

# Bibliography of Published Reports and Articles Related to Hydrological Research on the Sagavanirktok River



Prepared for  
Alaska Department of Transportation and Public Facilities

Prepared by  
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INE/WERC 17.15  
August 2017



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**Front cover photo:**

Sagavanirktok River on May 27, 2016, by John Keech, UAF.

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## **ACKNOWLEDGMENTS**

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## **DISCLAIMER**

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## **INTRODUCTION**

Researchers from the Water and Environmental Research Center (WERC), University of Alaska Fairbanks (UAF), are conducting a study of sediment transport conditions along the Sagavanirktok River. This document, as part of the study, provides a compilation of published literature related to the Sagavanirktok River (or adjacent watersheds with similar characteristics) including previous or ongoing hydrological and sedimentological research in the Sagavanirktok River basin. The literature referenced includes research on climate change, hydrology, sedimentology, permafrost and soils, meteorology, field data, satellite or aerial imagery, geophysics, modeling, water quality, and geochemistry in the Sagavanirktok River basin.

## **METHODOLOGY**

Hydrological and sediment transport research (from the 1960s to present) pertaining to the Sagavanirktok River was identified. The databases searched include Dissertation Abstracts, Wilson and ProQuest Direct, EBSCO Academic Search Premier, and the University of Alaska Fairbanks libraries. The keywords used in searching the databases are Sagavanirktok and Alaska arctic hydrology.

Publications pertaining to hydrologic research in the Sagavanirktok River basin are listed in table format (Table 1). Full citations of the publications shown in the table are provided in the appendix. The categories of publications include Bullen Point-related reports, Endicott-related reports, journal and scholarly articles, and field data/real-time data collection. The Bullen Point-related reports category includes hydrologic investigations pertaining to the Bullen Point road project, a proposed road corridor that would run east from Deadhorse across the Sagavanirktok River to Bullen Point. The Endicott-related reports category contains a series of environmental studies completed during the 1980s and 1990s associated with oil and gas infrastructure development and maintenance at Endicott, the Prudhoe Bay oil development offshore of the Alaska North Slope. The journal/scholarly articles category includes peer-reviewed journal articles, conference proceedings, dissertations, and government reports (such as U.S. Geological Survey [USGS] publications) that involve hydrologic research in or near the Sagavanirktok River basin. The field data/real-time data collection category includes a list of agencies or universities currently collecting hydrologic data in or near the Sagavanirktok River basin.

**Table 1. Published Reports and Articles Related to the Sagavanirktok River Basin, Including Topics of Research**

Publication	Date	Author(s)	Climate Change	Hydrology	Sedimentology	Permafrost and Soils	Meteorology	Field Data	Satellite/Aerial Imagery	Geophysics	Modeling	Water Quality	Geochemistry
<b>Bullen Point-Related Reports</b>													
Snow Survey Data for the Sagavanirktok River Bullen Point Hydrology Study: Spring 2007	2007	Berezovskaya, S., Derry, J., Kane, D., Gieck, R., Lilly, M., & White, D.				X		X					
Snow Survey Data for the Sagavanirktok River Bullen Point Hydrology Study: Spring 2008	2008	Berezovskaya, S., Derry, J., Kane, D., Lilly, M., & White, D.				X		X					
Snow Survey Data for the Central North Slope Watersheds: Spring 2009	2010	Berezovskaya, S., Derry, J., Kane, D., Gieck, R., & Lilly, M.				X		X					
Snow Survey Data for the Central North Slope Watersheds: Spring 2010	2010	Berezovskaya, S., Hilton, K., Derry, J., Youcha, E., Kane, D., Gieck, R., Homan, J., & Lilly, M.				X		X					
Snow Survey Data for the Sagavanirktok River/Bullen Point Hydrology Study: Spring 2006	2006	Kane, D., Berezovskaya, S., Irving, K., Busey, R., Chambers, M., Blackburn, A., & Lilly, M.				X		X					

