Meteorological Post Processing Documentation and Task Lists for 2021/2022

McMurdo Dry Valley Long Term Ecological Research (LTER)

This document compiles the steps taken to post-process raw meteorological data files and notes from station visits. Each numbered output value is identified by column header name, unit of measurement, and post-processing instruction. Station notes document datalogger time adjustments, sensor status, sensor and station maintenance, time of storage module changes, equipment and data problems, and other observations. Files are listed alphabetically by file name that begin with the station ID.

Station Reports

Appendix

Prepared by: Krista Myers, 2021-22 Field Season, Louisiana State University

Sensors:

See below for list of sensors currently used on McMurdo LTER meteorological stations

Sensor Type	Manufacturer	Model Number
Air Temperature	Campbell	107
Relative Humidity	Vaisala	HMP45
Relative Humidity (new 2022)	Vaisala	HMP155A-L
Wind (anemometer)	RM Young	05103
Shortwave radiation (pyranometer)	Licor	LI-200R
Shortwave radiation (pyranometer)	Eppley	SPP
Photosynthetically Active Radiation (PAR)	Licor	LI-190R
Longwave radiation (pyrgeometer)	Eppley	PIR
Soil Temperature	Campbell	107
Ultrasonic Ranger	Campbell	SR-50
Barometer	Vaisala	CS106
Soil moisture	Decagon	ECH20 5TM
Datalogger	Campbell	CR10X

File description and task list for files:
  o1=omit from level 1
  ok= no changes to get to level 1
  rclow= reverse temperatures to mV and apply clow subroutine to mV values using Steinhart-Hart equation
  bad= normally would be included in level 1 but number is suspect or know to be incorrect
  flag= reasonable number but needs a note attached concerning its collection
  Lowe= see note for relative humidity below

Data Flags

Definition	Flags	Post-processing	Data Manager
Out of Range	R	None	Flag as R, except flag as "U" when IceT20cm exceeds 0 degrees and "V" when IceT1m exceeds 0 degrees
Negative values zeroed out	Z	Converted to zero	Flag as Z
Bad Value - Value below zeroing value	T	Value omitted	Flag as F
Bad Value - Value is equal to -6999 or known to be questionable	B	Value omitted (changed 2018)	Flag as B
Bad Value - Raw temp value (-53C and 32.79C) which exceeds the bracketed limited for bisection	F	Value omitted	Flag as B
SwRadOut is greater than a % of SwRadIN	S	None	Flag as S
Wdir and WDirStD zeroed out because WSpd = 0	N	Converted to zero	Flag as N
Value missing	M	None	Flag as M

Relative humidity correction note: All of the relative humidity (RH) values were corrected for a systematic error in the measurement created by an instrument manufacturer error. All RH data with air temperatures below freezing were corrected using the vapor pressure over ice (rather than over water which was used initially). The error became quite large for very cold temperatures (the correction could grow to around 30%). The polynomials used for the correction is based on Lowe (1977).

=[RH3m]*(6.107799961 + [AirT3m] * (0.4436518521 + [AirT3m] * (0.01428945805 + [AirT3m] * (0.0002650648471 + [AirT3m] *(0.000003031240396 + [AirT3m] * (0.00000002034080948 + 0.0000000006136820929 * [AirT3m])))))) / (6.109177956 + [AirT3m] * (0.503469897 + [AirT3m] * (0.01886013408 + [AirT3m] * (0.0004176223716 + [AirT3m] * (0.00000582472028 + [AirT3m] * (0.00000004838803174 + 0.0000000001838826904 * [AirT3m]))))))

Relative Humidity values are capped between 0 to 100%. Any values that fall outside of this range are flagged as 'R'.

Lake Bonney Met Station (BOYM)

Filename:	BOYM_202122_PROCESSED_noLwRad.csv	
Author of this report:	Krista Myers	
File Period:	12/2/2020 12:00 to 12/13/2021 10:45	
Sampling Frequency:	sonic and prec. every 60 minutes, wind speed every 4 sec, other every 30 sec	
Averaging and Output Interval:	every 15 minutes	
Program Name:	BOYM_201718_V1.dld	

1	array I.D.	o1
2	Year	ok
3	Day	ok
4	Time	ok
5	mean air temp. @ 3 meters (C)	rclow
6	corrected mean R.H. @ 3 meters (%)	Lowe correction
7	mean air temp. @ 1 meters (C)	rclow
8	mean solar flux; incoming (up-facing) (W/m2) **Licor pyranometer; SN: PY25306**	ok
9	mean solar flux; outgoing (down-facing) (W/m2) **Licor pyranometer; SN: PY20222**	ok
10	mean horizontal wind speed (m/s)	ok
11	resultant mean wind speed (m/s)	o1
12	resultant mean wind direction (degrees from north)	ok
13	standard deviation of wind direction (degrees)	ok
14	maximum wind speed (m/s) **RM Young SN: WM85155**	ok
15	minimum wind speed (m/s)	ok
16	mean P.A.R. (micromols/s/m2) **Licor quantum; SN: Q29764**	divide by 200, multiply by 239.95 (Q29764)
17	mean soil temperature @ 0 cm in soil (C)	rclow
18	mean soil temperature @ 5 cm in soil (C)	rclow
19	mean soil temperature @ 10 cm in soil (C)	rclow
20	sample depth from sensor to surface (cm)	Measured depth * -100
21	mean up-facing pyrgeometer, rad. comp. (W/m2) ***Eppley data not reliable - removed***	***Removed***
22	mean up-facing pyrgeometer2 (W/m2) ***Eppley data not reliable - removed***	***Removed***
23	mean down-facing pyrgeometer, rad. comp. (W/m2) ***Eppley pyrgeometer not working - removed***	***Removed***
24	mean down-facing pyrgeometer2 (W/m2) ***Eppley pyrgeometer not working - removed***	***Removed***
25	sample precipitation (mm)	ok
26	sample of battery voltage	o1

