

## S. McKenzie Skiles, PhD

Assistant Professor

Department of Geography

University of Utah

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### Education

- 2014 PhD, *Geography*, University of California - Los Angeles
- 2010 MS, *Geography*, University of Utah
- 2008 BS, *Geography*, University of Utah
- 2008 BS, *Environmental Studies*, University of Utah
- 2008 GIS Certificate, University of Utah

### Appointments

Assistant Professor, University of Utah, Department of Geography, Jul 2017 - Current  
Assistant Professor, Utah Valley University, Department of Earth Science, Aug 2016 - Jul 2017  
Postdoctoral Scholar, California Institute of Technology, NASA JPL, Mar 2015 - Aug 2016

### Research Interest

Remote sensing, snow hydrology, snow albedo and energy balance, light absorbing particles in snow, cryosphere-hydrosphere-climate interaction

### Publications

#### *Thesis/Dissertation*

- 2014 Dust and Black Carbon Radiative Forcing Controls on Snowmelt in the Colorado River Basin. *University of California - Los Angeles*.
- 2010 Interannual Variability in Radiative Forcing by Desert Dust in Snowcover in the Colorado River Basin. *University of Utah*.

#### *Peer Reviewed Publications*

(\*indicates advising of graduate student lead author)

- 2022 **Skiles, S.M.**, D. Ragar, S. Clark, Hourly Snow Energy and Mass Balance at Atwater Study Plot, Alta, UT. *Hydrologic Processes*, doi: 10.1002/hyp.14558
- 2022 Meyer, J., J.S. Deems, K.J. Bormann, D. Shean, **S.M. Skiles\***. Mapping snow depth and volume at the alpine watershed scale from aerial imagery using Structure from Motion. *Frontiers in Earth Science - Environmental Informatics and Remote Sensing*, doi: 10.3389/feart.2022.989792
- 2022 Abolafia-Rosenzweig, R., C. He, **S.M. Skiles**, F. Chen, D. Gochis. Evaluation and optimization of snow albedo scheme in Noah-MP land surface model using in-situ spectral observations in the Colorado Rockies. *Journal of Advances in Modeling Earth Systems*, doi: 10.1029/2022MS003141
- 2022 Donahue, C., **S.M. Skiles**, K. Hammonds. Mapping liquid water content in snow: An intercomparison of mixed-phase optical property models using hyperspectral imaging and in situ measurements. *The Cryosphere*, doi: 10.5194/tc-2021-247

