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Qualifications

Since 2006, my education and work has been focused on studies of the coupled Arctic system. As an observational scientist, my contribution to the collection and processing of fundamental Arctic data sets are being used for climate and weather validation and improvements.

In my current position as a Research Physical Scientist at the National Oceanic and Atmospheric Administration (NOAA), I have developed a number of specialty areas: 1) Arctic ground heat fluxes – a critical component of the surface energy budget, of which spatial and temporal analysis of the ground heat flux demonstrates the impact of the term on Arctic melt, 2) research in ice mitigation strategies for Arctic instrumentation, specifically broadband radiometers, to investigate the impact of data lost in Polar Regions due to harsh weather conditions. Co-leading the De-Icing Comparison Experiment (D-ICE), my research focuses on improvements to radiation instrumentation capturing measurements in harsh Arctic environments, so that the scientific community can better account for discrepancies in the radiative term of the surface energy budget, and 3) Arctic radiation budgets and the collection and processing of climate grade data sets.

I participate in weather and climate research community outreach through in-class/virtual K-12 classroom presentations and mentoring/supervising interns at the NOAA/DSRC. As a recent 2021 winner of the NOAA/OAR Dr. Daniel L. Albritton Outstanding Science Communicator Award, I find it incredibly important to communicate our research with the those outside of the field. I directed, produced and edited a short documentary outlining the construction and deployment of an Atmosphere Surface Flux Station (ASFS) system to the Multi-disciplinary drifting Observatory for the Study of Arctic Climate (MOSAiC) expedition. The purpose of the video was to communicate to the general public and NOAA leadership the monumental task (and success) of deploying and maintaining a system over the Arctic sea-ice for an entire year. During MOSAiC (<https://www.mosaic-expedition.org/>), I was one of the US Coordinators for the expedition, and I facilitated Arctic climate science by coordinating the development and field deployment of remote flux stations to measure all components of the surface energy budget on the sea-ice. Similarly, as US Coordinator, I facilitate surface energy budget science, data science and logistical efforts while participating as a member of the Central Communications Management Unit (CCMU).

I provide support development of web-based tools for presenting information on weather and climate variability through my work as one of the developers of the IASOA website, where we provide observations and data to facilitate both science and services to the scientific community. Additionally, through my work in data science, I have designed and developed an organizational type of metadata, called 'Datagrams' to present information on instrument observations (publication on Datagram can be found here: <https://doi.org/10.1175/BAMS-D-21-0219.1>). The 'Datagram' platform is intended to host technical, mechanical, processing and research specifics to diagrammatically outline the flow of data between the instrument and the end-user. I am also currently supporting the development of a new type of merged data file through the YOPPsiteMIP, whereby data gathered from different types of institutions/organizations/programs/laboratories can be merged together into one file through a new toolkit, easing the challenges observationalists and modelers face when trying to incorporate many types of data into one synthesized research project. This will allow researchers to utilize and compare different types of datasets through one lens, to better expedite the research process.

Education

- 2015-2018 University of Colorado Boulder, CO
M.A. Physical Geography, Arctic Emphasis
Advisor: Mark Serreze (serreze@nsidc.org), Director NSIDC
Thesis: *"Variability of Ground Heat Fluxes at Tiksi Station"*
- 2006-2010 University of Colorado Boulder, CO
B.A.S. Environmental Science, Climate Emphasis
Minor: Atmospheric and Oceanic Science

Professional Experience

- ❖ National Oceanic and Atmospheric Administration (ESRL/PSL/POP)
 - 08 Dec 2019 – present
 - Title: Federal Research Physical Scientist (ZP-1301-3)**
 - Department: Physical Sciences Laboratory (PSL) – Polar Observations & Processes Team
 - Research of the surface energy budget (SEB) on coupled processes in the Arctic
 - Spatial and temporal ground heat flux (GHF) analysis in the Arctic
 - Participation in the study of the closure of the SEB
 - Impact of the GHF term on SEB closure and Arctic melt

- ❖ Cooperative Institute for Research in Environmental Sciences (CIRES) at the National Oceanic and Atmospheric Administration
 - 01 Oct 2017 – 30 Sept 2019
 - Title: Baseline Surface Radiation Data Manager (Associate Scientist II)**
 - Department: Global Monitoring Division (GMD) – Global Radiation Group