Notes:
- Station visited on 12/13/2021 by M. Stone and K McNulty
- Power off at 10:55; power on at 16:46
- Wind monitor (RM Young anemometer) was snapped off and found ~20 m away from the station to the east. Anemometer snapped off during a strong wind event in August 2021. Data was removed and flagged as 'B' from 8/2/2021 through 12/13/2021. Replaced anemometer on 12/13/2021.
- Wind monitor rotated 2 degrees clockwise.
- Sonic ranger not functioning – replaced with new internal transducer

- Replaced upward facing Licor pyranometer. Old SN: PY25306, new SN: PY28349 (new sensor also had SN D2440 written on it too)
- Replaced downward facing Licor pyranometer. Old SN: PY20222, new SN: PY20567
- Replaced quantum sensor (terrestrial PAR). Old SN: Q29764, new SN: Q30805. Note: in 2018, field notes indicated that quantum sensor was replaced with serial number C11725. We could not find any record of this serial number or calibration sheet. It wasn't until 2021 when we swapped the sensor that we realized the sensor we removed was Q29764, which was installed in November 2016. This means that C11725 must have been an error in the field, and the sensor was actually not swapped in 2018. The quantum sensors are supposed to be recalibrated every 2 years, so the data from 2018 – 2021 is out of calibration and users should be aware of this.
- Removed Eppley upward facing Pyrgeometer because it was out of calibration and we did not have a replacement. Sent back to LSU for maintenance.
- Soil temperature sensor depths were measured and re-established. 0 cm depth sensor actual depth before was measured to be 2.5 cm. Re-established at 1.7 cm (just below surface/rocks to prevent solar radiation from hitting it directly). 5 cm depth sensor actual depth before was measured to be 7.1 cm. Re-established at 5.0 cm depth. 10 cm depth sensor actual depth before was measured to be 11.5 cm, re-established at 10.0 cm depth.
- Replaced Campbell SM4M storage module (P8: BOYM_201718_V1.dld)
- GPS position taken with handheld GPS: Lat = 77.714711, Long = 162.464721

Lake Brownworth Met Station (BRHM)

Filename:	BRHM_202122_PROCESSED.csv	
Author of this report:	Krista Myers	
File Period:	11/30/2020 12:00 to 1/19/2022 15:45	
Sampling Frequency:	sonic every 60 minutes, wind speed every 4 sec, other every 30 sec	
Averaging and Output Interval:	every 15 minutes	
Program Name	BRHM_201112_v1	

1	array I.D.	o1
2	year	ok
3	day	ok
4	time	ok
5	mean air temp. @ 3 meters (C)	rclow
6	corrected mean R.H. @ 3 meters (%)	lowe correction
7	mean solar flux; incoming (up-facing) (W/m^2) **Licor pyranometer; SN: PY51355**	ok
8	mean solar flux; outgoing (down-facing) (W/m^2) **Licor pyranometer; SN: PY28371**	ok
9	mean horizontal wind speed (m/s) **RM Young anemometer; SN: WM15190**	ok
10	resultant mean wind speed (m/s) **RM Young anemometer; SN: WM15190**	ok
11	resultant mean wind direction (degrees from north) **RM Young anemometer; SN: WM15190**	o1
12	standard deviation of wind direction (degrees) **RM Young anemometer; SN: WM15190**	ok
13	maximum wind speed (m/s) **RM Young anemometer; SN: WM15190**	ok
14	minimum wind speed (m/s) **RM Young anemometer; SN: WM15190**	ok
15	mean P.A.R. (micromols/s/m^2) – **Licor quantum; SN: Q09916**	ok multiply by 1.379690949 (Q09916)
16	mean soil temperature @ 0 cm in soil (C)	rclow
17	mean soil temperature @ 5 cm in soil (C)	rclow
18	mean soil temperature @ 10 cm in soil (C)	rclow
19	sample depth from sensor to surface (cm)	measured depth * -100
20	sample of battery voltage	o1

Notes:

- Station visited on 1/19/2022 by K Myers, M Stone, and K McNulty
- Power off at 1547, Power on at 1610
- Ultrasonic ranger not working (still), required the SR50 sonic ranger red wire. It was wired into the 12V port on the very bottom right panel of the CR10X datalogger. Wiring diagram from 2011 does not show a red wire connected. We disconnected it, and will see if that fixes the issue. Did not replace the internal transducer.
- Wind monitor confirmed to be pointing true north. Data from past three years was now included in database because it was confirmed to be reliable.
- Wind monitor changed (new SN: WM15190)
- Replaced RH 3 m with Vaisala HMP45ASP, new SN: Y3340029
- Did not have time to check soil temperature sensor depths, will check next season

Canada Glacier Met Station (CAAM)

Filename:	CAAM_202122_PROCESSED	
Author of this report:	Krista Myers	
File Period:	12/14/2020 11:00 to 12/24/2021 09:00	
Sampling Frequency:	wind speed every 4 sec; all other every 30 sec	
Averaging and Output Interval:	every 15 minutes	
Program Name	CAAM_201011.V1	