- 2022 Fair, Z., M. Flanner, A. Schneider, **S.M. Skiles**. Sensitivity of modeled snow grain size retrievals to solar geometry, snow particle asphericity, and snowpack impurities. *The Cryosphere*, doi: 10.5194/egusphere-2022-266
- 2022 Lund, J., R.R. Forster, E.J. Deeb, G.E. Liston, **S.M. Skiles**, H.P. Marshall. Interpreting Sentinel-1 SAR backscatter signals of snowpack surface melt/freeze, warming, and ripening, through field measurements and physically based SnowModel. *Remote Sensing*, doi: 10.3390/rs14164002
- 2021 Donahue, C., **S.M. Skiles**, K. Hammonds, In situ effective snow grainsize mapping using a compact hyperspectral imager. *Journal of Glaciology*, doi: 10.1017/jog.2020.68
- 2021 Bair, N.E., K. Rittger, T. Stillinger, **S.M. Skiles** (2021) COVID-19 Lockdown Show Reduced Pollution on Snow and Ice in the Indus River Basin. *PNAS*, doi: 10.1073/pnas.2101174118
- 2021 Ackroyd, C., **S.M. Skiles\***, K. Rittger, J. Meyer, Trends in Snow Cover Duration Across River Basins in High Mountain Asia from Daily Gap-filled MODIS Fractional Snow Covered Area. *Frontiers in Earth Science*, doi: 10.3389/feart.2021.713145
- 2021 Hotaling, S, S. Lutz, R.J. Dial, A.M. Anesio, L.G. Benning, A.G. Fountain, J.L. Kelley, J. McCutcheon, **S.M. Skiles**, N. Takeuchi, and T.L. Hamilton, Biological Albedo Reduction on Ice Sheets, Glaciers, and Snowfields. *Earth-Science Reviews*, doi: 10.1016/j.earscirev.2021.103728
- 2021 Shah, J., R. Bares, B. Bowen, G. Bowen, D. Eiriksson, A. G. Hallar, J. Horel, S. Hinnert, L. Jamison, J. Lin, D. Pataki, **S.M. Skiles**, R. Smith, M. Wolf, P. Brooks. The Wasatch Environmental Observatory: A mountain to urban research network in the semi-arid Western US. *Hydrologic Processes*, doi: 10.1002/hyp.14352
- 2021 Flanner, M.G., J. Arnheim, J.M. Cook, C. Dang, C. He, X. Huang, D. Singh, **S.M. Skiles**, C.A. Whicker, C.S. Zender. SNICAR-AD v3: A community tool for modeling spectral snow albedo. *Geoscientific Model Development*, doi: 10.5194/gmd-2021-182
- 2020 Cook, J. M., Tedstone, A. J., Williamson, C., McCutcheon, J., Hodson, **S.M. Skiles**, and others. Glacier algae accelerate melt rates on the western Greenland Ice Sheet. *The Cryosphere*, doi: 10.5194/tc-2019-58
- 2020 Uecker, T., S. Kaspari, K. Musselman, **S.M. Skiles**. The post-wildfire impact of burn severity and age on black carbon snow deposition and implications for snow water resources, Cascade Range, Washington, USA. *Journal of Hydrometeorology*, doi: 10.1175/JHM-D-20-0010.1
- 2019 **Skiles, S.M.** & T.H. Painter. Toward understanding direct absorption and grain size feedbacks by dust radiative forcing in snow with coupled snow physical and radiative transfer modeling. *Water Resources Research*, doi: 10.1029/2018WR024573
- 2019 Meyer, J. & **S.M. Skiles\***. Assessing the ability of Structure from Motion to map high resolution snow surface elevations in complex terrain: A case study from Senator Beck Basin, CO. *Water Resources Research*, doi: 10.1029/2018WR024518
- 2019 Bair, N.E., K. Rittger, **S.M. Skiles**, J. Dozier. An examination of snow albedo estimates from MODIS and their impact on snow water equivalent reconstruction. *Water Resources Research*, doi: 10.1029/2019WR024810
- 2019 Nagorski, S., S. Kaspari, E. Hood, J. Fellman, **S.M. Skiles**. Radiative Forcing by Dust and Black Carbon on the Juneau Icefield, Alaska. *Journal of Geophysical Research-Atmospheres*, doi: 10.1029/2018JD029411

