member, 1997–present)
American Society for Photogrammetry & Remote Sensing (member, 1998–present)
American Association of Geographers (member, 1998–present)

Association of Polar Early Career Scientists (member from 2007)
Coastal & Estuarine Research Federation (member, 2017–present)
Geological Society of America (member, 1997–present)
Permafrost Young Researchers Network (member from 2007)
Society of Woman Geographers (member, 2004–present)

EDITORIAL/REVIEW SERVICE

Positions Held:

Editorial Board Member, *Progress in Environmental Geography* (2021–present)
Guest Editor, *Deep Sea Research Part II: Topical Studies in Oceanography* (2017–2019)
Editorial Board Member, *The Professional Geographer* (2011–2019)

Article, book, and proposal reviews:

American Geophysical Union Monographs, Geophysical Research Letters, Global Biogeochemical Cycles, Global Change Biology, Human Geography, Journal of Geophysical Research-Biogeosciences, Nature, Nature Geoscience, Polar Research, Remote Sensing of Environment, NASA Cryospheric Sciences Program, NASA Earth and Space Science Fellowship Program, NASA Earth Venture Instrument Program, NASA Terrestrial Hydrology Program, NSF Arctic Natural Sciences Program, NSF Arctic Observing Network Program, NSF Arctic System Science Program, NSF Navigating the New Arctic, NSF Office of Polar Programs Postdoctoral Program, NSF Geography and Spatial Science Program

Panelist:

NASA Cryospheric Sciences Branch (February 2014, New Investigator Program)
NSF Office of Polar Programs (May 2010, Arctic Observing Network (AON))
NASA Cryospheric Sciences Branch (April 2010, Earth Venture-1)
NASA Cryospheric Sciences Branch (September 2009, Studies with ICESat and CryoSat-2)
NASA Hydrological Sciences Branch (February 2007, International Polar Year)

UNIVERSITY/DEPARTMENTAL SERVICE

Clark University:

Review of the Graduate School of Geography Director
2021
Clark Labs Implementation Committee
2020–2021
Trustee Development and Alumni Committee
2019–2022
VP of Marketing and Communications Presidential Advisory/Search Committee
Spring/Summer 2020
George Perkins Marsh Institute Steering Committee
2019–2021
2016–2019
2012–2015
Editorial Advisory Board (liaison board between University Marketing and Communications and university faculty)
2018–2019/Chair
2017–2018/Chair
2016–2017
2015–2016
Faculty Mentor/Clark Junior Faculty (Dept. of Chemistry, Dept. of Biology)
2019–2020
2018–2019
2017–2018
2016–2017
Faculty Search Committee: Natural Resources, International Development, Community and Environment (IDCE) Dept.
2017–2018
Geller Award Review Committee
2017–2018
New Faculty Orientation Panelist
September 2008, August 2017
Graduate Board

2016–2017
Climate Change Teach-In (speaker)
March 2016
Research Board
2010–2011
2009–2010
2008–2009
Earth System Science Representative, Environmental Science Steering Committee
2009–2010
2008–2009
Clark University Open House (speaker/participant)
October 2011, April 2011, April 2010
Presidential Scholars Panel on Undergraduate Research (panelist/participant)
April 2009
Traina Presidential Scholars Day (participant and interviewer)
February 2009, February 2008
Clark University Sciences Preview Day (participant and presenter/speaker)
October 2008
Art from the Arctic, Difficult Dialogues Symposium on Climate Change (presenter/panelist)
April 2008
An Inconvenient Truth, Difficult Dialogues Symposium on Climate Change (presenter/panelist)
February 2008
Focus the Nation Teach-In, Difficult Dialogues Symposium on Climate Change (presenter)
January 2008

Clark University, Graduate School of Geography:
Edna Bailey Sussman Fund Graduate Fellowship Review Committee
2021–2022/Chair
2020–2021/Chair (\$82,550 total received in grants + \$50,000 total received in Doctoral Dissertation Fellowships)
2019–2020/Chair (\$76,125 total received in grants)
2018–2019/Chair (\$43,610 total received in grants)
2017–2018/Chair (\$33,310 total received in grants)
2016–2017/Chair (\$21,375 total received in grants)
2015–2016/Chair (\$29,585 total received in grants)
2014–2015/Chair (\$17,380 total received in grants)
2013–2014/Chair (\$15,650 total received in grants)