1	array I.D.	o1
2	Year	ok
3	Day	ok
4	Time	ok
5	mean air temp. @ 3m (C)	rclow
6	corrected mean relative humidity (%)	Lowe correction
7	Aspirated mean air temp @ 3m (C)	rclow
8	mean solar flux; incoming (up-facing) (W/m^2) **Licor pyranometer; SN: PY56364**	ok
9	mean solar flux; outgoing (down-facing) (W/m^2) **Licor pyranometer; SN: PY27929**	ok
10	mean horizontal wind speed (m/s) **Anemometer; SN: WM15188**	ok
11	resultant mean wind speed (m/s) **Anemometer; old SN: WM15188**	o1
12	resultant mean wind direction (degrees from north) **Anemometer; SN: WM15188**	ok
13	standard deviation of wind direction (degrees) **Anemometer; old SN: WM15188**	ok
14	maximum wind speed (m/s) **Anemometer; old SN: WM15188**	ok
15	minimum wind speed (m/s) **Anemometer; old SN: WM15188**	ok
16	mV_therm_average	o1
17	mV_tpile_AVG	o1
18	Ice surface temp (C)	ok
19	sample battery voltage	o1

Notes:
- Station visited on 12/24/2021 by K Myers, M Stone, and K McNulty
- Power off at 09:09, power on at 10:26
- Replaced 3 m relative humidity sensor. Old SN: U2730016, new SN: Y3250058
- Replaced wind monitor. Old SN: WM15188, new SN: WM15828
- Height of downward pyranometer to the ice = 32.5 cm
- Hole on south tripod leg is melted out – less than 1 cm in the ice! Need to re-drill leg
- Returned on 12/31/2021 to redrill leg – got kovacs drill stuck 3 flights deep! Now using the kovacs drill as a leg for the station.
- Replaced Campbell SM4M storage module (P8: CAAM_201011_V1.dld)
- Years were off for a few of the datafiles on the SM4M download. Switched 1/9/2033 21:00 – 1/10/2033 1:15 & 1/11/2033 15:15 – 1/11/2033 1915 to the correct year (2021)
- There was a HUGE gap in the data from 5/28/2021 14:15 to 8/27/2021 13:45. This is because the battery voltage dipped too low and the station shut off. Need to replace the batteries next year (did not realize this when we first downloaded the data until we returned to the US).

Commonwealth Glacier Met Station (COHM)

Filename:	COHM_202122_PROCESSED.csv	
Author of this report:	Krista Myers	
File Period:	12/14/2020 11:30 to 12/24/2021 10:45	
Sampling Frequency:	sonic every 60 minutes, wind every 4 secs.; other every 30 secs.	
Averaging and Output Interval:	every 15 minutes	
Program Name:	COHM_201314_v1	

1	array I.D.	o1
2	Year	ok
3	Day	ok
4	Time	ok
5	mean air temp. @ 3 meters (C)	rclow
6	mean R.H. @ 3 meters (%) **Vaisala HMP45AC; SN: V1110042**	lowe correction
7	mean air temp. @ 1 meters (C)	rclow
8	mean solar flux; incoming (up-facing) (W/m^2) **Eppley PSP pyranometer; SN: 35071F3**	divide by 100; multiply by 135.50
9	mean solar flux; outgoing (down-facing) (W/m^2) **Eppley PSP pyranometer; SN: 30853F3**	divide by 100; multiply by 132.63
10	mean horizontal wind speed (m/s)	ok
11	resultant mean wind speed (m/s)	o1
12	resultant mean wind direction (degrees from north)	ok
13	standard deviation of wind direction (degrees)	ok
14	maximum wind speed (m/s)	ok
15	minimum wind speed (m/s)	ok
16	mean incoming IR pyrgeometer output (pins A-B) (W/m^2) **Eppley pyrgeometer; SN: 32348F3**	divide by 250; multiply by 262.47
17	mean incoming IR pyrgeometer output2 (W/m^2) **Eppley pyrgeometer; SN: 32348F3**	Calculated using hemisphere temp (pins A-C), thermophile output (pins F-G), and case temp (pins E-D)
20	mean outgoing IR pyrgeometer output (pins A-B)(W/m^2) **Eppley pyrgeometer; SN: 29786F3**	divide by 250; multiply by 276.24
21	mean outgoing IR pyrgeometer output (W/m^2) **Eppley pyrgeometer; SN: 29786F3**	Calculated using hemisphere temp (pins F-G), thermophile output (pins A-C), and case temp (pins E-D)
22	ice temperature @ 50cm (original depth, mV*0.01)	No longer recording
23	ice temperature @ 100cm (original depth, mV*0.01)	No longer recording
24	IRT thermistor (mV)	o1
25	IRT raw ice surface temp mV	o1
26	Surface Temperature (C)	ok
27	sample depth from sensor to surface (cm)	measured depth* -100
28	sample of battery voltage (V)	ok

Notes:
- Station visited on 12/24/2021 by K Myers, M Stone, and K McNulty
- Power off at 10:59, power on at 12:27. Powered off again at 12:53, power on at 13:05
- Tried to replace downward facing pyrgeometer, but sensor gave 99999 values, so had to keep original sensor
- Replaced HMP45AC relative humidity, old SN: V1110042, new SN: V1140044
- Downward pyranometer (Eppley) after lowering is 71 cm above ice surface
- Lowered station by ~16 cm

- Replaced wind monitor, new SN: WM27713
- Replaced Campbell SM4M storage module with same program (P8: COHM_201314_V1.dld).