- 2018 Painter, T.H., **S.M. Skiles**, J.S. Deems, J. Dozier, T. Brandt. Variation in rising limb of Colorado River snowmelt runoff hydrograph controlled by dust radiative forcing in snow. *Geophysical Research Letters*, doi: 10.1002/2017GL075826
- 2018 [Editor's Choice Award](#) Dial, R.J., G.Q. Ganey, **S.M. Skiles**. What color should glacier algae be? An ecological role for red carbon in the cryosphere. *FEMS Microbiology Ecology*, doi: 10.1093/femsec/fiy007
- 2018 **Skiles, S.M.**, T.H. Painter, Assessment of Radiative Forcing by Light-Absorbing Particles in Snow from In Situ Observations with Radiative Transfer Modeling. *Journal of Hydrometeorology*, doi: 10.1175/JHM-D-18-0072.1
- 2018 [Invited Review](#) **Skiles, S.M.**, M. Flanner, M. Dumont, J. Cook, T.H. Painter. Radiative Forcing by Light Absorbing Particles in Snow. *Nature Climate Change*. doi: 10.1038/s41558-018-0296-5
- 2018 **Skiles, S.M.**, D. Mallia, A.G. Hallar, J.C. Lin, A. Lambert, R. Petersen, S. Clark. Implications of a shrinking Great Salt Lake for dust on snow deposition in the Wasatch Mountains, UT, as informed by a source to sink case study from the April 13th, 2017 dust event. *Environmental Research Letters*, doi: 10.1088/1748-9326/aaefd8
- 2017 **Skiles, S.M.**, & T.H. Painter. Daily evolution in dust and black carbon content, snow grain size, and snow albedo during snowmelt, Rocky Mountains, Colorado. *Journal of Glaciology*, doi: 10.1017/jog.2016.125
- 2017 **Skiles, S.M.**, T.H. Painter, G.S. Okin. A method to retrieve the spectral complex refractive index and single scattering optical properties of dust deposited in mountain snow, *Journal of Glaciology*, doi: 10.1017/jog.2016.126
- 2017 Casey, K.A., S.D. Kaspari, **S.M. Skiles**, K. Kreutz, M.J. Handley. Light absorbing particulates on snow: the spectral and chemical measurements of pollutant impacts on snow near South Pole, Antarctica, *Journal of Geophysical Research: Atmospheres*, doi: 10.1002/2016JD026418
- 2016 Miller, S., F. Wang, A. Burgess, **S.M. Skiles**, T.H. Painter, M. Rogers. Satellite-Based Estimation of Temporally Resolved Dust Radiative Forcing in Snow Cover, *Journal of Hydrometeorology*, doi: 10.1175/JHM-D-15-0150.1
- 2016 Painter, T.H., **S.M. Skiles**, and others. The Airborne Snow Observatory: scanning lidar and imaging spectrometer fusion for mapping snow water equivalent and snow albedo, *Remote Sensing of the Environment*, doi: 10.1016/j.rse.2016.06.018
- 2016 Seidel, F., K. Rittger, **S.M. Skiles**, T.H. Painter. Case study of spatial and temporal variability of snow cover, grain size, albedo and radiative forcing in the Sierra Nevada and Rocky Mountain snowpack derived from imaging spectroscopy, *The Cryosphere*, doi: 10.5194/tc-10-1229-2016
- 2016 Minder, J.R., T.W. Lechter, **S.M. Skiles**. An evaluation of high-resolution regional climate model simulations of snow cover and albedo over the Rocky Mountains, with implications for the simulated snow-albedo feedback, *Journal of Geophysical Research: Atmospheres*, doi: 10.1002/2016JD024995
- 2015 Oaida, C., Y. Xue, M. Flanner, **S.M. Skiles**, F. De Sales, T.H. Painter. Investigating Physical Snow Processes Including Aerosols Using an Enhanced WRF/SSiB Model. *Journal of Geophysical Research – Atmospheres*, doi: 10.1002/2014JD022444
- 2015 Kaspari, S., **S.M. Skiles**, I. Delaney, D. Dixon, T.H. Painter. Accelerated Glacier Melt on Snow Dome, Mt. Olympus, Washington, USA due to Deposition of Black Carbon and Mineral Dust from Wildfire. *Journal of Geophysical Research- Atmospheres*, doi: 10.1002/2014JD022676

- 2015 **Skiles, S.M.**, T.H. Painter, J. Belnap, L. Holland, R.L. Reynolds, H.L. Goldstein, J. Lin. Regional variability in dust-on-snow processes and impacts in the Upper Colorado River Basin. *Hydrologic Processes*, doi:10.1002/hyp.10569
- 2014 Kaspari, S., T.H. Painter, M. Gysel, **S.M. Skiles**, M. Schwikowski. Seasonal and elevational variations of black carbon and dust in snow and ice in the Solu-Khumbu, Nepal and estimated radiative forcings, *Atmospheric Chemistry and Physics*, doi:10.5194/acpd-13-33491-2013
- 2013 Painter, T. H., A. C. Bryant, **S.M. Skiles**. Radiative Forcing by light absorbing impurities in snow from MODIS surface reflectance data, *Geophysical Research Letters*, 39, doi:10.1029/2012GL052457
- 2013 Painter, T. H., F. Seidel, A.C. Bryant, **S.M. Skiles**, K. Rittger. Imaging Spectroscopy of albedo and radiative forcing by light-absorbing impurities in mountain snow, *Journal of Geophysical Research: Atmospheres*, 118(17), doi: 10.1002/jgrd.50520
- 2013 Reynolds, R.L., H. L. Goldstein, B. M. Moskowitz, **S. M. Skiles**, R.F. Kokaly, C.B. Flagg, K. Yauk, T. Berquó, G. Breit, M. Ketterer, D. Fernandez, M.E. Miller, T.H. Painter. Composition of dust deposited to snow cover in the Wasatch Range (Utah, USA): Controls on radiative properties and snow cover and comparison to some dust source sediments, *Aeolian Research*, doi: 10.1016/j.aeolia.2013.08.001
- 2013 Li, J., G.S. Okin, **S.M. Skiles**, T.H. Painter. Relating variation of dust on snow to bare soil dynamics in the western United States, *Environmental Research Letters*, 8(4), doi: 10.1088/1748-9326/8/4/044054
- 2012 Painter, T.H., **S.M. Skiles**, J. Deems, C. C. Landry, Dust Radiative Forcing in snow of the Upper Colorado River Basin: Part I. A 6 year record of energy balance, radiation, and dust concentrations. *Water Resources Research*. 48, doi:10.1029/2012WR011985
- 2012 [Editors' Choice Award](#) **Skiles, S.M.**, T. H. Painter, J. Deems, C. C. Landry. Dust Radiative Forcing in snow of the Upper Colorado River Basin: Part II. Interannual variability in radiative forcing and snowmelt rates. *Water Resources Research*. 48, doi:10.1029/2012WR011986