Diversity, Equity, and Inclusion Committee
Spring 2022
Associate Director and Graduate Advisor
2020–2021
2019–2020
2018–2019
Graduate Studies Committee
2020–2021/Chair
2019–2020/Chair
2018–2019/Chair
2017–2018
Web Committee
2020–2021/Chair
2019–2020/Chair
2018–2019/Chair
2017–2018/Chair
Spring 2017/Chair
Tenure/Promotion Committees
Mark Davidson/Promotion to Full Professor (2020–2021)
Chris Williams/Promotion to Full Professor (2018–2019)
John Rogan/Tenure & Promotion (2008–2009)
Faculty Search Committees
2020–2021 (Earth System Science, tenure-track), Diversity Advocate
2016–2017/Chair (GIScience, tenure-track)

2011–2012 (GIScience, tenure-track)
 Spring 2011 (GIScience, two visiting positions)
 2007–2008 (Earth System Science, tenure-track)

Assistant to the Director Search Committee
 Spring/Summer 2020

Facilitated and organized the filming of five promotional films for the GSG (primary department contact with filmmaker, led interviews, created graphic design elements, and assisted in editing)
 2018–2019 (GSG Overview)
 2017–2018 (HE/UE)
 2015–2016 (ESS/GISci)

Graduate Admissions Committee
 2015–2016
 2013–2014/Chair
 2012–2013/Chair
 2011–2012/Chair
 2010–2011
 2009–2010

Strategic Plan Final Writing Committee
 2012–2013

Undergraduate Studies Committee for Geography and Global Environmental Studies
 Spring 2011

Atwood and Colloquium Committee
 Spring 2011

Earth System Science Undergraduate Major Coordinator
 2009–2010
 2008–2009

Coordinator for Capstone and Research Application Requirements, Geography Undergraduate Major
 2008–2009

COURSES DEVELOPED AND TAUGHT

Typical teaching load in the Graduate School of Geography is four courses per academic year

First-Year Intensive Course: The Arctic in the Anthropocene (GEOG 119)

Clark University: Fall 2016, Fall 2019

The Arctic is currently experiencing some of the most rapid and severe climate change on Earth. Some of the most profound environmental changes currently unfolding are those resulting from climate warming in the Arctic: loss of Arctic sea ice, melting of glaciers/ice caps/ice sheets, thawing of carbon-rich permafrost, extinction of species, among numerous other impacts. This first-year intensive course gives students the opportunity to (a) understand the basic land, atmosphere, ocean, ice and human dimensions of the Arctic and how these components interact with one another; (b) understand recent impacts of climate warming in the Arctic and how these feed back to global processes; (c) learn how to “read”, “write” and “speak” in the context of climate change science, undoubtedly the three most important skills to acquire as a scientists; (d) learn about ongoing Arctic research in the field; and (e) conduct a final product and learn how to construct a quality manuscript based on learned concepts in the field of Arctic Climate Science.

The Arctic in the Anthropocene/Arctic System Science (GEOG 119)

Clark University: Spring 2008, Spring 2009, Spring 2010, Spring 2011, Spring 2012, Fall 2017, Fall 2018, Fall 2020

This undergraduate course focuses on the interfaces of systems in the Arctic, including land-atmosphere-ocean-ice-human interactions. Topics include arctic hydrology, climatology, biogeochemical cycling, permafrost, glacier/ice sheet dynamics, terrestrial and marine ecology, sea ice, physical oceanography, and human-environment interactions. The course also gives students a perspective on arctic climate variability over past, present, and predicted future time scales.