Explorers Cove Met Station (EXEM)

Filename:	EXEM_202122_PROCESSED	
Author of this report:	Krista Myers	
File Period:	12/2/2020 13:00 to 12/23/2021 10:00	
Sampling Frequency:	prec every 60 minutes, wind every 4 secs.; others: every 30 secs.	
Averaging and Output Interval:	every 15 minutes	
Program Name:	EXE1819V1.dld	

#	Description	Status
1	array I.D.	
2	year	o1
3	day	ok
4	time	ok
5	mean air temp. @ 3 meters (C)	ok
6	mean RH @ 3 meters	rclow
7	mean solar flux; incoming (up-facing) (W/m^2) **Licor pyranometer; SN: PY41099**	lowe correction
8	mean solar flux; outgoing (down-facing) (W/m^2) **Licor pyranometer; SN: PY28348**	ok
9	mean horizontal wind speed (m/s) **RM Young; SN: WM17645**	ok
10	resultant mean wind speed (m/s) **RM Young; SN: WM17645**	ok
11	resultant mean wind direction (degrees from north) **RM Young; SN: WM17645**	o1
12	standard deviation of wind direction (degrees) **RM Young; SN: WM17645**	ok
13	maximum wind speed (m/s) **RM Young; SN: WM17645**	ok
14	minimum wind speed (m/s) **RM Young; SN: WM17645**	ok
15	mean P.A.R. (mmols/s/m^2) **Licor quantum; SN: Q33906**	divide by 200, multiply by 295.65 (Q33906)
16	mean soil temperature @ 0 cm (C)	rclow
17	mean soil temperature @ 5 cm (C)	rclow
18	mean soil temperature @ 10 cm (C)	rclow
19	sample precipitation (mm)	ok
20	sample battery voltage (V)	ok
21	Soil moisture (volumetric water content, m^3/m^3)	ok
22	Soil temperature, measured by soil moisture probe (C)	ok

Notes:
- Station visited on 12/23/2021 by K Myers, M Stone, K McNulty
- Power off at 10:19, power on at 13:27
- Old wind monitor (SN: WM17645) not working properly – a lot of data flagged as B for 'bad'
- Replaced wind monitor (RM Young Anemometer), new SN: WM85183
- Replaced quantum sensor (terrestrial PAR), new SN: Q30804
- Replaced downward facing pyranometer (new SN: PY45668 – note serial numbers for old and new downward pyra were switched in field notes)
- Replaced relative humidity sensor, new SN: X1210007 (Vaisala HMP45ASP)
- Measured and re-buried soil temp sensors, 0cm: old depth = 0.0 cm, new depth = 0.0 cm; 5cm: old depth = 8.2 cm, new depth = 5.0 cm; 10cm: old depth = 13.9 cm, new depth = 10.0 cm

- Precipitation gauge maintenance: Dumped out old (green) glycol, cleaned out ~0.5 inches of sediment. Filled to bottom rim (~2 inches with food grade glycol from Crary
- Camera wasn't working upon arrival - charge controller was wired incorrectly so battery died. Replaced camera battery and wired it correctly. Downloaded data that was on the card, but a lot of missing data due to station being dead.
- Soil temperature sensor at 0cm depth was kicked and stopped working. Error was E04188. We tried doing *A to increase the intermediate storage to 128 but only some values were reading. Station threw an error that could not be fixed, so we had to revert to an earlier program (that doesn't have the soil moisture probe). New program is now EXE1112V1. Next season we are going to upgrade the station to a CR1000x datalogger, and the soil moisture probe will be back up and running.

Mt. Fleming Met Station (FLMM)

Filename:		FLMM_202021_202122_PROCESSED
Author of this report:		Krista Myers
File Period:		12/27/2019 15:45 to 12/27/2021 14:15
Sampling Frequency:		wind every 4 sec; others: every 30 sec
Averaging and Output Interval:		every 15 min
Program Name:		FLMM_201213_V2.dld

1	array I.D.	o1
2	Year	ok
3	Day	ok
4	Time	ok
5	AirT2m (C)	ok
6	RH1.3m (%)	Lowe correction
7	wspd_U_WVT (m/s)	ok
8	wspd_U_WVT (m/s)	o1
9	WDir DU (degrees)	ok
10	WDir Std Dev	ok
11	WSpd Max (m/s)	ok
12	WSpd Max (m/s)	ok
13	Pressure (mbar)	ok
14	Voltage	o1

Notes:
- Station visited on 12/27/2021 by K Myers, M. Stone, and K McNulty. All input values looked good.
- Did not visit station previous season due to COVID-19 (flight to Mt Fleming was not approved)
- Power off at 14:23, power on at 14:56
- Replaced relative humidity sensor. Old SN: Z1340106 (model # HMP45AC), new SN: X1210006 (model # HMP45ASP)
- Replaced anemometer (new SN: WM17804)
- Replaced Campbell SM4M storage module, same program P8: FLMM_201213_V2.dld

Lake Fryxell Met Station (FRLM)

Filename	FRLM_202122_PROCESSED.csv	
Author of this report:	Krista Myers	
File Period:	11/30/2020 10:30 to 12/28/2021 11:15	
Sampling Frequency:	sonic every 60 min, wind every 4 sec; others: every 30 sec	
Averaging and Output Interval:	every 15 min	
Program Name:	FRL_201112_v2	

1	array I.D.	o1
2	Year	ok
3	Day	ok
4	Time	ok
5	mean air temp. @ 3 meters (C)	rclow
6	mean RH @ 3 meters **Vaisala HMP45AC; SN: U2730007**	lowe correction
7	mean solar flux; incoming (up-facing) (W/m^2) **Licor pyranometer; SN: PY28170**	ok
8	mean solar flux; outgoing (down-facing) (W/m^2) **Licor pyranometer; SN: PY20562**	ok
9	mean horizontal wind speed (m/s)	ok
10	resultant mean wind speed (m/s)	o1
11	resultant mean wind direction (degrees from north)	ok
12	standard deviation of wind direction (degrees)	ok
13	maximum wind speed (m/s)	ok
14	minimum wind speed (m/s)	ok
15	mean P.A.R. (micromols/s/m^2) **Licor quantum; SN: Q23199**	divide by 200, multiply by 295.65 (Q23199)
16	mean soil temperature @ 0 cm in soil (C)	rclow
17	mean soil temperature @ 5 cm in soil (C)	rclow
18	mean soil temperature @ 10 cm in soil (C)	rclow
19	sample depth from sensor to surface (cm)	measurement * -100
20	sample of battery voltage	o1