*Under Review (DOI indicates availability of pre-print)*

- 2022 **Skiles, S.M.**, C. Donahue, A. Hunsaker, J. Jacobs. Snow Effective Grain Size and Albedo Patterns Mapped from UAV Hyperspectral Imaging to Assess Landsat 9 OLI Pixel Variability: A Case Study from Senator Beck Basin, Colorado. *Frontiers in Remote Sensing*.
- 2022 Meyer, J., J. Horel, P. Kormos, A. Hedrick, E. Trujillo, **S.M. Skiles\***. Operational water forecast ability of the iSnoBAl-HRRR coupling; an evaluation to adapt into production environments. *Geoscientific Model Development Discussions*, doi: 10.5194/gmd-2022-129
- 2022 Raiho, A., K. Cawse-Nicholson, A. Chlus, J. Dozier, M.M. Gierach, K. Miner, S.P. Serbin, D. Schimel, F. Schneider, A.N Shiklomanov, **S.M. Skiles**. Exploring mission design for imaging spectroscopy retrievals for land and aquatic ecosystems. *Journal of Geophysical Research – Biogeosciences*. doi: 10.1002/essoar.10510949.1
- 2022 Leidman, S.Z., A.K. Rennermalm, A. Getraer, R. Muthyala, **S.M. Skiles**. Intra-Seasonal Variability in Supraglacial Stream Sediment on the Greenland Ice Sheet. *Frontiers in Earth Science – Cryospheric Sciences*.

*Peer Reviewed Reports and Book Chapters*

- 2021 Feldman, D. (Lead author), et al., with **Skiles, S.M.** (co-author). Surface Atmosphere Integrated Field Laboratory (SAIL) Science Plan. No. DOE/SC-ARM-21-004. Oak Ridge National Lab (ORNL), Oak Ridge, TN (United States). *Atmospheric Radiation Measurement (ARM) Data Center*.

- 2019 Hock, R. (lead author), et al., with **Skiles, S.M.** (contributing author). Special Report on Oceans and Cryosphere in a Changing Climate, Chapter 2: High Mountain Areas. *Intergovernmental Panel on Climate Change*.
- 2019 Cook, J., M. Flanner, C. Williamson, **S.M. Skiles**, Bio-optical properties of Terrestrial Snow and Ice. Springer Series on Light Scattering, Volume 3: Light Scattering and Radiative Transfer. *Springer*. Series Editor: A. Kokhanovsky.

*Peer Reviewed Conference Proceedings*

- 2018 **Skiles, S.M.**, J. Lund, T.H. Painter, Ground validation of Airborne Snow Observatory spectral and broadband albedo during SnowEx '17. *IEEE Geoscience and Remote Sensing Symposium (IGARSS)*, doi: 10.1109/IGARSS.2018.8518341
- 2018 Brucker, L., et al., including **S.M. Skiles**. Nasa Snowex'17 in SITU Measurements and Ground-Based Remote Sensing. *IEEE Geoscience and Remote Sensing Symposium (IGARSS)*, doi: 10.1109/IGARSS.2018.8517777
- 2017 Painter, T.H., **S.M. Skiles**, R.O. Green, F.C. Seidel, F.C., A. Nolin, Imaging spectroscopy to understand the controls on cryospheric melting in a changing world, *IEEE Geoscience and Remote Sensing Symposium (IGARSS)*, doi: 10.1109/IGARSS.2017.8127647
- 2016 **Skiles, S.M.**, & T.H. Painter. A 9-yr record of dust-on-snow in the Colorado River Basin, *Proceedings of the 12<sup>th</sup> Biennial Conference of Science and Management on the Colorado Plateau*, doi: 10.3133/sir20155180