- ❖ Cooperative Institute for Research in Environmental Sciences (CIRES) at the National Oceanic and Atmospheric Administration
 - 29 Feb 2012 – 07 Dec 2019
 - Title: Arctic Data Scientist (Associate Scientist II)**
 - Department: Physical Sciences Division (PSD) – Polar Observations & Processes Team
 - Research of the surface energy budget (SEB) on coupled processes in the Arctic
 - Spatial and temporal ground heat flux (GHF) analysis in the Arctic

- ❖ Cooperative Institute for Research in Environmental Sciences (CIRES) at the National Oceanic and Atmospheric Administration
 - 01 Dec 2011 – 29 Feb 2012
 - Title: Professional Research Assistant (Associate Scientist I)**
 - Department: Global Monitoring Division (GMD) – Ozone Water Vapor Group

- ❖ Science and Technology Corp. (STC) at the National Oceanic and Atmospheric Administration
 - 22 Nov 2010 – 30 Nov 2011
 - Title: Ozone Program Research Assistant (Associate Computer Specialist)**
 - Department: Global Monitoring Division (GMD) – Ozone Water Vapor Group

- ❖ Cooperative Institute for Research in Environmental Sciences (CIRES) at the National Oceanic and Atmospheric Administration
 - 10 May 2010 – 19 Nov 2010
 - Title: Temporary Student**
 - Department: National Geophysical Data Center (NDGC)

Professional Activities, Committees & Awards

Science Community Activities:

- Developer of the ARP Virtual Arctic Research Laboratory initiative (2021-2022)
- Producer/Director of [ASFS science documentary](#) short (2021)
- US Coordinator of [MOSAiC](#) Expedition (2019-2020)
- Co-Lead of [De-Ing Experiment](#) (D-ICE) field campaign (2018)
- Facilitator and Coordinator of IASOA portal and scientific Working Groups (2012-2019)
- PI for surface ozone instrumentation at Tiksi and Eureka Arctic observatories (2012-2018)
- Software design and dataset developer for global radiation baseline observatories (2017-2019)
- [BSRN](#) station scientist for NOAA baseline observatories (2017-2019)

Committee Service:

- IT Steering Committee, Physical Sciences Laboratory – Polar Observations and Processes Representative, 2021-present
- Senior Research Council Panel Member, Early-Career Arctic Panel and Presenter, 2021
- Workplace Advisory Committee, Physical Sciences Laboratory - Polar Observations and Processes Representative, 2021-present
- International Arctic Science Committee (IASC), Atmosphere Working Group Secretary, 2019-2021

Scientific Awards:

- NOAA/OAR Dr. Daniel L. Albritton Outstanding Science Communicator Award (2021)
- Selected member for Global Monitoring Division Leadership Training (2019)

Data Management

- Development and creation of Datagrams as a visual metadata product; [published](#) online February 2022, DOI: <https://doi.org/10.1175/BAMS-D-21-0219.1>
 - Development of machine-readable Datagram metadata collection structure and spreadsheet
- Coordination and development of toolkit structure responsible for creating Merged Observatory Data Files (MODF); As part of the Year of Polar Prediction site Model Inter-comparison Project ([YOPPsiteMIP](#))
- Development and creation of machine-readable variable template ingested by the MODF toolkit
 - Guided development of the [H-K Variable Schema Table](#)
- Restructuring of [GML Global Radiation](#) team’s Baseline Observatory data sets
- Restructuring of [PSL](#) Polar Observation and Processes team’s observational data sets
- Central Communications Management Unit (CCMU) for [MOSAiC](#) Expedition
 - Development of database for research participant [profile pages](#)

- Advised and guided IASOA portal data harvesting tools and structure
 - IASOA website and portal maintenance
- Facilitation of the collection of field data sets with NOAA IT and data services
- Manage the processing and archiving of data from a wide range of commercial and research grade sensors
- Development of a web accessible ftp site and browser for data sets with consistent formats, file structures, data transfer, ingest and tools
- Create and develop ingest, reformatting and diagnostic display software with MATLAB programs for Arctic data sets
- Provide data management support and infrastructure for complete data flow processes at Baseline and Arctic field sites
- Proficient in MATLAB, experienced in IDL and R programming
- Skillful in web design, content and functionality
- Drafted and certified observational based data management plans