Notes:
- Station visited on 11/30/2021 by K Myers, M Stone, and K McNulty. Ultrasonic not working properly upon arrival (reading 0).
- Power off at 15:09, power on at 17:14
- Ultrasonic sensor wasn't working, replaced internal transducer and it is now working
- Changed upward facing Licor pyranometer. Old SN: PY28170, new SN: PY41090
- Changed relative humidity sensor. Existing SN: U2730007 (HMP45AC), new SN: W4230008 (HMP45ASP)
- Changed RM Young wind monitor (anemometer). New SN: WM04840
- Did not have the right allen key to change the quantum sensor – must return.
- Swapped SM4M storage module to download data
- Recorded GPS of station using handheld GPS device (-77.607244, 163.119014)

- Station visited again on 12/3/2021 by M Stone and K McNulty
- Power off at 14:24, power on at 15:06
- Changed downward facing Licor pyranometer. Old SN: PY20562, new SN: PY20561
- Rotated wind monitor by 15 degrees clockwise to point true north

- Measured and re-set soil moisture probes: 0cm probe: original depth = 3 cm, reset to 1 cm. 5cm probe: original depth 6 cm, reset to 5cm. 10cm probe: original depth 11.5 cm, reset to 10 cm.

- Station visited again on 12/28/2021 by K Myers, M Stone, and K McNulty
- Power off at 11:24, power on at 12:00
- Replaced screw on downward facing pyranometer (set screw was stripped previously and was held in place temporarily by electrical tape and zipties)
- Replaced quantum (terrestrial PAR sensor). Old SN: Q23199, new SN: Q23210.
- PAR serial number was recovered this year, so PAR data from 2018 – 2021 will be reprocessed and posted to website using calibration coefficient of Q23199.

Friis Hills Met Station (FRSM)

Filename:	FRSM_202122_PROCESSED	
Author of this report:	Krista Myers	
File Period:	12/2/2020 10:45 to 12/27/2021 12:00	
Sampling Frequency:	wind every 4 sec; others: every 30 sec	
Averaging and Output Interval:	every 15 min	
Program Name:	FRSM_201920_V1.dld	

1	array I.D.	o1
2	Year	ok
3	Day	ok
4	Time	ok
5	Mean air temp. @ 2.5 m (C)	ok
6	Mean RH @ 2.5m (%)	lowe correction
7	NetRad (W m^{-2})	ok
8	NetRad (W m^{-2}) Correction	ok
9	Mean horizontal wind speed (m/s)	ok
10	WSpd_U_WVT L	o1
11	Resultant mean wind direction (degrees from north)	ok
12	Standard deviation of wind direction (degrees)	ok
13	Wind Speed Max (m/s)	ok
14	Wind Speed Min (m/s)	ok
15	Pressure (mbar)	ok

Notes:
- Station visited on 12/27/2021 by K Myers, M Stone, and K McNulty
- Power off at 12:08, power on at 12:56
- Replaced relative humidity sensor. Old SN: U2340002, new SN: W4230016.
- Replaced RM Young anemometer (wind). Old SN: WM12803, new SN: WM38186
- Rotated wind monitor by 30 degrees clockwise to point true north
- Replaced Vaisala barometer. Old SN: R0141345 (PTB1101B0CA), new SN: T1140838 (PTB1101BOCA)
- So much snow!! Very light and fluffy covering everything. 7 cm measured at met station!

New Lake Hoare Met Station (HO2M)

Filename:	HO2M_202122_PROCESSED
Author of this report:	Krista Myers
File Period:	11/30/2020 11:15 to 11/24/2021 18:15
Sampling Frequency:	wind every 4 sec.; others: every 30 sec.
Averaging and Output Interval:	every 15 minutes
Program Name	HOEM_201920v1.dld

1	array I.D.	o1
2	Year	ok
3	Day	ok
4	Time	ok
5	mean air temp. @ 3 meters (C)	rclow
6	corrected mean R.H. @ 3 meters (%)	lowe correction
7	mean air temp. @ 1 meter (C)	rclow
8	mean solar flux; incoming (up-facing) (W/m2) **Licor pyranometer; SN: PY28169**	ok
9	mean solar flux; outgoing (down-facing) (W/m2) **Licor pyranometer; SN: PY28370**	ok
10	mean horizontal wind speed (m/s)	ok
11	resultant mean wind speed (m/s)	o1
12	resultant mean wind direction (degrees from north)	ok
13	standard deviation of wind direction (degrees)	ok
14	maximum wind speed (m/s) **RM Young Anemometer; SN: WM10365**	ok
15	minimum wind speed (m/s)	ok
16	mean P.A.R. (micromols/s/m2) **Licor quantum; SN: Q32567**	divide by 200, multiply by 285.45 (Q32567)
17	mean soil temperature @ 0 cm in soil (C)	rclow
18	mean soil temperature @ 5 cm in soil (C)	rclow
19	mean soil temperature @ 10 cm in soil (C)	rclow
20	Atmospheric pressure	ok
21	d_Temp_AVG	o1
22	sample depth from sensor to surface (cm)	measurement * -100
23	AccRTNRT_TOT	o1
24	AccNRT_TOT	o1
25	AccTotNRT	o1
26	Precip RT_Average	o1
27	Precip NRT	ok
28	Status	o1
29	sample of battery voltage	o1