The Climate System and Global Environmental Change (GEOG 263/363)

Clark University: Fall 2008, Fall 2009, Fall 2011, Fall 2012, Spring 2016, Spring 2017, Spring 2018, Spring 2020, Spring 2021, Spring 2022

Serving both upper-level undergraduate and graduate students, this course utilizes an Earth systems approach towards climate science. To this end, this course provides students an understanding of the climate system’s overall response to both external and internal forcings, rather than simply cataloging the Earth’s history of climate change. Earth’s climate history is examined at a range of time scales covering the entire 4.55 billion year period, with particular emphasis on major climate events and changes occurring on a global scale. The first portion of the course focuses on processes controlling *natural* variability of the

Earth's climate system, while the latter portion of the course is geared towards *anthropogenic* climate change. In order to understand, contextualize, and predict the Earth's current and future climate, it is imperative to know the forces that can drive both these natural and anthropogenic climate changes.

Introduction to Geographic Information Science (GEOG 190/390)

Clark University: Fall 2007, Fall 2008

Geographic Information Science (GISci) has revolutionized the way we store, query, and analyze spatial data. In this course, students gain both a working knowledge of the theory and applications of raster and vector based GISci. Class meetings are a combination of both lecture material and laboratory exercises, making extensive use of the Idrisi software developed by Clark Labs and the ArcGIS software developed by Environmental Systems Research Institute (ESRI). Weekly laboratory exercises and a final independent project provide intensive hands-on exposure to GISci software. At the conclusion of this course, students have the ability to independently develop, manage, and complete a GISci project.

The Polaris Project Field Experience for Undergraduates (www.thepolarisproject.org)

Clark University: Summer 2008–2015

Although not an official Clark University course on record, the NSF-funded Polaris Project (taught and led by several scientists, including Frey) has taken undergraduates from multiple institutions across the country to the Northeast Science Station in Cherskiy, East Siberia over the past several summers since 2008. During the annual month-long field expedition to the Siberian Arctic, undergraduate students conduct cutting-edge investigations that advance scientific understanding of the changing Arctic. In particular, students focus on field measurements and laboratory analyses that further understanding of the transport and transformation of carbon and nutrients as they move with water from terrestrial uplands to the Arctic Ocean. Students develop independent field- and laboratory-based projects that they further develop alongside their advisors over subsequent semesters once at home institutions (typically as B.A. honors theses and M.A./M.S. theses).

Applications of Radar Remote Sensing (GEOG 322)

Clark University: Spring 2012

This graduate-level seminar focuses on the applications of satellite-based radar remote sensing to a full suite of Earth Science related fields. Radar remote sensing offers fundamentally different potential applications compared to optical remote sensing owing to its sensitivity to wetness and surface roughness as well as its independence from sunlight and cloud conditions. As such, radar remote sensing lends itself to a variety of fields, including the investigation of forest ecology, land cover/land use, soil moisture, snow and ice, hydrology, geomorphology, oceanography, and urban spaces. This seminar introduces students to both seminal and recent, cutting-edge research in the field of radar remote sensing. Students will additionally focus on independent research projects that will allow them to analyze and apply radar data within their particular fields of interest.

Emerging Issues in Climate Change Science/Controversies in Earth System Science (GEOG 378)

Clark University: Spring 2008, Spring 2009, Spring 2010, Spring 2014, Fall 2016, Fall 2017, Fall 2018, Fall 2020, Spring 2022

This graduate-level seminar examines emerging issues surrounding global climate change and Earth System Science. Climate Change Science is inherently interdisciplinary and processes within this field involve significant interactions between land, atmosphere, ocean, ice, and humans. Specific topics discussed in this seminar include abrupt climate change, biogeochemical cycling, biocomplexity, oscillatory climate phenomena, trace gas exchange, glacier/ice sheet dynamics, sea ice variability, sea level rise, paleoclimate, extreme weather events, and human-induced environmental change. Readings will be focused on the most recent climate literature, including the latest Intergovernmental Panel on Climate Change (IPCC) assessment reports. This seminar not only introduces students to recent, cutting-edge research, but given the sometimes controversial nature of these issues also gives students insight into the process of critically evaluating Climate Change Science studies.