*Open Source Data and Software*

Landsat Operational Land Imager Dust Radiative Forcing in Snow (OLIDRFS) [Software]. GitHub. <https://github.com/UofU-Cryosphere/DRFS>

Airborne Snow Observatory Imagery Processing including Structure from Motion Workflow [Software]. GitHub. <https://github.com/UofU-Cryosphere/snow-aso>

Near real time snow remote sensing processing and analysis workflow for MODIS and AMSR-2 [Software]. GitHub. <https://github.com/UofU-Cryosphere/servir-snow>

Atwater Study Plot, Alta, UT (Version 1) [Data set]. S. M. Skiles. (2022). Zenodo. <https://doi.org/10.5281/zenodo.5885283>

Senator Beck Basin with Corrected Radiation (Water Years 2005-2014) (Version 1) [Data set]. S. M. Skiles. (2019). Zenodo. <http://doi.org/10.5281/zenodo.2532590>

Grand Mesa Study Plot (Version 1) [Data set]. S. M. Skiles. (2018). Zenodo. <http://doi.org/10.5281/zenodo.1479859>

SNOWPACK LRT (Version 1) [Data set]. S. M. Skiles. (2018). Zenodo. <http://doi.org/10.5281/zenodo.2647633>

**Selected Invited Seminars and Presentations**

2022 *The Great Salt Lake and the Greatest Snow on Earth*. Great Salt Lake Summit, Utah House of Representatives.

*Developing remote sensing tools to monitor our changing mountain snowpack across scales*. University of Nevada, Reno, Hydrologic Science Program Seminar.

*Monitoring the changing mountain snowpack from space*. Massachusetts Institute of

- Technology (MIT), Program in Atmospheres, Oceans and Climate Colloquium.
- 2021 *From Playas to Peaks: Monitoring Patterns of Dust Deposition and Impacts on Seasonal Snow Water Resources in the Western US*, Duke University, Civil & Environmental Engineering Colloquium.
- Mapping the Changing Color of Snow and Implications for Accelerated Mountain Snowmelt*. Texas A&M, Geography Colloquium.
- Snow Pits to Mountain Peaks: Optical Remote Sensing for Snow Hydrology from the Micro- to Macro Scale (Invited)*. American Geophysical Union Annual Meeting, San Francisco, CA.
- 2020 *Energy Balance Modeling in the Upper Colorado River Basin*. Colorado River Hydrologic Symposium.
- Remote sensing for Snow Hydrology*. Snow, Ice, and Climate Talk Series. Dartmouth College.
- 2019 *Mapping surface elevations and snow depth with Structure from Motion photogrammetry*. Western Snow Conference Short Course, 87<sup>th</sup> Annual Western Snow Conference, Reno, NV.
- Implications of a shrinking Great Salt Lake for dust on snow deposition in the Wasatch Mountains, UT*. Swaner Lecture Series. Swaner Preserve and EcoCenter, Park City, UT.
- Advancing Remote Sensing Methods to Constrain Physical Understanding of Accelerated Mountain Snowmelt (Invited)*. American Geophysical Union Annual Meeting, San Francisco, CA.
- 2018 *Keynote: Advances and Opportunities in Alpine Measurements including Remote Sensing*. 3<sup>rd</sup> Annual Workshop for the International Network for Alpine Research and Catchment Hydrology, Zugspitze, Germany.
- Ground validation of Airborne Snow Observatory spectral and broadband albedo during SnowEx '17 (Invited)*. IEEE Geoscience and Remote Sensing Symposium (IGARSS), Valencia, Spain.
- Keynote: Climate and hydrology studies leveraging ASD VNIR spectral snow albedo measurements*. Malvern Panalytical Webinar Series.