Notes:
- Station visited on 11/24/2021 by K Myers and M Stone
- Power off at 18:20, power on at 20:28
- Replaced Vaisala barometer. Old SN: R1030609, new SN: N0750442 (model PTB110)
- Replaced upward facing licor pyranometer. Old SN: PY28169, new SN: PY18400
- Replaced downward facing licor pyranometer. Old SN: PY28370, new SN: PY40424
- Replaced quantum sensor (terrestrial PAR), old SN: W32567, new SN: Q20266
- Replaced RH sensor 3m. Old SN: V1140041, new SN: V2340043

- Replaced wind monitor (RM Young anemometer). Old SN: WM10365, new SN: WM31282
- Changed (3) batteries
- Downloaded UV station data
- Rotated the wind monitor by 5 degrees counter clockwise, now pointing true north

Howard Glacier Met Station (HODM)

Filename: HODM_202122_PROCESSED
Author of this report: Krista Myers
File Period: 12/14/2020 12:00 to 1/20/2022 13:00
Sampling Frequency: sonic every 60 min, wind every 4 sec; others: every 30 sec
Averaging and Output Interval: every 15 minutes
Program Name: HODM_201314_V1.dld

1	array I.D.	o1
2	Year	ok
3	Day	ok
4	Time	ok
5	mean air temp. @ 3 meters (C)	rclow
6	mean R.H. @ 3 meters (%)	lowe correction
7	mean solar flux; incoming (up-facing) (W/m^2) **Eppley pyranometer; SN: 32057F3**	divide by 100; multiply by 125.79 (32057F3)
8	mean solar flux; outgoing (down-facing) (W/m^2) **Eppley pyranometer; SN: 30884F3**	divide by 100; multiply by 130.04 (30884F3)
9	mean horizontal wind speed (m/s)	ok
10	resultant mean wind speed (m/s)	o1
11	resultant mean wind direction (degrees from north)	ok
12	standard deviation of wind direction (degrees)	ok
13	maximum wind speed (m/s)	ok
14	minimum wind speed (m/s)	ok
15	mean air temp @ 1 m (C)	rclow
16	mean rh @ 1 meter (%)	lowe correction
17	sample depth from sensor to surface (cm)	measured depth * -100
18	sample of battery voltage	o1

Notes:
- Station visited on 1/20/2021 by K Myers
- Station visited by Krista Myers. Just swapped SM4M. Did not have time to do any maintenance (just got out of helo while it was still hot, glacier conditions bad to land on and we were running out of time before weather was coming in)
- Ultrasonic sensor had some weird points where it would jump by 1 meter. Data removed and flagged as bad.

Miers Valley Met Station (MISM)

Filename:	MISM_202122_PROCESSED	
Author of this report:	Krista Myers	
File Period:	12/14/2020 15:15 to 1/21/2022 13:45	
Sampling Frequency:	wind every 4 secs.; ultrasonic every 1 hr; others every 30 secs.	
Averaging and Output Interval:	every 15 minutes	
Program Name	MISM_201112_v1.dld	

1	array I.D.	o1
2	year	ok
3	day	ok
4	time	ok
5	mean air temp. @ 3 meters (C)	rclow
6	mean R.H. @ 3 meters (%)	lowe correction
7	mean solar flux; incoming (up-facing) (W/m^2) **Licor pyranometer; SN: PY18656**	ok
8	mean solar flux going up; outgoing (down-facing) (W/m^2) **Licor pyranometer; SN: PY28167**	ok
9	mean horizontal wind speed (m/s)	ok
10	resultant mean wind speed (m/s)	o1
11	resultant mean wind direction (degrees from north)	ok
12	standard deviation of wind direction (degrees)	ok
13	maximum wind speed (m/s) **Anemometer; SN: WM17809**	ok
14	minimum wind speed (m/s)	ok
15	mean P.A.R. (micromols/s/m^2) **Licor quantum; SN: Q17248**	*Calibration sheet missing – data excluded for now*
16	mean soil temperature @ 0 cm in soil (C)	rclow
17	mean soil temperature @ 10 cm in soil (C)	rclow
18	pressure (mbars)	ok
19	distance to surface (cm)	ok
20	sample of battery voltage	o1

Notes:
- Station visited on 1/21/2022 by K Myers and M Stone
- Power off at 13:54, power on at 14:71
- Calibration sheet for quantum PAR sensor (Q17248) still unable to be located. Data excluded until we can find the calibration sheet.
- Replaced quantum (terrestrial PAR). New SN: Q114258
- Replace upward facing licor pyranometer. New SN: PY23276
- Replaced downward facing licor pyranometer. New SN: PY27937
- Replaced wind monitor (RM Young anemometer). New SN: WM80554
- Adjusted wind monitor by 33 degrees clockwise to point true north
- Measured and re-set soil temperature sensor 0cm: original depth = 1 cm, final depth 0 cm
- Measured and re-set soil temperature sensor 10cm: original depth = 12 cm, final depth = 10 cm
- Replaced Vaisala barometer.   Old model #: PTB101B, old SN: P2730029. New model #: PTB110, new SN: T1140837

Taylor Glacier Met Station (TARM)

Filename:	TARM_202122_PROCESSED	
Author of this report:	Krista Myers	
File Period:	12/14/2020 10:15 to 12/27/2021 09:30	
Sampling Frequency:	depth every 60 minutes, wind every 4 secs.; others: every 30 secs.	
Averaging and Output Interval:	every 15 minutes	
Program Name	TARM_201112_V1	