Publication	Date	Author(s)	Climate Change	Hydrology	Sedimentology	Permafrost and Soils	Meteorology	Field Data	Satellite/Aerial Imagery	Geophysics	Modeling	Water Quality	Geochemistry
Meteorological and Hydrological Data and Analysis Report for Bullen Point and Foothills Projects: 2006–2008	2009	Kane, D., White, D., Lilly, M., Toniolo, H., Berezovskaya, S., Schnabel, W., Youcha, E., Derry, J., Gieck, R., Paetzold, R., Trochim, E., Remillard, M., Busey, R., & Holland, K.		X		X	X	X					
Meteorological and Hydrological Data and Analysis Report for the Foothills/Umiat Corridor and Bullen Projects: 2006–2011	2012	Kane, D., Youcha, E., Stuefer, S., Toniolo, H., Schnabel, W., Gieck, R., Myerchin-Tape, G., Homan, J., Lamb, E., & Tape, K.		X		X	X	X			X		
Sagavanirktok River Bridge Hydrological Investigation Report	2003	PND Engineers		X				X					
Bullen Point Road 2005 Spring Breakup and Hydrologic Assessment	2006	PND Engineers		X				X					
Stream Crossing Site Analysis, Bullen Point Project	2008	PND Engineers		X									
<b>Endicott-Related Reports</b>													
Sagavanirktok River Bridge and River Training Structures 1982 Breakup Report	1982	ARCO Oil and Gas Company		X				X					

<b>Publication</b>	<b>Date</b>	<b>Author(s)</b>	<b>Climate Change</b>	<b>Hydrology</b>	<b>Sedimentology</b>	<b>Permafrost and Soils</b>	<b>Meteorology</b>	<b>Field Data</b>	<b>Satellite/Aerial Imagery</b>	<b>Geophysics</b>	<b>Modeling</b>	<b>Water Quality</b>	<b>Geochemistry</b>
1988 Endicott Environmental Monitoring Program, Volume IV: Ice Breakup/Freezeup	1991	Atwater, S. Science Applications International Corporation		X			X	X					
1989 Endicott Environmental Monitoring Program, Volume IV: Ice Breakup/Freezeup	1991	Atwater, S. Science Applications International Corporation		X			X	X					
Sagavanirktok River Breakup	1993	Bell and Associates		X				X					
Sagavanirktok River Breakup	1995	Bell and Associates		X				X					
Sagavanirktok River Breakup Synopsis	1997	Bell and Associates		X				X					
Sagavanirktok River Breakup Synopsis	1998	Bell and Associates		X				X					
Sagavanirktok River Breakup Synopsis	1999	Bell and Associates		X				X					
Sagavanirktok River Breakup Synopsis	2000	Bell and Associates		X				X					
Sagavanirktok River Breakup Synopsis	2001	Bell and Associates		X				X					
Sagavanirktok River Breakup Synopsis	2002	Bell and Associates		X				X					



<b>Publication</b>	<b>Date</b>	<b>Author(s)</b>	<b>Climate Change</b>	<b>Hydrology</b>	<b>Sedimentology</b>	<b>Permafrost and Soils</b>	<b>Meteorology</b>	<b>Field Data</b>	<b>Satellite/Aerial Imagery</b>	<b>Geophysics</b>	<b>Modeling</b>	<b>Water Quality</b>	<b>Geochemistry</b>
Sagavanirktok River Breakup Report	2003	Bell and Associates		X				X					
Sagavanirktok River Breakup Report	2004	Bell and Associates		X				X					
1988 Final Report for the Endicott Environmental Monitoring Program, Volume IV: River Discharge	1991	Bjerklie, D. Dames & Moore, Inc. & Science Applications International Corporation		X	X		X	X					
1989 Final Report for the Endicott Environmental Monitoring Program, Volume IV: River Discharge	1991	Bjerklie, D. Dames & Moore, Inc. & Science Applications International Corporation		X	X		X	X					
1990 Endicott Environmental Monitoring Program Final Report, Volume V: River Discharge	1993	Bjerklie, D. Dames & Moore, Inc. & Science Application International Corporation		X			X	X					
The 1992 Endicott Development Fish Monitoring Program, Volume III: Oceanography	1994	Bjerklie, D. Dames & Moore, Inc. & Science Application International Corporation		X				X					
1993 Endicott Development Fish Monitoring Program, Volume III: Sagavanirktok River Discharge	1994	Bjerklie, D. Dames & Moore, Inc.		X				X					