Field Experience

- 2022 [Study of Precipitation, the Lower Atmosphere and Surface for Hydrometeorology](#) (SPLASH) atmosphere surface flux station (ASFS) troubleshooting and maintenance in Gothic, Colorado; ***research on SEB impacts of precipitation in the East River watershed of the Colorado mountains***
- 2019 Development of [Atmospheric Surface Flux Stations](#) (ASFS) for deployment during the MOSAiC Expedition in the Arctic; ***study of the closure of the SEB over ice***
- 2018 [De-Icing Comparison Experiment](#) (D-ICE) continued (see details below)
- 2017 Co-Lead on the [De-Icing Comparison Experiment](#) (D-ICE) examining ice mitigation techniques for solar radiometer instrumentation in the Arctic at the Barrow Observatory in Alaska; ***research of instrument modifications necessary for Arctic environments***
- 2016 Deployment of surface energy budget flux measurements at the Arctic station of [Alert](#) in Nunavut Territory, Canada; ***research the SEB on coupled processes in the Arctic***
- 2016 Research and technical work on solar radiation instrumentation at the Storm Peak Laboratory in Steamboat Springs, Colorado; ***research of ice mitigation methods on broadband radiometers***
- 2012 Execution and maintenance of surface energy budget flux and ozone measurements at the Arctic station of [Tiksi](#) in Siberia, Russia; ***research the SEB on coupled processes in the Arctic***
- 2012 Installation of surface ozone instrumentation on the Boulder Atmospheric Observatory (BAO) tower in Boulder, Colorado; ***study of surface ozone level profiles in Eastern Colorado***

Technological and Instrumentation Expertise

- Soldering connectors and circuitry
- Tropospheric and surface ozone meters and calibration units
- Dobson Radar ozone profiler
- Turbulent flux sonic anemometers
- Surface radiometers (solar, infrared)
- Meteorological sensors (temperature, humidity, pressure, wind)
- Black carbon aerosol particle aethalometers

- Fluxtower development, installment, and maintenance
- Campbell Scientific data loggers
- ISO Standard surface ozone calibrations
- Solar Radiation Calibration Facility
- Run Hybrid Single Particle Lagrangian Integrated Trajectory (HYSPPLIT) Models
- Research comparative instrument studies on instrument modifications necessary for Arctic environments

Science Coordination & Logistics

- US Coordinator of [MOSAiC](#) Expedition (2019-2020)
 - Coordinated required field training for participants
 - Drafted shipping documentation and customs forms (rail, cargo barge, long-haul trailers)
 - Organized hazardous material shipping, handling, and delivery
 - Coordinated communication for remote field participants
- Organized travel for research participants (charter/military flights, research vessel ships, commercial aircraft)
- Co-Lead of [De-Ing Experiment](#) (D-ICE) field campaign (2018)
 - Coordinated vendor, research institute, and government participation and equipment
 - Drafted shipping documentation forms (cargo flight)
- Purchase card holder; expert in Federal Purchase Order documents

Science Mentoring and Outreach

Mentorship:

- Summer intern (CIRES RECCS Program), Project: Study of Precipitation, the Lower Atmosphere and Surface for Hydrometeorology, 2022
- Spring intern (NOAA Pathways Program), Project: Atmosphere Surface Flux Station PSL article, 2022
- Summer intern (NOAA Pathways Program), Project: Atmosphere Surface Flux Station documentary, 2021
- Fall intern (CIRES research intern), Project: Arctic station processing software development, 2016
- Spring intern (ARP student), Project: Quality Control Visual Checker Arctic Stations, "Frostbyte" video development, 2013

Invited Presenter:

