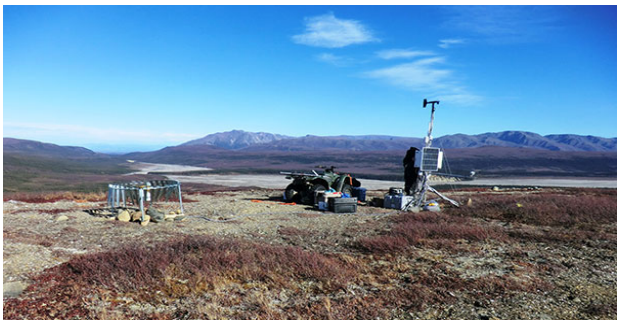
Site Name	Coal Mine Ridge
Processed by	Niki Jacobs
Collected by	Anna Liljedahl, Joel Bailey
PI	Anna Liljedahl, akliljedahl@alaska.edu
Location(UTM)	X: 561974 Y: 7060795
Elevation(m)	1021

Codes for missing or bad data	6999 = Missing Data 7777 = Poor Quality Data

Notes

Times are in AKST = UTC-08.00
Rainfall(PPT) is defined as precipitation recorded when air temperature exceeds -1 °C.
Precipitation recorded at colder temperaures were marked with a 7777.
Snow depths of less than 0m or more than 1m were marked with a 7777.
Summer data for snow depth is noise from vegetation, but is still reported.
Solar radiation and rainfall are only measured in summer.
No valid solar radiation data was collected for this year.

Funding: National Science Foundation, Arctic System Science Award #1304905 (2013–2016)



Instruments

Air Temperature(AT) and Relative Humidity(RH):

Heights of Sensors:	1m and 2m
Serial numbers:	60837457(1m) and 60837491(2m)
Instrument Name/Company:	Campbell Scientific HC2S3-L Temperature and Relative Humidity Probe

General Sensor Specifications
Electronics Operating Limits: -40° to +100°C
Storage Temperature: -50° to +100°C
Diameter: 15 mm (0.6 in)
Length w/o connector: 85 mm (3.3 in)
Length w/connector: 183 mm (7.25 in)
Weight: 10 g (0.35 oz)
Filter: Polyethylene (standard) or Teflon (optional, ordered separately)
Current Consumption:
< 4.3 mA @ 5 Vdc
< 2.0 mA @ 12 Vdc
Supply Voltage: 5 to 24 Vdc
Startup Time: 1.5 s typicala
Maximum Startup Current:
< 50 mA for 2 µs
Analog Outputs
Offset at 0 V: ±3 mV (maximum)
Deviation for Digital Signal:
< ±1 mV (0.1°C, 0.1% R. H.)

Technical details for temperature sensor
Temperature Sensor: PT100 RTD, IEC 751 1/3 Class B
Measurement Range: -40° to +60°C (default)b
Output Signal Range: 0 to 1 V
Accuracy at 23°C: ±0.1°C with standard configuration settings
Long Term Stability: < 0.1°C/year
Sensor Time Constant
[63% step change (1 m/s air flow at sensor)]
Standard PE Filter: ≤ 22 s
Optional Teflon Filter: ≤ 30 s [Typical 4 s, 63% of a step change (1 m/s air flow at sensor)]

Technical details for relative humidity sensor
Sensor: ROTRONIC® Hygromer IN-1
Measurement Range: 0 to 100% RH, non-condensing
Output Signal Range: 0 to 1 Vdc
Long-Term Stability: < 1% RH per year
Accuracy at 23°C: ±0.8% RH with standard configuration settings
Sensor Time Constant
[63% of a 35 to 80% RH step change (1 m/s air flow at sensor)]
Standard PE Filter: ≤ 22 s
Optional Teflon Filter: ≤ 30 s [Typical 10 s, 63% of a 35 to 80% RH step change (1 m/s air flow at sensor)]

Dew Point(DP): Calculated from air temperature and relative humidity at 1m.