## Externally Funded Projects

### Active

NOAA Cooperative Institute for Research to Operations in Hydrology  
*Improve representation of snow accumulation and melting processes in the NextGen NWM in support of seasonal to sub-seasonal water supply forecasts*

Role: Co- Principal Investigator

Start/End Date: 8/1/2022 – 8/1/2025

NASA Terrestrial Hydrology

*Bridging MODIS to SBC: Improving the historical remotely sensed snow albedo record and preparing for satellite imaging spectroscopy via multi-sensor fusion*

Role: Principal Investigator

Start/End Date: 2/1/2022 – 1/31/2025

NASA Earth Science Applications: Water Resources

*Advancing domestic and international water management capabilities with a global daily snow cover and albedo product*

Role: Co-Investigator/Institutional Principal Investigator

Start/End Date: 1/1/2022 – 12/31/2024

NASA Earth Science Applications: Water Resources

*Developing an operational framework for incorporating remote sensing and snow energy balance modeling into runoff forecasting in snow dominated watersheds in the Colorado River Basin*

Role: Principal Investigator

Start/End date: 12/01/2018-11/30/2021

NSF Critical Zone Collaborative Network (CZ-Net)

*Dust in the Critical Zone from the Great Basin to the Rocky Mountains*

Role: Co- Principal Investigator

Start/End date: 8/01/2020-8/01/2026

NSF CNH-2 Dynamics of Integrated Socio-Environmental Systems

*The coupled, co-evolving roles of drought and electricity systems in humans' exposure to air pollution*

Role: Co- Principal Investigator

Start/End date: 8/01/2020-8/01/2024

NASA Interdisciplinary Research in Earth Science

*The role of dust in the life cycle of snow: Coupling remote sensing with models to link land-use, climate, and water resources*

Role: Principal Investigator

Start/End date: 9/01/2020-9/01/2024

Department of Defense Broad Area Announcement

*Cold Region Science and Technology: Cold Climate Sensing*

Role: Co-Investigator/Task Lead

Start/End date: 5/01/2021-5/01/2024

NASA The Science of Terra, Aqua, and Suomi-NPP

*Fusion of MODIS, VIIRS, and Landsat snow cover data to create high spatial and temporal resolution estimates of snow water equivalent in a well-instrumented and austere basin (COVID 19 supplement)*

Role: Team Member

Start/End date: 06/01/2020-09/31/2022

NASA Terrestrial Hydrology

*Snow Albedo Test Bed Scoping Studies*

Role: Co- Principal Investigator

Start/End date: 01/01/2020-09/31/2022

*Completed*

NASA Surface Biology and Geology (SBG)

*SBG Imaging Spectrometer Satellite Mission Pathfinder Study (SISTER)*

Role: Principal Investigator (Snow Algorithms Lead)

Start/End date: 10/01/2020-09/30/2021

DOE Office of Science

*Constraining physical understanding of aerosol loading, biogeochemistry, and snowmelt hydrology from hillslope to watershed scale in the East River Special Focus Area*

Role: Principal Investigator

NASA Cryosphere: High Mountain Asia

*Precipitation and glacier mass balance in High Mountain Asia over the modern era  
(Commercial Imagery Supplement)*

Role: Team Member

NASA SERVIR Applied Sciences

*Managing the Changing Water Resources South of the Himalayas*

Role: Co-Investigator

### **Awards**

- 2022 National Academy of Sciences Kavli Fellow
- 2022 Superior Research Award Junior Tenure Track, College of Social and Behavioral Science
- 2021 Junior Faculty Research Leave Award, College of Social and Behavioral Science
- 2019 Outstanding Mentor/Advisor, Department of Geography
- 2018 Editor's Choice Award, FEMS Microbiology Ecology
- 2013 Outstanding Graduate Student Publication, UCLA Department of Geography
- 2013 Editors' Choice Award, Water Resources Research
- 2012 Outstanding Student Paper Award, Cryosphere Section, American Geophysical Union

### **Professional Roles, Leadership, and Service**

Associate Editor, Remote Sensing of Environment

Incoming President/Executive Committee, NASA Snow International Working Group (SINTER)

Vice President, International Commission on Snow and Ice Hydrology

Chair, South Continental Committee, Western Snow Conference

Conference Chair, Western Snow Conference 2022

Campus Representative, Consortium of Universities for the Advancement of Hydrologic Science (CUAHSI)