Polar Environmental Change Research (GEOG 396)

Clark University: Spring 2011, Spring 2013, Spring 2016, Spring 2018, Spring 2019

Earth's polar regions are particularly vulnerable to observed and projected shifts in climate and act as harbingers of global change, as these regions are poised to warm more than any other region over the next century. This graduate-level seminar focuses on recent advances in polar environmental change research, providing a system-science approach to understanding land-ocean-atmosphere-ice-human interactions at high latitudes. Students also focus on independent research projects that can be contextualized within existing primary and cutting-edge polar science literature.

GIS in the Environmental Sciences (GEOL 204)

The College of William & Mary: Fall 2006, Spring 2007

This course provides an introduction to Geographic Information Systems (GIS). Emphasis is placed on hands-on application of GIS to create maps, organize and visualize spatial data, and query spatial data to elucidate answers to environmental

questions. Through reading and research, students gain an appreciation and understanding of the theory behind GIS. Through laboratory assignments and research projects, students gain practical working knowledge in the latest GIS technology and the ability to put theory into practice.

STUDENTS ADVISED

Ph.D. Dissertations (Frey as chair)

Anna Zhu, Clark University (Ph.D. in Geography, current)

TBD

Clare Gaffey, Clark University (Ph.D. in Geography, current)

A Multi-Dimensional Spatio-Temporal Analysis to Resolve Novel Fall Primary Production in the Pacific Arctic Region

Luisa Young (co-advised with J. Rogan), Clark University (Ph.D. in Geography, current)

Characterizing Arctic Ocean Sea Ice Environments: from melt ponds to phytoplankton phenology

Melishia Santiago, Clark University (Ph.D. in Geography, 2019)

Observing and Understanding the Impacts of a Thinning and Retreating Sea Ice Cover on Light Propagation and Biogeochemistry in the Pacific Arctic Region

- Currently: College of Natural Sciences Director of Student Success and Diversity, UMass Amherst

Ashley York, Clark University (Ph.D. in Geography, 2019)

Investigating the Influence of Sea-Surface Variability on Ice Sheet Mass Balance and Outlet Glacier Behavior using Ice Core Records from Disko Bugt, West Greenland

- Currently: Lecturer of Geospatial Analysis, Department of Geography, Planning, and Sustainability, Rowan Univ.

Kristen Shake (co-advised with D. Martin), Clark University (Ph.D. in Geography, 2019)

Sociolegal Dynamics of Sea Ice in a Changing Arctic Ocean Environment

- Currently: Regulatory Affairs Manager, Alyeska Pipeline Service Company

Luke Trusel, Clark University (Ph.D. in Geography, 2014)

Quantifying Antarctic Ice Sheet Surface Melt: Recent Dynamics and Future Trajectories

- Currently: Assistant Professor, Department of Geography, Penn State University

Prajjwal Panday, Clark University (Ph.D. in Geography, 2013)

Cryospheric and Hydrological Processes in the Hindu Kush–Himalayan Region: An Assessment of Snowmelt Dynamics, Snowmelt Hydrology, and Multimodel Ensemble Climate Projections

- Currently: Assistant Professor of Environmental Science, Nichols College

Ph.D. Dissertations (Frey as committee member)

Ravi Hanumantha, Clark University (Ph.D. in Environmental Science & Policy/Self-Designed Ph.D., current)

Exploring the Sustainability and Climate-Change Resilience of Water Supply and Wastewater Sanitation in the Mexico City Region

Mara van den Bold, Clark University (Ph.D. in Geography, current)

Greening Energy: The Politics of Wind in Senegal

Helen Rosko, Clark University (Ph.D. in Geography, 2021)

Defining Development's Target: Aiming for Adaptation Subjects in Mali

Scott Odell, Clark University (Ph.D. in Geography, 2020)

Bridge over Troubled Water: Assessing hydrosocial relations among communities, mining companies, and policymakers in Chile

- Currently: Postdoctoral Associate, MIT Environmental Solutions Initiative

Sarah Cooley, Brown University (Ph.D. in Earth, Environmental and Planetary Sciences, 2020)

Understanding Dynamic Arctic Environmental Change using High-Temporal Resolution Satellite Imagery

- Currently: Postdoctoral Scholar, Department of Earth System Science, Stanford University

Dylan Harris, Clark University (Ph.D. in Geography, 2020)