- Saint Mary's Academy High School, Science classrooms, "MOSAiC & Arctic Research", 2022 (virtual)
- Reach the World/Exploring by the Seat of your Pants, "Supplying an Arctic Expedition: MOSAiC", 2020 (virtual)
- Erie Middle School, 8th grade science classrooms, "MOSAiC Expedition", 2020 (in-person)
- NOAA/ESRL/DSRC 8th Grade Science Days, "MOSAiC Expedition", 2020 (virtual)
- NOAA/ESRL/DSRC 8th Grade Science Days, "Global Radiation", 2019 (in-person)
- Erie Middle School, 8th grade science classrooms, "My Arctic Career", 2019 (in-person)
- Erie Middle School, 6th grade science classrooms, "Research in the Arctic", 2016 (in-person)

Publications and Presentations

(Presently: S.M. Morris, Formerly: S.M. Crepinsek)

Publications

Morris, S., & Uttal, T., (2022). Datagrams: Diagrammatic Metadata for Humans, *Bulletin of the American Meteorological Society* (published online ahead of print 2022). Retrieved Mar 22, 2022, from <https://journals.ametsoc.org/view/journals/bams/aop/BAMS-D-21-0219.1/BAMS-D-21-0219.1.xml>

Shupe, MD, ..., **Morris, S.,** et al., (2022). Overview of the MOSAiC expedition—Atmosphere. *Elementa: Science of the Anthropocene* 10(1). DOI: <https://doi.org/10.1525/elementa.2021.00060>

Christopher Cox, ..., **Morris, S.,** et al., (2021). Atmospheric Surface Flux Station #30 measurements (Level 1 Raw), Multidisciplinary Drifting Observatory for the Study of Arctic Climate (MOSAiC), central Arctic, October 2019 - September 2020. *Arctic Data Center*. doi:10.18739/A20C4SM1J

Christopher Cox, ..., **Morris, S.,** et al., (2021). Atmospheric Surface Flux Station #40 measurements (Level 1 Raw), Multidisciplinary Drifting Observatory for the Study of Arctic Climate (MOSAiC), central Arctic, October 2019 - September 2020. *Arctic Data Center*. doi:10.18739/A2CJ87M7G.

Christopher Cox, ..., **Morris, S.,** et al., (2021). Atmospheric Surface Flux Station #50 measurements (Level 1 Raw), Multidisciplinary Drifting Observatory for the Study of Arctic Climate (MOSAiC), central Arctic, October 2019 - September 2020. *Arctic Data Center*. doi:10.18739/A2445HD46.

Christopher Cox, ..., **Morris, S.,** et al., (2021). 10-meter (m) meteorological flux tower measurements (Level 1 Raw), Multidisciplinary Drifting Observatory for the Study of Arctic Climate (MOSAiC), central Arctic, October 2019 - September 2020. *Arctic Data Center*. doi:10.18739/A2VM42Z5F.

Christopher Cox, ..., **Morris, S.,** et al., (2021). 10-meter (m) meteorological flux tower measurements (Level 1 Raw), Continuous observations of the surface energy budget and meteorology over the Arctic Ocean sea ice during MOSAiC. (2022). *Nature Scientific Data*.

Cox, C.J., **Morris, S.M.,** et al., (2021). The De-Icing Comparison Experiment (D-ICE): A study of broadband radiometric measurements under icing conditions in the Arctic. *Atmos. Meas. Tech.*, 14, 1205-1224. <https://doi.org/10.5194/ant-14-1205-2021>.

Shupe, M., ..., **Morris, S.,** et al., (2021). Overview of the MOSAiC Expedition - Atmosphere. *Elementa - MOSAiC Special Feature*.

Bognar, K., ..., **Morris, S.,** et al., (2020). Measurements of Tropospheric Bromine Monoxide Over Four Halogen Activation Seasons in the Canadian High Arctic. *JGR Atmos.* 125(18), <https://doi.org/10.1029/2020JD033015>

Yang, X., ..., **Morris, S.,** et al., (2020). Pan-Arctic surface ozone: modelling vs. measurements. *Atmos. Chem. Phys.*, 20(24), 15937-15967. doi:10.5194/acp-20-15937-2020

Cox, C.J., **S.M. Morris**, T. Uttal, C.N. Long, A. McComiskey, (2019). The De-Icing Comparison Experiment – ARM Contribution (DICEXACO) *Field Campaign Report*, Ed. by Robert Stafford, ARM user facility, DOE/SC-ARM-19-020