<b>Publication</b>	<b>Date</b>	<b>Author(s)</b>	<b>Climate Change</b>	<b>Hydrology</b>	<b>Sedimentology</b>	<b>Permafrost and Soils</b>	<b>Meteorology</b>	<b>Field Data</b>	<b>Satellite/Aerial Imagery</b>	<b>Geophysics</b>	<b>Modeling</b>	<b>Water Quality</b>	<b>Geochemistry</b>
Environmental Summer Studies (1982) for the Endicott Development, Volume II: Physical Properties	1983	Britch, R., Miller, R., Downing, J., Petrillo, T., & Veit, M. LGL Alaska Research Associates		X	X		X	X					
1988 Final Report for the Endicott Environmental Monitoring Program, Volume IV: Meteorology.	1991	Cover, D. Science Applications International Corporation					X	X					
1985 Final report for the Endicott Environmental Monitoring Program, Volume V: Sedimentation and Erosion Monitoring	1987	Danek, L., & Tourtellotte, G. U.S. Army Corps of Engineers, Alaska District		X	X			X					
1986 Final Report for the Endicott Environmental Monitoring Program Part III, Chapter 2, Sedimentation and Erosion Monitoring	1990	Danek, L., & Tourtellotte, G. U.S. Army Corps of Engineers, Alaska District		X	X			X					
Report of Results, Discharge Measurement Program, October to December 1979, West Channel, Sagavanirktok River	1980	Earl and Wright Consulting Engineers		X				X					
Preliminary Study of River Hydrology and River Training Measures at the Bridge on West Channel Sagavanirktok River	1980	Earl and Wright Consulting Engineers		X									

<b>Publication</b>	<b>Date</b>	<b>Author(s)</b>	<b>Climate Change</b>	<b>Hydrology</b>	<b>Sedimentology</b>	<b>Permafrost and Soils</b>	<b>Meteorology</b>	<b>Field Data</b>	<b>Satellite/Aerial Imagery</b>	<b>Geophysics</b>	<b>Modeling</b>	<b>Water Quality</b>	<b>Geochemistry</b>
1985 Final Report for the Endicott Environmental Monitoring Program, Volume II: Meteorology	1987	Hummer, P. Envirosphere Company		X			X	X					
1986 Final Report for the Endicott Environmental Monitoring Program, Volume II, Part II, Chapter 1: Meteorology	1990	Hummer, P. Envirosphere Company		X			X	X					
1987 Final Report for the Endicott Environmental Monitoring Program, Volume III, Part II, Chapter I: Meteorology	1991	Hummer, P. Envirosphere Company		X			X	X					
1982 Breakup Observations, West Channel Sagavanirktok River	1982	Hydrocon Engineering		X				X					
Repair of River Training Structures As a Result of Sagavanirktok River Flood, August	1992	Hydroconsult EN3 Services Ltd.		X									
1986 Endicott Environmental Monitoring Program, Annual Report, Volume II: River Discharge, Part II, Chapter 2	1990	Johannessen, J. Envirosphere Company		X			X	X					