Solar Radiation Shield:
Instrument Name/Company: Campbell Scientific 41003-5 10-Plate Solar Radiation Shield

Solar Radiation Shield Specifications
Attaches to a crossarm, mast, or user-supplied pipe with a 1.0 to 2.1 in. OD
Weight: 590 g (1.3 lb)
Height: 20.3 cm (8.0 in.)
Plate Diameter: 11.9 cm (4.7 in.)
Construction: UV stabilized white thermoplastic plates, aluminum mounting bracket, white powder coated stainless-steel U-bolt clamp

Wind Speed(WS) and Wind Direction(WD):
Height of Sensor: 3m
Serial number: WM118947
Instrument Name/Company: Campbell Scientific RM Young 05103-45-L Wind Monitor, Alpine Version

General Sensor Specifications
Operating Temperature:
-50° to +50°C, assuming non-riming conditions
Overall Height: 37 cm (14.6 in.)
Overall Length: 55 cm (21.7 in.)
Main Housing Diameter: 5 cm (2.0 in.)
Propeller Diameter: 14 cm (5.5 in.)
Mounting Pipe Description:
34 mm (1.34 in.) OD; standard 1.0-in. IPS schedule 40
Weight: 1 kg (2.2 lb)

Technical details for wind speed
Range: 0 to 100 m/s (0 to 224 mph)
Accuracy: ±0.3 m/s (0.6 mph) or 1% of reading
Starting Threshold: 1.0 m/s (2.2 mph)
Distance Constant (63% recovery): 2.7 m (8.9 ft)
Output: ac voltage (three pulses per revolution);
90 hz (1800 rpm) = 8.8 m/s (19.7 mph)

Technical details for wind direction
Range
Mechanical: 0 to 360°
Electrical: 355° (5° open)
Accuracy: ±5°
Starting Threshold at 10° Displacement:
1.1 m/s (2.4 mph)
Damping Ratio: 0.3
Damped Natural Wavelength:
24.3 ft (7.4 m)
Undamped Natural Wavelength:
23.6 ft (7.2 m)
Output: analog dc voltage from potentiometer—resistance 10kohms; linearity 0.25%; life expectancy 50 million revolutions
Power switched excitation voltage supplied by datalogger

Rain(PPT):
Height of Sensor: 61cm
Serial number: 51311-512
Instrument Name/Company: Campbell Scientific Texas Electronics TE525MM Rain Gage

Technical details
Sensor Type: Tipping bucket/magnetic reed switch
Material: Anodized aluminum
Temperature: 0° to +50°C
Resolution: 1 tip
Volume per Tip: 0.16 fl. oz/tip (4.73 ml/tip)
Rainfall per Tip: 0.01 in (0.254 mm)
Accuracy
Up to 1 in./hr: ±1%
1 to 2 in./hr: +0, -3%
2 to 3 in./hr: +0, -5%
Funnel Collector Diameter: 15.4 cm (6.06 in)
Height: 24.1 cm (9.5 in)
Tipping Bucket Weight: 0.9 kg (2.0 lb)
Cable: 2-conductor shielded
Cable Weight: 0.1 kg (0.2 lb) per 10 ft length

A Wind screen was used to house the rain gauge and minimize the effects of strong winds.

Instrument Name/Company: Campbell Scientific 260-953 Alter-Type Wind Screen for Tipping Bucket Rain Gages

Wind Screen Specifications
Manufacturer: Novalynx

Leaves
Number: 32
Material: Zinc-plated 20-gauge steel
Width: 3 in. (7.6 cm)
Length: 16 in. (40.6 cm)

Posts
Number: Four
Length: 2 ft (0.6 m)
Material: Galvanized steel

Ring Installed Diameter: 4 ft (1.2 m)
Spacers: 3/4–in. EMT
Installed Height: 2 ft (0.6 m) without leg extensions or 3 ft (0.9 m) with leg extensions
Shipping Weight: 45 lb (20.4 kg)