Snow Measurement School Lead Instructor, CUAHSI-NASA

Aerosol Team, Surface Atmosphere Integrated Field Laboratory (DOE SAIL)

Ambassador, Community Snow Observations

Science Alliance, Protect Our Winters

*Conference Sessions Convened*

American Geophysical Union

*Remote Sensing of the Cryosphere: Seasonal Snow (2018-current)*

*Dust and Black Carbon in Cryosphere (2013-2020)*

International Union of Geodesy and Geophysics

*Observations and modeling of impacts to snow and glaciers due to deposition of light-absorbing particles (2019, 2023)*

*Snow in the Critical Zone (2023)*

### **Selected Media**

- [The Future of Utah's Water](#). RadioWest. 4/28/2022.
- [Climate Scientist Katharine Hayhoe and educator McKenzie Skiles on climate change](#). KCPW. 4/22/22.
- [Researchers developing new snowpack forecast model to better understand water conservation](#). KUTV. 4/12/22.
- [This \\$7M effort in Utah will help us understand droughts, floods](#). Deseret News. 4/6/22.
- [How climate change could affect snow at the Winter Olympics by 2080](#). Business Insider. 2/10/2022



- [Dust Clouds are killing people out West- and the dangers could spread](#). Popular Science. 2/24/22
- Utah's Olympics prospects amid shrinking snowpack. Utah Public Radio. 1/14/2022
- [Can the Great Salt Lake be saved?](#) KPCW. 1/13/22.
- Snowpack in the West: Will there be enough to ski in 50 years? Deseret News. 12/9/2021
- [The Rocky Future of Climbing Due to Climate Change](#). Newsy. 11/20/21.
- [A Long View of Sierra Snow](#). NASA Earth Observatory. 7/28/2021
- [Wildlife, Air Quality at Risk as Great Salt Lake Nears Low](#). Associated Press. 6/6/2021
- [NASA Snow Campaign Digs Deep in 2021](#). NASA. 2/24/2021
- [Dirty snow could impact spring snowmelt](#). KSL News Radio. 2/8/2021
- [The Future of the Outdoor State](#). Protect Our Winters. 9/22/2020
- The Outdoor State of Mind. Protect Our Winters. 5/12/2020
- [Our Changing Mountain Snowpack](#). The Avalanche Review. 4/1/2020
- [Save our Winters](#). Utah Business. 4/19/2019.
- [Fire & Ice Podcast: What's Killing the Great Salt Lake?](#) 3/5/2019.
- [This Green Earth Podcast](#). 1/22/2019.
- [Dust Is Speeding Up Snow Melt, Threatening Utah's Greatest Snow On Earth](#). Utah Public Radio. 01/07/2019.
- [Tribune editorial: Can the Great Salt Lake be great again?](#) Salt Lake Tribune. 12/29/2018.
- [Dust is causing Utah's snowpack to melt faster, new U. study says](#). KSL. 12/21/2018.

## Teaching

Introduction to GIS and Cartography (Fall 2017-2019)

Introduction to Remote Sensing (Fall 2019-2021)

Geospatial Field Methods: GPS and Drones (Spring 2019-2021, Fall 2020-2022, Spring 2023)

Snow and Ice (Spring 2019)

Snow Dynamics and Avalanche Mechanics (Spring 2020)

Remote Sensing of Mountain Snow and Ice (Graduate Seminar, Spring 2018)

Advanced Snow Measurement Methods (Graduate Seminar, Spring 2022)

## Student Advising (*\*completed*)

Advisor: Joachim Meyer (MS\*, PhD), Chelsea Ackroyd (MS\*, PhD), Pat Naple (PhD), Otto Lang (PhD), Jillian Gayler (MS), Dillon Ragar (MS\*), Jon Wagner (MS\*), Hannah Peterson (MS\*)

Co-Advisor: Matt Olson (PhD\*)

Committee Member: Luis Garcia (MS\*), Kate Baustian (MS\*), Mickey Campbell (PhD\*), Jewell Lund (PhD\*), Dianne Pablo (MSGIS\*), Troy Hagenmeyer (MSGIS\*), Eric Johnson (PhD), Dane Lijstrand (PhD), Ry Weber (MS), Baylee Olds (MS)