Telling the Story of Climate Change: Cultural Politics and Climate Consciousness

- Currently: Assistant Professor, Department of Geography, University of Colorado, Colorado Springs

Aimee Neeley, University of Maryland Center for Environmental Science (Ph.D. in Marine Science, 2020)

Remote Sensing and Modeling of Primary Production in the Arctic Ocean

- Currently: Senior Research Scientist, NASA GSFC

Claire Griffin, University of Texas at Austin (Ph.D. in Marine Science, 2016)

Dissolved Organic Matter in Major Rivers across the Pan-Arctic from Remote Sensing

- Currently: Postdoctoral Researcher, Department of Environmental Sciences, University of Virginia

Qingling Wu, Clark University (Ph.D. in Geography, 2013)

From Phenomena to Objects: Segmentation of Fuzzy Objects and its Application to Ocean Eddies

- Currently: Research Associate, Department of Geography, University College London

M.A./M.S. Theses (Frey as chair)

Aandishah Samara (co-advised with A. Frazier), Clark University (M.S. in GISci, current)

Satellite-Based Observations of Cloud Cover Responses to Declining Sea Ice in the Pacific Arctic Region

Anela Layugan, Clark University (M.S. in GISci, 2018)

A Change-Point Analysis of Sea Ice Cover in Biologically Productive Areas of the Pacific Arctic Region

- Currently: GIS Analyst, UN Sustainable Development Solutions Network

Warren Scott, Clark University (M.S. in GISci, 2017)

Annual cycles of sea ice, wind and primary productivity in the Cape Bathurst and Saint Lawrence Island Polynyas, 1998–2015

- Currently: Remote Sensing Specialist, RedCastle Resources, Inc.

Nelson Crone, Clark University (M.S. in GISDE, 2015)

Comparison of Sea Ice Classification Techniques using High Resolution WorldView-2 Imagery in the Chukchi and Beaufort Seas

- Currently: GIS Analyst, Susitna Environmental, LLC

Samuel Berman, Clark University (M.S. in GISci, 2015)

Chromophoric Dissolved Organic Matter across a Marine Distributed Biological Observatory in the Pacific Arctic Region

- Currently: Power Market Modeling Team Lead, Enel Group

Emily Sturdivant, Clark University (M.S. in GISci, 2015)

Snowmelt Detection from QuikSCAT and ASCAT Satellite Radar Scatterometer Data across the Alaskan North Slope, 2000–2014

- Currently: Geospatial Research Analyst, Universidad Nacional Autónoma de México

Dylan Broderick, Clark University (M.A. in GISci, 2013)

Below Ground Carbon Storage in the Kolyma River Basin, East Siberia Estimated Through In Situ and Satellite Observations

- Currently: GIS Specialist, Vanasee Hangen Brustlin, Inc. (VHB) Civil Engineering Consulting and Design Firm

Meghan Helmberger, Clark University (M.S. in Environmental Science & Policy, 2013)

Chromophoric Dissolved Organic Matter: A Spatial, Temporal, and Lake Morphological Exploration across the Alaskan North Slope

- Currently: Ph.D. Candidate, Department of Geography, University of Colorado Boulder

Christie Wood Logvinova, Clark University (M.A. in Geography, 2012)

Impacts of a Melting Sea Ice Cover on the Biogeochemistry of the Chukchi and Beaufort Seas

Boyd Zapatka, Clark University (M.A. in GISci, 2012)

Using Aerial and Satellite-Borne Radar Data and Ground-Based Measurements to Assess Soil Moisture Characteristics in the Anaktuvuk River Fire, Alaska

Blaize Denfeld, Clark University (M.A. in GISci, 2011)

Carbon Processing in the Siberian Kolyma River Basin and its Role in CO₂ Evasion from Streams and Rivers

- Currently: Deputy Director, Swedish Infrastructure for Ecosystem Science (SITES)

M.A./M.S. Theses (Frey as committee member)

Katherine Landesman, Clark University (M.S. in GISci, 2017)

Modeling the Vulnerability of Mangrove Forests to Conversion to Aquaculture in Myanmar

Lucas Earl, Clark University (M.S. in GISci, 2015)