Snow depth:
Height of Sensor: 1.276m
Serial number: ?
Instrument Name/Company: Campbell Scientific SR50A-L Sonic Ranging Sensor

Technical details
Measurement Time: < 1.0 s
Output Options: SDI-12 version 1.3, RS-232, RS-485 (output options selected by configuring internal jumpers)
Baud Rates (RS-232, RS-485 modes):
1200 to 38400 bps
Power Requirements: 9 to 18 Vdc (typically powered by datalogger's 12 Vdc power supply)
Measurement Range: 0.5 to 10 m
(1.6 to 32.8 ft)
Beam Acceptance: ~30°
Resolution: 0.25 mm (0.01 in)
Accuracy: ±1 cm (0.4 in) or 0.4% of distance to target (whichever is greatest); requires external temperature compensation
Operating Temperature Range: -45° to +50°C
Length: 10.1 cm (4.0 in)
Diameter: 7.5 cm (3 in)
Weight: 1.0 kg (2.2 lb)

Power Consumption
Active (typical): 250 mA
Quiescent SDI-12 Mode: < 1.0 mA
Quiescent RS-232/RS485 Modes:
< 1.25 mA (≤9600 bps)
< 2.0 mA (>9600 bps)

Solar Radiation: No valid data collected.

Soil Temperature(ST):
Height of Sensor: multiple depths, see data "Hourly Soil"
Sensor Installation: Soil temperature sensors, custom built using 12 pair, twisted pair, direct burial, telephone cable.
Type: Thermistor used is an YSI44033

Soil Moisture(SM):
Height of Sensor: multiple depths, see data "Hourly Soil"
Serial number: ?
Instrument Name/Company: Campbell Scientific CS616-L Water Content Reflectometer

Technical details
Operational Temperature: 0° to +70°C
Probe-to-Probe Variability: ±0.5% VWC in dry soil, ±1.5% VWC in typical saturated soil
Accuracy: ±2.5% VWC using standard calibration with bulk electrical conductivity of ≤0.5 dS m-1, bulk density of ≤1.55 g cm-3, and measurement range of 0% VWC to 50% VWC
Precision: better than 0.1% VWC
Resolution: 0.1% VWC
Output: ±0.7 V square wave with frequency dependent on water content

Current Drain: 65 mA @ 12 Vdc (when enabled); 45 µA (quiescent typical)
Power Supply Voltage: 5 Vdc minimum;
18 Vdc maximum
Enable Voltage: 4 Vdc minimum; 18 Vdc maximum
Electromagnetic: CE compliant; meets EN61326 requirements for protection against electrostatic discharge
Rod Length: 300 mm (11.8 in)
Rod Diameter: 3.2 mm (0.13 in)
Rod Spacing: 32 mm (1.3 in)
Probe Head Height: 85 mm (3.3 in)
Probe Head Width: 63 mm (2.5 in)
Probe Head Depth: 18 mm (0.7 in)
Weight without cable: 280 g (9.9 oz)
Cable Weight: 35 g per m (0.38 oz per ft)

Data Logging:	**Name**	**Serial #**
Data Logger:	Campbell Scientific Cr1000	50163
Multiplexor:	Campbell Scientific AM16/32B	13284
Keyboard:	Campbell Scientific CR1000KD	6555
Cellular Digital Modem:	Airlink GPRS Cell Modem	1202673425
Solar Controller:	Morningstar SS-10-12V	12140595
Camera(at 1m):	Campbell Scientific CC5MPX w/Defroster	1532

Comments

This data was compiled and processed in R, scripts should be contained in the server files.
For more information or copies of scripts please contact Niki Jacobs at najacobs@alaska.edu
Soil temperatures at 150cm were excluded from the text file and soil temperature plot as the measurements were an extreme deviation from the the other depths
CorrectedSnow removes negative values from snow depth data
Snow depths of less than 0m or more than 1m were marked with a 7777.