<b>Publication</b>	<b>Date</b>	<b>Author(s)</b>	<b>Climate Change</b>	<b>Hydrology</b>	<b>Sedimentology</b>	<b>Permafrost and Soils</b>	<b>Meteorology</b>	<b>Field Data</b>	<b>Satellite/Aerial Imagery</b>	<b>Geophysics</b>	<b>Modeling</b>	<b>Water Quality</b>	<b>Geochemistry</b>
1987 Endicott Environmental Monitoring Program, Annual Report, Volume II: River Discharge, Part II, Chapter 2	1991	Johannessen, J. Envirosphere Company		X			X	X					
Sagavanirktok and Putuligayuk River, Prudhoe Bay Alaska	1981	McDonald, G.		X				X					
Sagavanirktok and Putuligayuk River, Prudhoe Bay, Alaska	1983	McDonald, G.		X				X					
Prudhoe Bay Unit Breakup 1984 Sagavanirktok and Putuligayuk Rivers, Prudhoe Bay, Alaska	1984	McDonald, G.		X			X						
1988 Breakup Climatologic Conditions Sagavanirktok River Basin	1988	McDonald, G.		X			X						
1989 Sagavanirktok River Breakup	1990	McDonald, G.		X			X						
1990 Breakup Annual Summary Report.	1990	McDonald, G.		X			X						
Stream Studies Program, Volume II: Stream Investigations in the West Sag Development Area, Alaska, 1984	1984	PND		X									

<b>Publication</b>	<b>Date</b>	<b>Author(s)</b>	<b>Climate Change</b>	<b>Hydrology</b>	<b>Sedimentology</b>	<b>Permafrost and Soils</b>	<b>Meteorology</b>	<b>Field Data</b>	<b>Satellite/Aerial Imagery</b>	<b>Geophysics</b>	<b>Modeling</b>	<b>Water Quality</b>	<b>Geochemistry</b>
1990 Endicott Environmental Monitoring Program Final Report, Volume V: Meteorology	1993	Walter, B., & Horgan, M. Science Application International Corporation					X	X					
1985 Endicott Environmental Monitoring Program Annual Report, Volume II: River Discharge	1987	Rummel, B. Envirosphere Company		X				X					
Sagavanirktok River Breakup, 1987	1987	Santana B., & Wangstrom, P. ARCO Oil and Gas Company		X				X					
1986 Endicott Environmental Monitoring Program Annual Report, Part III, Chapter 1, Ice Breakup/Freezeup	1990	Schrader, G., & Hachmeister, L. Envirosphere Company		X				X					
1985 Final Report for the Endicott Environmental Monitoring Program, Part III, Chapter 1, Ice Breakup/Freezeup	1987	Stringer, W. Envirosphere Company		X									
Endicott Development Project Final Environmental Impact Statement, Volume II: Technical Discussion	1984	U.S. Army Corps of Engineers, Alaska District and Environmental Research and Technology, Inc.		X		X	X						
1989 Final Report for the Endicott Environmental Monitoring Program, Volume IV: Meteorology	1991	Walter, B., Horgan, M., & Cover, D. Science Applications International Corporation		X			X	X					

Publication	Date	Author(s)	Climate Change	Hydrology	Sedimentology	Permafrost and Soils	Meteorology	Field Data	Satellite/Aerial Imagery	Geophysics	Modeling	Water Quality	Geochemistry
Duck Island/Sag Delta Development Project Final Report	1982	Woodward-Clyde Consultants		X									
<b>Journal/Scholarly Articles</b>													
Overview of environmental and hydrogeologic conditions at Deadhorse, Alaska	1995	Alcorn, M., & Dorava, J.		X								X	
Short-pulse radar detection of groundwater in the Sagavanirktok River floodplain in early spring	1992	Arcone, S., Chacho, E., & Delaney, A.								X			
Seasonal structure of taliks beneath arctic streams determined with ground-penetrating radar	1998	Arcone, S., Chacho, E., & Delaney, A.								X			
Water discharge in the Colville River, 1962	1966	Arnborg, L., Walker, H., & Peippo, J.		X									
Suspended load in the Colville River, Alaska, 1962	1967	Arnborg, L., Walker, H., & Peippo, J.		X	X								
Sagavanirktok River sediment load 1980	1981	Barnes, P.W., & Reiss, T.		X	X								