Morris, S.M., (2018). Variability of Ground Heat Flux at Tiksi Station *ProQuest Dissertations Publishing*, Master's {Degree: thesis publication, University of Colorado at Boulder}

Grachev, A., ..., **S.M. Morris**, et al., (2017). Seasonal and latitudinal variations of surface fluxes at Arctic terrestrial sites *Climate Dynamics*, 1-26, doi: 10.1007/s00382-017-3983-4, issn: 1432-0894

Cox, C.J., ..., **S. Crepinsek**, et al., (2016). Cloud radiative forcing from pan-Arctic Baseline Surface Radiation Network BSRN stations *J. Clim.*

Eckhardt, S., ..., **S Crepinsek**, et al., (2015). Current model capabilities for simulating black carbon and sulfate concentrations in the Arctic atmosphere: a multi-model evaluation using a comprehensive measurement data set *Atmos. Chem. Phys.*, COPERNICUS GESELLSCHAFT MBH, 15(16), 9413-9433, doi: 10.5194/acp-15-9413-2015, issn: 1680-7316, ids: CQ5LT

Evangelidou, ..., **S Crepinsek**, et al., (2016). Wildfires in northern Eurasia affect the budget of black carbon in the Arctic - a 12-year retrospective synopsis (2002-2013) *Atmos. Chem. Phys.*, COPERNICUS GESELLSCHAFT MBH, 16(12), 7587-7604, doi: 10.5194/acp-16-7587-2016, issn: 1680-7316, ids: DQ7VZ

Uttal T., ..., **Crepinsek S.M.**, et al., (2015). International Arctic Systems for Observing the Atmosphere (IASOA): An International Polar Year Legacy Consortium *Bull. Amer. Meteor. Soc.*, doi: 10.1175/BAMS-D-14-00145.1

Scientific Presentations

Morris, S.M., 2022-02-25: Virtual Arctic Research Laboratory. *GOMO Arctic Research Program Quarterly Meeting*, Boulder, Colorado, United States (virtual)

Morris, S.M., Lemagie, E., Hu, L., Osborn, E., Bushuk M., Goethel, C., Schill, G., 2021-11-30: Early Career-Led Scientific Opportunities Discussion. *Senior Research Council Early-Career Arctic Research Panel*, Boulder, Colorado, United States (virtual)

Morris, S.M., Thompson, E., Bariteau, L., 2021-7-13: BLO & POP Folder Restructure (PSL Data Management). NOAA PSL Team Leads, Boulder, Colorado, United States (virtual)

Morris, S.M., 2019-6-13: Overview (Observatories and Barrow Datagram). *GMD G-RAD*, Boulder, CO, United States

Morris, S.M., Cox, C.J., Long, C., 2018-5-22: Winter 2017-2018 Results from the De-Icing Comparison Experiment (D-ICE) at NOAA's Barrow Atmospheric Baseline Observatory, Utqiagvik, Alaska. *Global Monitoring Annual Conference*, Boulder, CO, United States

Morris, S.M., 2018-4-4: Variability of Ground Heat Flux at Tiksi Station. *Thesis Defense*, Boulder, CO, United States

Crepinsek, S., Cox, C., Serreze, M., Hall, E., Long, C., 2016-11-30: Arctic Radiometer Modifications. *IASOA*, Boulder, Colorado, USA

Crepinsek, S., 2016-11-30: Arctic Radiometer Modifications. *IASOA*, Boulder, Colorado, United States

Crepinsek, S., McClure, A., 2016-9-31: Ozone Working Group Climatology Publication. *IASOA*, Boulder, Colorado, United States

Crepinsek, S., 2015-11-04: Determining Ground Heat Flux around the Tiksi Station. *IASOA*, Boulder, Colorado, United States

Crepinsek, S., Uttal, T., Sandoval, C., Persson, O.P., Grachev, A.A., 2013-12-12: Comparison of Heat Flux Measurements and Calculations at an Arctic Site. *American Geophysical Union Conference*, San Francisco, California, United States