Satellite-Derived Glacier Area Change in North Asia: 1985–2014

Michelle Bozeman, Clark University (M.A. in GISci, 2009)

Greenland Ice Sheet Melt Dynamics Revealed from Seasonal Trend Analysis of QuikSCAT Image Time Series

B.A. Senior Honors Theses (Frey as chair)

Emily Heltzel, Clark University (B.A. in Earth System Science, current)

TBD

Aandishah Samara, Clark University (B.A. in Earth System Science, 2021)

Satellite-Based Observations of Cloud Cover Responses to Declining Sea Ice in the Pacific Arctic Region

Sophie Spiliotopoulos, Clark University (B.A. in Geography, 2020)

Spatial Relationships of Chlorophyll-a and Suspended Particulate Matter in the Pacific Arctic through In-Situ and Satellite Data

Shannon Reault, Clark University (B.A. in Earth System Science, 2020)

Is the Bering Sea the New Hotspot of Sea Ice Decline? A Comparative Analysis of First-Year Sea Ice Trends in the Barents and Bering Seas

Jessica Strzempko, Clark University (B.A. in Earth System Science, 2020)
Burn Severity and Vegetation Recovery Analysis for the Anaktuvuk River Fire on the North Slope Tundra of Alaska

Anthony Himmelberger, Clark University (B.A. in Earth System Science, 2019)
Investigating the Fragmentation of Pacific Walrus Sea-Ice Habitat in the St. Lawrence Island and Wainwright Regions of the Bering and Chukchi Seas (Alaska) using Landsat Satellite Data

Anela Layugan, Clark University (B.A. in Earth System Science, 2017)
The Detection of Change Points in Arctic Sea Ice Cover across Different Spatial Scales, Locations, and Seasons

Saraneh Fitzgerald, Clark University (B.A. in Geography, 2017)
A Time Series of Sea Ice Melt Pond Distribution across the Arctic

Warren Scott, Clark University (B.A. in Geography, 2016)
Variability in Sea Ice in the St. Lawrence Island and Cape Bathurst Polynyas in the Pacific Arctic Region

Samuel Berman, Clark University (B.A. in Earth System Science, 2014)
Thermokarst Lake Dissolved Organic Carbon Storage near Cherskiy, Northeast Siberia

Emily Sturdivant, Clark University (B.A. in Geography, 2013)
Detection of Arctic Lake Melt: Spatio-Temporal Variability for Six Lakes across the Alaskan North Slope from QuikSCAT, 2000–2009

Dylan Broderick, Clark University (B.A. in Geography, 2012)
Using Landsat-5 TM and Field Data for Land Cover Classification and Terrestrial Carbon Stock Estimation along the Kolyma River near Cherskiy, Russia

Blaize Denfeld, Clark University (B.A. in Earth System Science/Geography, 2010)
Recent Climate Trends in the Kolyma River Watershed and their Potential Influences on the Carbon Cycle

Claire Griffin, Clark University (B.A. in Geography/Environmental Science, 2010)
Mapping Late Summer Dissolved Organic Matter in the Kolyma River Using Landsat TM and ETM+ Imagery

Boyd Zapatka, Clark University (B.A. in Geography/Environmental Science, 2010)
Burn Scar Recognition in the Boreal Forest near Cherskiy, Russia Using Synthetic Aperture Radar and Landsat TM Data

Sara Coren, The College of William & Mary (B.A. in Geology/Environmental Science, 2007)
Influence of Bedrock Geology on Debris Flow Initiation, Madison County, VA

Laura Sauls, The College of William & Mary (B.A. in Int. Relations/Environmental Studies, 2007)
Green Aid Meets Grassroots Development: Explaining Environmental Aid Flows to Central America since the Rio Earth Summit

B.A. Senior Honors Theses (Frey as committee member)

Lucas Earl, Clark University (B.A. in Geography, 2014)
A Glacier Inventory for North Asia

Lauren Ziemer, Clark University (B.A. in Earth System Science, 2013)
Land Cover and Land Use Change in Massachusetts in the Context of Socio-Economic Development, 1976–2009