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Association of ice and river channel morphology determined using ground penetrating radar in the Kuparuk River, Alaska	2005	Best, H., McNamara, J.P., & Liberty, L.		X	X	X				X			
The Sagavanirktok and adjacent river systems, eastern North Slope, Alaska: An analog for ancient fluvial terrain on Mars	1983	Boothroyd, J., & Timson, B.		X	X								
Sedimentary processes along Sagavanirktok River, eastern North Slope, Alaska	1984	Boothroyd, J., & Timson, B.		X	X								
Measurement of lateral erosion at proposed river crossing sites of the Alaska pipeline	1971	Brice, J.		X	X								
Use of synthetic aperture radar (SAR) to identify and characterize overwintering areas of fish in ice-covered arctic rivers	2010	Brown, R., Duguay, C., Mueller, R., Moulton, L., Doucette, P., & Tagestad, J.		X					X				
Modeling snowmelt runoff in an arctic coastal plain	1974	Carlson, R., Norton, W., & McDougall, J.		X							X		
Flood surveys along proposed TAPS route, Alaska, July 1971	1972	Childers, J.		X									

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Hydrologic reconnaissance of streams and springs in eastern Brooks Range Alaska July 1972	1973	Childers, J., Sloan, C., & Meckel, J.		X					X			X	
Channel erosion surveys along TAPS route Alaska 1974	1975	Childers, J., & Jones, S.		X	X				X				
Water resources along the TAPS route, Alaska, 1970–74	1977	Childers, J., Nauman, J., Kernodle, D., & Doyle, P.		X								X	
Hydrologic reconnaissance of the eastern North Slope, Alaska, 1975	1977	Childers, J., Sloan, C., Meckel, J., & Nauman, J.		X									
Stream flow and channel erosion investigations along the TAPS route	1978	Childers, J., Kernodle, D., & Loeffler, R.		X	X					X			
Application of near-surface geophysical techniques for geologic and hydrologic investigations in the Arctic	2002	Delaney, A., Peapples, P., & Arcone, S.		X	X	X				X			
Hydrology of North Slope coastal plain streams	1983	Drage, B., Gilman, J., Hoch, D., Griffiths, L., Pewe, T., & Brown, J.		X	X	X							
Preliminary engineering maps of the proposed trans-Alaska pipeline route, Beechey Point and Sagavanirktok quadrangles	1971	Ferrians, O.				X							



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Applications of ERS-1 SAR data for analyzing riverine and coastal processes and geomorphology	1993	Gatto, L., Calkins, D., & Chacho, E.		X	X				X	X			
Multispectral remote observations of hydrologic features on the North Slope of Alaska	1977	Hall, D., & Bryan, M.		X					X				
Distribution and character of icings in northeastern Alaska. Environmental assessment of the Alaskan Continental Shelf. Principal investigators' report for the year ending March 1976	1977	Harden, D., Barnes, P., & Reimnitz, E.		X		X						X	
Gravel mine site rehabilitation in the Alaskan Arctic: A case history	1988	Hemming, C., Byrne, B., Weber, P., & Joyce, M.		X	X							X	
The Sagavanirktok River, North Slope Alaska: Characterization of an arctic stream	1986	Hodel, K.		X	X								
Precipitation in the Alaska Central Arctic	2015	Homan, J.		X			X						
Hydrology of the Central Arctic river basins of Alaska	1973	Kane, D., & Carlson, R.		X		X	X						

