

Site Name	Coal Mine Ridge
Processed by	Aaron, ajorr@alaska.edu
Collected by	Joel Bailey, Tiffany Gatesman, Aaron Orr
PI	Anna Liljedahl, akiljedahl@alaska.edu
Location(UTM)	X: 561974                      Y: 7060795
Elevation(m)	1012m
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 temperatures 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.
Funding	National Science Foundation, Arctic System Science Award #1304905 (2013–2016)



Instruments	<b>Air Temperature(AT) and Relative Humidity(RH):</b> <b>Heights of Sensors:</b> 1m and 2m <b>Serial numbers:</b> 60837457(1m) and 60837491(2m) <b>Instrument Name/Company:</b> Campbell Scientific HC2S3-L Temperature and Relative Humidity Probe
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**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 typical  
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)  
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:  $\pm 0.3$  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:  $\pm 5^\circ$   
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:  $\pm 1\%$   
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

<b>Wind Screen Specifications</b>	
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)	

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

<b>Technical details</b>	
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)	

<b>Power Consumption</b>	
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)	

<b>Solar Radiation:</b>	
<b>Height of Sensor:</b>	1m
<b>Serial number:</b>	116490
<b>Instrument Name/Company:</b>	Campbell Scientific Kipp & Zonen CMP3-L Pyranometer with Sun Shield

<b>Technical details</b>	
Light Spectrum Waveband: 310 to 2800 nm	
Maximum Irradiance: 2000 W/m²	
Sensitivity: 5 to 20 µV/W/m²	
Operating Temperature Range: -40° to +80°C	
Temperature Dependence: ±5% (-10° to +40°C)	
Non-linearity (0 to 1000 W/m²): < ±2.5%	
Tilt Response (±80°): < ±2% at 1000 W/m²	
ISO Classification: Second Class	
Width: 7.9 cm (3.1 in.)	
Height: 6.7 cm (2.6 in.)	
Dome Diameter: 3.2 cm (1.3 in.)	
Weight with 10 m cable: 600 g (1.2 lb)	

<b>Soil Temperature(ST):</b>	
<b>Height of Sensor:</b>	multiple depths, see data "Hourly Soil"
<b>Sensor Installation:</b>	Soil temperature sensors, custom built using 12 pair, twisted pair, direct burial, telephone cable.
<b>Type:</b>	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<sup>-1</sup>, bulk density of ≤1.55 g cm<sup>-3</sup>, 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)

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

Comments