1	array I.D.	o1
2	Year	o1
3	Day	ok
4	Time	ok
5	mean air temp. @ 3 meters (C)	rclow
6	mean R.H. @ 3 meters (%)	lowe correction
7	mean air temp @ 1m (C)	rclow
8	mean RH at 1m (%)	lowe correction
9	mean solar flux; incoming (pointing up) (W/m^2) – **Eppley pyranometer; SN: 29763F3**	divide by 100; multiply by 128.53 (29763F3)
10	mean solar flux; outgoing (pointing down) (W/m^2) – **Eppley pyranometer; SN: 29762F3**	divide by 100; multiply by 136.99 (29762F3)
11	mean horizontal wind speed (m/s) **Anemometer; SN: WM15249**	ok
12	resultant mean wind speed (m/s) **Anemometer; SN: WM15249**	o1
13	resultant mean wind direction (degrees from north) **Anemometer; SN: WM15249**	ok
14	standard deviation of wind direction (degrees) **Anemometer; SN: WM15249**	ok
15	maximum wind speed (m/s) **Anemometer; SN: WM15249**	ok
16	minimum wind speed (m/s) **Anemometer; SN: WM15249**	ok
17	surface temperature internal thermistor output (mV)	o1
18	surface temperature (mV)	o1
19	surface temperature (C)	ok
20	sample depth from sensor to surface (cm)	multiple by -100
21	sample of battery voltage	ok

Notes:
- Station visited on 12/27/2021 by K Myers, M Stone, and K McNulty
- Power off at 09:46, power on at 11:15
- Removed first line of data from 12/14/2022 10:00 because 2020/21 data already had that timestamp processed.
- Replaced upward facing Eppley pyranometer, new SN: 33733F3
- Replaced downward facing Eppley pyranometer, new SN: 31435F3
- Replaced relative humidity sensor @ 3m, new SN: Y2820003
- Replaced wind monitor (RM Young anemometer), new SN: WM47474
- Rotated wind monitor by 55 degrees clockwise – it was very off from true north! Now pointing true north
- Lowered station by average of 52.1 cm and removed one flight from each tripod leg that had ablated out
- Changed (2) batteries and new charge controller (because it was wired up weird. UNAVCO helped replace charge controller on second visit
- Recorded GPS using handheld GPS unit, Lat -77.623071, Long 162.901693

Lake Vanda Met Station (VAAM)

Filename:	VAAM_202122_PROCESSED
Author of this report:	Krista Myers
File Period:	11/30/2020 16:30
Sampling Frequency:	wind every 4 secs.; ultrasonic every 1 hr; others every 30 secs.
Averaging and Output Interval:	every 15 minutes
Program Name	VAAM_201112_v1.dld

1	array I.D.	o1
2	day	ok
3	time	ok
4	mean air temp. @ 3 meters (C)	rclow
5	mean R.H. @ 3 meters (%)	lowe correction
6	mean solar flux; incoming (up-facing) (W/m^2) **Licor pyranometer; SN: RMA 27666 Line#22)**	ok
7	mean solar flux going up (W/m^2) **Licor pyranometer; SN: PY33985**	ok
8	mean horizontal wind speed (m/s)	ok
9	resultant mean wind speed (m/s)	o1
10	resultant mean wind direction (degrees from north)	ok
11	standard deviation of wind direction (degrees)	ok
12	maximum wind speed (m/s) **Anemometer; SN: WM47080**	ok
13	minimum wind speed (m/s)	ok
14	mean P.A.R. (micromols/s/m^2) **Licor quantum; SN: Q29766**	divide by 200, multiply by 243.475 (Q29766)
15	mean soil temperature @ 0 cm in soil (C)	rclow
16	mean soil temperature @ 5 cm in soil (C)	rclow
17	mean soil temperature @ 10 cm in soil (C)	rclow
18	distance to surface (cm)	measured depth * -100
19	sample of battery voltage	ok

Notes:
- Station visited on 1/19/2022 by K Myers, M Stone, K McNulty
- Power off at 13:10, power on at 14:02
- Replaced upward facing licor pyranometer. Old SN: U52440 or RMA 27666 Line 22 (illegible), new SN: PY23277
- Replaced downward facing licor pyranometer. Old SN: PY33985, new SN: PY28374
- Replaced relative humidity sensor 3 m. Old SN: Y3340031 (model HMP45D), new SN: U2020021 (model HMP45AC)
- Replaced wind monitor (RM Young anemometer). Old SN: WM47080, new SN: WM37721
- Rotated wind monitor by 15 degrees clockwise to point true north
- Measured ultrasonic ranger (distance to surface) to be 62.1 cm
- Very warm day!! +5 C when we visited – absolutely beautiful to work in.

Lake Vida Met Station (VIAM)

Filename:	VIAM_202122_PROCESSED	
Author of this report:	Krista Myers	
File Period:	12/2/2020 09:45 to 1/19/2022 10:45	
Sampling Frequency:	wind every 4 secs.; ultrasonic every 1 hr; others every 30 secs.	
Averaging and Output Interval:	every 15 minutes	
Program Name	VIA1213V1.dld	