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Regional groundwater flow in an area mapped as continuous permafrost, NE Alaska (USA)	2013	Kane, D., Yoshikawa, K., & McNamara, J.		X		X							X
Geochemistry of streams, soils, and permafrost and the geochemical effects of climate change in a continuous permafrost region, Arctic Alaska, United States	2006	Keller, K.				X						X	X
Initial quantification of suspended sediment loads for three Alaska North Slope rivers	2016	Lamb, E., & Toniolo, H.		X	X								
Flood characteristics of Alaskan streams	1978	Lamke, R.											
Flood-prone area maps at three sites along the trans-Alaska pipeline, Alaska	1980	Lamke, R., & Jones, S.		X					X				
Fluvial aquifers as a source of potable water: Kuparuk and Sagavanirktok River, Prudhoe Bay area, Alaska	1976	Lewellen, R.		X									
Aufeis in the Ivishak River, Alaska, mapped from satellite radar interferometry	1997	Li, S., Benson, C., Shapiro, L., & Dean, K.		X					X				

<b>Publication</b>	<b>Date</b>	<b>Author(s)</b>	<b>Climate Change</b>	<b>Hydrology</b>	<b>Sedimentology</b>	<b>Permafrost and Soils</b>	<b>Meteorology</b>	<b>Field Data</b>	<b>Satellite/Aerial Imagery</b>	<b>Geophysics</b>	<b>Modeling</b>	<b>Water Quality</b>	<b>Geochemistry</b>
Channel erosion surveys along the TAPS route, Alaska 1977	1977	Loeffler, R., & Childers, J.		X	X				X				
Evolution and deposits of a gravelly braid bar, Sagavanirktok River, Alaska	2004	Lunt, I., & Bridge, J.		X	X				X	X			
A quantitative, three-dimensional depositional model of gravelly braided rivers	2004	Lunt, I., Bridge, J., & Tye, R.		X	X						X		
River export of nutrients and organic matter from the North Slope of Alaska to the Beaufort Sea	2014	McClelland, J., Townsend-Small, A., Holmes, R., Pan, F., Stieglitz, M., Khosh, M., & Peterson, B.										X	X
Case study of a large summer flood on the North Slope of Alaska: Bedload transport	2008	McNamara, J., Oatley, J., Kane, D., & Hinzman, L.		X	X			X					
The impact of a shrinking cryosphere on the form of arctic alluvial channels	2009	McNamara, J., & Kane D.	X	X	X	X	X						
The flooding potential and geomorphology of five selected arctic rivers, Arctic Coastal Plain, Alaska	1982	Mortensen, T.		X					X	X			
North Slope water resources studies	1976	Nelson, G.		X									

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Composition of dissolved and suspended matter transported by the Sagavanirktok, Kuparuk and Colville rivers in the Alaskan Arctic	2002	Rember, R.		X	X							X	X
Increased concentrations of dissolved trace metals and organic carbon during snowmelt in rivers of the Alaskan Arctic	2004	Rember, R., & Trefry, J.		X	X							X	X
Chemical and physical weathering of fluvial sands in an arctic environment: Sands of the Sagavanirktok River, North Slope, Alaska	1997	Robinson, R., & Johnsson, M.		X	X					X			
Spatial variability in river sediments and its link with river channel geometry	2006	Rubin, Y., Lunt, I., & Bridge, J.		X	X								
Determining the permeability of braided river deposits from the Sagavanirktok River, Alaska: A modern analog for glacial outwash aquifers and petroleum reservoirs	2002	Salogar, L., & Salvage, K.		X	X	X							