Matthew Wolak, The College of William & Mary (B.A. in Biology/Environmental Science, 2007)
Modeling of a Diamondback Terrapin Population in Chesapeake Bay

Clark University LEEP Summer Fellows Advised

Aandishah Samara (Summer 2020; Earth System Science '21)

Clark University NOAA Fellows Advised

Anthony Himmelberger (Summer 2018; Earth System Science '19)
 Sophie Spiliotopoulos (Summer 2018; Geography '20)
 Jess Strzempko (Summer 2018; Earth System Science '20)
 Gina Jenkins (Summer 2013; Environmental Science & Policy '14)
 Emily Sturdivant (Summer 2012; Geography '13)

Clark University Polaris Project Undergraduates Advised (www.thepolarisproject.org/team/students/)

2013: Samuel Berman (Earth System Science, 2014)
 Casey DeMarsico (Geography, 2014)

2012: Samuel Berman (Earth System Science, 2014)
 Dylan Broderick (Geography, 2012)

2011: Dylan Broderick (Geography, 2012)
 Emily Sturdivant (Geography, 2013)

2010: Blaize Denfeld (Earth System Science, 2010)
 Cassandra Volatile-Wood (Earth System Science, 2012)

2009: Blaize Denfeld (Earth System Science, 2010)
 Claire Griffin (Geography, 2010)

2008: Katherine Willis (Environmental Science & Policy, 2008)
Boyd Zapatka (Geography, 2010)

No. Undergraduate Advisees

2007–2008 (6), 2008–2009 (15), 2009–2010 (15), 2010–2011 (7), 2011–2012 (16), 2012–2013 (14), 2013–2014 (9), 2014–2015 (sabbatical), 2015–2016 (1), 2016–2017 (22), 2017–2018 (22), 2018–2019 (20), 2019–2020 (35), 2020–2021 (18)

STUDENT FELLOWSHIPS AND GRANTS SPONSORED

Edna Bailey Sussman Doctoral Dissertation Fellowship (2021) <i>“Characterizing Arctic Ocean Sea Ice Environments: from melt ponds to phytoplankton phenology”</i> in support of Luisa Young’s dissertation writing at Clark University.	\$10,000
Edna Bailey Sussman Fund Graduate Fellowship (2021) <i>“Understanding Drivers of Nitrate Variability in Rivers Across the US with Science on the Fly”</i> in support of Aandishah Samara’s M.S. research at Clark University.	\$7,000
Edna Bailey Sussman Fund Graduate Fellowship (2020) <i>“The Effects of Novel Arctic Algae Double Blooms on Benthic Food Supply”</i> awarded to Clare Gaffey to support her dissertation research at Clark University.	\$8,825
Edna Bailey Sussman Fund Graduate Fellowship (2019) <i>“Impacts of a warming Arctic on marine phytoplankton assemblages”</i> awarded to Luisa Young to support her dissertation research at Clark University.	\$8,000
NSF Doctoral Dissertation Research Improvement Grant (2016–2017) <i>“The Uncertainties of Sea Ice: Socio-Legal Dynamics in a Changing Arctic Oceanscape”</i> awarded to Kristen Shake (with Martin and Frey as co-PIs) to support her dissertation research at Clark University.	\$12,760
Edna Bailey Sussman Fund Graduate Fellowship (2016) <i>“Climate change effects on dissolved organic matter distribution in the Pacific Arctic Region”</i> awarded to Melishia Santiago to support her dissertation research at Clark University.	\$6,775
NASA Earth and Space Science Fellowship (2012–2015) <i>“Antarctic Surface Melting: Intensity, Climatology, and Driving Mechanisms”</i> awarded to Luke Trusel (with Frey as PI) to support his dissertation research at Clark University.	\$90,000
NASA Earth and Space Science Fellowship (2010–2013) <i>“Cryospheric and Hydrological Processes in the Hindu Kush-Himalayan Region: Implications of Climate Change for Snowmelt Hydrology, Seasonal Snow Cover and Glaciated Regions”</i> awarded to Prajjwal Panday (with Frey as PI) to support his dissertation research at Clark University.	\$90,000

— Updated 25 October 2021 —