Merritt E. Harlan

Mendenhall Fellow; Hydrologic Remote Sensing Branch; U.S. Geological Survey
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EDUCATION

PhD University of Massachusetts Amherst, Civil and Environmental Engineering May 2022
Dissertation: "Remote Sensing of High Latitude Rivers"
Committee: Colin J. Gleason (chair), Konstantinos Andreadis, David Boutt

International Institute for Applied Systems Analysis Summer 2019
Young Summer Scientists Program: "Projecting hydrologic changes in the terrestrial Arctic domain through the Community Water Model"

BA Williams College, Mathematics June 2016

HONORS AND AWARDS

NASA Future Investigators in Earth and Space Science and Technology (FINESST) 2019-2022
Rapid Discharge Estimation and SWOT Validation in Remote Areas Through UAV and Surface Observation-- Total Award: $135,000

FIELDWORK EXPERIENCE

***Inspiring Girls Expedition: Girls in the Forest;* Fairbanks, AK** August 2022
Mentored a group of high school girls on a pack raft trip on the Chena River and demonstrated and collected velocity and temperature profiles of the river. Additionally, joined the USGS Alaska office to collect acoustic Doppler current profiler (ADCP) measurements in the Yukon River near Stevens Village.

***Integrating Geosciences and Engineering in the Arctic*; Toolik Field Station, AK** Summer 2021
Led and mentored a team of six undergraduate students to survey Arctic beaded streams near Toolik Field Station and collect turbidity samples of the Sagavanirktok River over a five-week field deployment.

***Lake Observations from Citizen Scientists and Satellites (LOCSS);* New Hampshire** Summer 2021
Installed and surveyed 16 lake gages throughout the state of New Hampshire and coordinated with local citizen scientists to record measurements corresponding to satellite overpass dates.

***NASA SWOT Calibration/Validation;* Peace Athabasca Delta, Canada** Summer 2019
Primary science, personnel, and medical lead and for a nine-institution, six-week field deployment. Collected LiDAR topography, UAV images, shoreline maps, water surface elevation, sediment samples, greenhouse gas fluxes, and water samples at 24 lakes, and ADCP discharge profiles and sediment profiles along 12 rivers.

***NASA SWOT Calibration/Validation;* North Slope, Alaska; Saskatoon, Canada** Summer 2017
Alaska: Intensive three-week field camp approx. 350mi north of Fairbanks, AK. Surveyed rivers, ponds, lakes, and surrounding land with pressure transducers, advanced GPS drifters, ADCPs, ground-based LIDAR, and permafrost probes. Canada: Collected lidar topography for the North Saskatchewan River and collected water surface elevation measurements under the NASA AirSWOT instrument

PUBLICATIONS

Harlan, M.E., Gleason, C.J., Flores, J.A., Langhorst, T.M., Roy, S., 2022. Mapping and characterizing Arctic beaded streams through high resolution satellite imagery. Remote Sensing of Environment 285, 113378. https://doi.org/10.1016/j.rse.2022.113378

Harlan, M. E., Gleason, C. J., Altenau, E. H., Butman, D., Carter, T., Chu, V. W., et al. (2021). Discharge Estimation from Dense Arrays of Pressure Transducers. *Water Resources Research*, 57, e2020WR028714. https://doi.org/10.1029/2020WR028714

Kyzivat, E. D., Smith, L. C., Garcia-Tigreros, F., Huang, C., Wang, C., Langhorst, T., Fayne, J., **Harlan, M.E.,** et al. (2022). The Importance of Lake Emergent Aquatic Vegetation for Estimating Arctic-Boreal Methane Emissions. *Journal of Geophysical Research: Biogeosciences*, *127*(6), e2021JG006635. https://doi.org/10.1029/2021JG006635

Pitcher, L. H., Smith, L. C., Cooley, S. W., Zaino, A., Carlson, R., Pettit, J., Gleason, C. J., Minear, T., Fayne, J. V., **Harlan, M. E.,** Langhorst, T., Topp, S. N., Dolan, W., Kyzivat, E. D., Pietroniro, A., Yang, D., Carter, T., Onclin, C., Hosseini, N., … Pavelsky, T. (2020). Advancing field-based GNSS surveying for validation of remotely sensed water surface elevation products. *Frontiers in Earth Science* https://doi.org/10.3389/feart.2020.00278

Kyzivat, E. D., Smith, L. C., Pitcher, L. H., Fayne, J. V., Cooley, S. W., Cooper, M. G., Topp, S.N., Langhorst, T., **Harlan, M.E.,** Horvat, C., Gleason, C.J., & T.M. Pavelsky (2019). A High-Resolution Airborne Color-Infrared Camera Water Mask for the NASA ABoVE Campaign. *Remote Sensing*, http://doi.org/10.3390/rs11182163

TECHNICAL SKILLS

Computational Skills: R, python, QGIS, Google Earth Engine Javascript API, Variable Infiltration Capacity model (VIC), Hillslope River Routing (HRR), Community Water Model (CWATM)

Certifications: Wilderness First Responder, FAA Part 107 UAV pilot

Field Instruments: LiDAR, acoustic Doppler current profiler, GNSS base station, DJI Mavic Pro UAV