<b>Publication</b>	<b>Date</b>	<b>Author(s)</b>	<b>Climate Change</b>	<b>Hydrology</b>	<b>Sedimentology</b>	<b>Permafrost and Soils</b>	<b>Meteorology</b>	<b>Field Data</b>	<b>Satellite/Aerial Imagery</b>	<b>Geophysics</b>	<b>Modeling</b>	<b>Water Quality</b>	<b>Geochemistry</b>
Implications of resource development on the North Slope of Alaska with regard to water quality on the Sagavanirktok River	1976	Schallock, E.		X								X	
Physical, chemical and biological conditions of the Sagavanirktok River and nearby control streams, Shaviovik and Canning rivers	1981	Schallock, E., & Mueller, E.										X	X
Effects of permafrost on stream channel behavior in Arctic Alaska	1978	Scott, K.		X	X	X							
A groundwater supply for an oil camp near Prudhoe Bay, Arctic Alaska	1973	Sherman, R.		X								X	
Icings along the trans-Alaska pipeline route	1975	Sloan, C., Zenone, C., & Mayo, L.		X									
Icing along the trans-Alaska pipeline route	1976	Sloan, C., Zenone, C., & Mayo, L.		X		X			X				
Antecedent conditions and damage caused by 2015 spring flooding on the Sagavanirktok River, Alaska	2017	Toniolo, H., Stutzke, J., Lai, A., Youcha, E., Tschetter, T., Vas, D., Keech, J., & Irving, K.		X	X		X	X					

Publication	Date	Author(s)	Climate Change	Hydrology	Sedimentology	Permafrost and Soils	Meteorology	Field Data	Satellite/Aerial Imagery	Geophysics	Modeling	Water Quality	Geochemistry
Lessons learned for river crossing designs from four major floods experienced along the trans-Alaska pipeline	2002	Veldman, W., & Ferrell, J.		X									
Permafrost and ice effects on riverbank erosion	1966	Walker, H., & Arnborg, L.		X		X							
The impact of Endicott causeway on sediment transport in the Sagavanirktok River delta, North Slope Alaska	2011	Yager, G.		X	X								
Causeway impacts on sediment transport in the Sagavanirktok River delta, North Slope Alaska	2013	Yager, G., & Ravens, T.		X	X								
Spring and aufeis (icings) hydrology in the Brooks Range, Alaska	2007	Yoshikawa, K., Hinzman, L., & Kane, D.		X								X	X
<b>Field Data/Real-Time Data Collection</b>													
National Oceanic and Atmospheric Administration (NOAA), National Climate Data Center (NCDC) <a href="https://www.ncdc.noaa.gov/">https://www.ncdc.noaa.gov/</a>		NOAA/NCDC		X			X	X					

<b>Publication</b>	<b>Date</b>	<b>Author(s)</b>	<b>Climate Change</b>	<b>Hydrology</b>	<b>Sedimentology</b>	<b>Permafrost and Soils</b>	<b>Meteorology</b>	<b>Field Data</b>	<b>Satellite/Aerial Imagery</b>	<b>Geophysics</b>	<b>Modeling</b>	<b>Water Quality</b>	<b>Geochemistry</b>
U.S. Department of Agriculture National Resources Conservation Service (NRCS) <a href="https://www.nrcs.usda.gov/wps/portal/nrcs/main/ak/snow/">https://www.nrcs.usda.gov/wps/portal/nrcs/main/ak/snow/</a>		NRCS		X		X	X	X					
Permafrost Laboratory University of Alaska Fairbanks Geophysical Institute (GI) <a href="http://permafrost.gi.alaska.edu/">http://permafrost.gi.alaska.edu/</a>		Romanovsky, V., Kholodov, A., Cable, W., Cohen, L., Panda, S., Muskett, R., Marchenko, S., & Nicol'sky, D. UAF/GI				X	X	X					
University of Alaska Fairbanks Toolik Field Station <a href="https://toolik.alaska.edu/edc/">https://toolik.alaska.edu/edc/</a>		UAF/Institute of Arctic Biology		X			X	X					
University of Alaska Fairbanks Water and Environmental Research Center <a href="http://ine.uaf.edu/werc">http://ine.uaf.edu/werc</a>		UAF/WERC		X			X	X				X	
USGS Water Data for the Nation <a href="https://waterdata.usgs.gov/nwis">https://waterdata.usgs.gov/nwis</a>		USGS		X			X	X				X	

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