1	array I.D.	o1
2	year	ok
3	day	ok
4	time	ok
5	mean air temp. @ 3 meters (C)	Rclow
6	mean R.H. @ 3 meters (%)	Lowe correction
7	mean solar flux; incoming (up-facing) (W/m^2) **Licor pyranometer; SN: PY23250**	ok
8	mean solar flux; outgoing (down-facing) (W/m^2) **Licor pyranometer; SN: PY25307**	ok
9	mean horizontal wind speed (m/s)	ok
10	resultant mean wind speed (m/s)	o1
11	resultant mean wind direction (degrees from north)	ok
12	standard deviation of wind direction (degrees)	ok
13	maximum wind speed (m/s) **Anemometer; SN: WM17401**	ok
14	minimum wind speed (m/s)	ok
15	mean P.A.R. (micromols/s/m^2) **Licor quantum; SN: Q29765**	divide by 200, multiply by 156.25 (Q29765)
16	mean soil temperature @ 0 cm in soil (C)	Rclow
17	mean soil temperature @ 5 cm in soil (C)	Rclow
18	mean soil temperature @ 10 cm in soil (C)	Rclow
19	distance to surface (cm)	Measured depth * -100
20	sample of battery voltage	o1

Notes:
- Station visited on 1/19/2022 by K Myers, M Stone, and K McNulty
- Power off at 10:59, power on at 11:19. Power cycled again, power off 11:21, power on 12:25, power off at 12:29, power on at 12:31.
- Replaced relative humidity sensor with new RH sensor that has better temperature range. Previous sensors (HMP45) do not function properly below -40C. Replaced with new model, HMP155A-L. New SN: T2920234. Old sensor HMP45AC, old SN: Y2850111.
- Replaced wind monitor (RM Young Anemometer), old SN: WM17401, new SN: WM27720
- Wind monitor did not require adjustment (pointing north)
- Ultrasonic ranger measured to be 60.4 cm from ground.

Appendix

Array ID and date of established date

Array ID	ID	Name	Date of Station Establishment
1	HOEM	Lake Hoare	Dec 1, 1993 by Peter Doran, Retired on Nov 7, 2014 by Maciej Obryk
1A	HO2M	Lake Hoare	Dec 27, 2012 by Thomas Nylen
2	FRLM	Lake Fryxell	Jan 6, 1994 by Peter Doran
3	BOYM	Lake Bonney	November 24, 1993 by Peter Doran
4	COHM	Commonwealth Glacier	November 22, 1993 by Peter Doran
5	HODM	Howard Glacier	November 20, 1993 by Peter Doran
6	TARM	Taylor Glacier	November 21, 1994 by Peter Doran
7	VAAM	Lake Vanda	November 24, 1994 by Peter Doran, moved to new location due to lake level rise on 12/8/2016 (new GPS = -77.52567, 161.69129)
8	BRHM	Lake Brownworth	November 13, 1996 by Peter Doran and DJ Osborne
9	EXEM	Explorer's Cove	Nov 21, 1997 by Peter Doran, DJ Osborne and K. Sauter
10	CAAM	Canada Glacier (without Eddy Sensors)	Nov 20, 1995 by Karen Lewis; reinstalled Jan 13, 1998
11	VIAM	Lake Vida	November 24, 1995 by Peter Doran
12	????	RETIRED Hoare Submerged	???
13	????	RETIRED Fryxell Submerged	???
14	????	RETIRED Bonney East Submerged	???
15	????	RETIRED Canada Gl. (w/ Eddy Sensors)	???
16	????	RETIRED Bonney West Submerged	???
17	F6MM	F6 Snow Fence, Met, and Sensit	Changed to F6 Met and F6 Sensit by Hassan Basagic, retired Dec 2016
18	BENM	RETIRED Beacon Valley	Jan 27, 2000 by Susan Kaspari, Thomas Nylen and Adrian Green. Retired in Dec 2012.
19	LHPM	RETIRED Lake Hoare Precipitatio	January 26, 2002 by Thomas Nylen (also Upper Howard)
19	UHDM	RETIRED Upper Howard Met	Temporary station Retired in 2004.
19	BLDM	RETIRED Blood Falls	Temporary station 11/14/2004
20	BRMM	Bonney Snow Fence	Changed to Bonney Riegel Met and Sensit by Hassan Basagic. Removed 2016.
21	FRSM	Friis Hills	Installed by Cuffey et al., ????; absorbed by LTER.
22	FLMM	Mt. Fleming	Installed 10/16/06 by Univ of Wisc AWS
25	GADM	RETIRED Garwood Valley	Installed by Peter Doran; Removed from service in 2011-12
25	MISM	Miers Valley	Installed by Nylen 2011-12
26	GAFM	Garwood Valley Ice Cliff	December 2010 by Thomas Nylen
27	HTDR	Lake Hoare TDR Station	08-09 Season by Hassan Basagic
92	EXSM	RETIRED Explorers Cove Sensit	Installed by Hassan Basagic; Retired Nov 2012
95	F6SM	F6 Snowfence Sensit	Installed by Hassan Basagic; Retired Dec 2016
96		Lake Fryxell Sensit	Installed by Hassan Basagic, Data combined with Fryxell station data
97		RETIRED Lake Hoare Sensit	Installed by Hassan Basagic, Retired 12/2010
98		RETIRED Lake Bonney Sensit	Installed by Hassan Basagic in 2005/06, Retired 12/2010
99	BRSM	Bonney Reigel Sensit	Installed by Hassan Basagic; removed Dec 2016
102	BRSS	Bonney Reigel Soil Station	
103	F6SS	F6 Soil station	Removed Dec 2016
104	LHS3	LH Soil station 2	
105	LHS4	LH Soil station 4	
112	BRTS	Bonney Reigel Theta Station	
113	F6TS	F6 Soil station	
114	LHS1	Lake Hoare Soil station 1 Theta	1/28/2003
115	LHS2	Lake Hoare Soil station 3 Soil	1/28/2003
119	HJHM	RETIRED Hjorth Hill Met	Installed by Peter Doran; Removed from service