

Meteorological Post Processing Documentation and Task Lists for 2022/2023

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.

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Appendix

Array I.D. key
Date of Establishment

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 2022/23)	Vaisala	HMP155A-L
Wind (anemometer)	RM Young	05103
Shortwave radiation (pyranometer)	Licor	LI-200R
Shortwave radiation (pyranometer)	Eppley	SPP or PSP
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	Campbell	CS655
Datalogger	Campbell	CR10X
Datalogger (new 2022/23)	Campbell	CR1000X

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).

$$\begin{aligned}
 &= [\text{RH3m}] * (6.107799961 + [\text{AirT3m}] * (0.4436518521 + [\text{AirT3m}] * (0.01428945805 + [\text{AirT3m}] * (0.0002650648471 + \\
 &[\text{AirT3m}] * (0.000003031240396 + [\text{AirT3m}] * (0.0000002034080948 + 0.0000000006136820929 * [\text{AirT3m}])))))) / \\
 &(6.109177956 + [\text{AirT3m}] * (0.503469897 + [\text{AirT3m}] * (0.01886013408 + [\text{AirT3m}] * (0.0004176223716 + [\text{AirT3m}] * \\
 &(0.00000582472028 + [\text{AirT3m}] * (0.0000004838803174 + 0.000000001838826904 * [\text{AirT3m}]))))))
 \end{aligned}$$

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_202223_PROCESSED_noLwRad.csv
 Author of this report: Krista Myers
 File Period: 12/13/2021 17:00 to 12/7/2022 10:30
 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 (%) (old sensor model = HMP45, new sensor model = HMP155)	Low 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: PY20567	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: WM15192	ok
15	minimum wind speed (m/s)	ok
16	mean P.A.R. (micromols/s/m2) Licor quantum; SN: Q30805	divide by 200, multiply by 220.75 (Q30805)
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 12/7/2022 by K. Myers and C. Ross
- Power off at 10:40 AM
- Replaced existing Campbell CR10X datalogger (SN = 3778) with new CR1000X datalogger (SN = 40104). This was part of the broader MCM LTER Equipment Upgrade 2022/23.
- CR1000X program on 12/7/2022 was BOYM_202223_V2.CR1X, however this program changed later and is not the final program on the station (see notes below for additional site visits)

- New CR1000X Datalogger Pakbus # = 401, same radio and schedule for telemetry used.
 - Old multiplexer no longer needed, removed sensors (mostly 107 soil temp probes) from multiplexer and rerouted into the main electronics enclosure & wired into CR1000X
 - Installed two new soil moisture probes (Campbell CS655) at 5 cm and 10 cm depth below soil surface. Installed adjacent to the existing soil temperature probes.
 - Installed new barometer (no barometer on station before). Model number = Vaisala PTB110, SN = U1020309. Data will be available next season
 - Upgraded relative humidity sensor to new HMP155 with new shield (new SN = U2511024). Removed old HMP45 and shield. Set at same height and location as old RH sensor.
 - Existing 10 cm soil temperature probe purple cable snapped off during rewiring. Removed temporarily/not working when we left the station on 12/7/2022.
 - Precipitation gage not working with new CR1000X code. Need to come back and troubleshoot.
-
- Station visited on 12/14/2022 by K. Myers and C. Dougherty
 - Power off at 12:21, power on at 13:13
 - Rotated wind monitor by 13 degrees clockwise using new method of determining true north using Garmin InReach GPS. Method established by Peter Doran in 2022/23 season.
 - Updated program from BOYM_202223_V3.CR1X to BOYM_202223_V4.CR1X
 - Added 12VDV bus bar – need smaller gage wires. All we had was 16AWG which is way overkill.
 - Wired in precipitation gage into CR1000X, but black / clear / resistor into earth ground first, seeing if that worked. Didn't work. Tried multiple different wiring combinations. Belfort precipitation gage code was converted using Loggernet Transformer package, which converts CR10X code to CR1000. Could not get Belfort gage to work at all.
 - Changed soil moisture and SR50 to all live on port C5 with different SDI12 addresses in order to make room for the precip gage code change. The SR50 didn't like this and didn't work.
 - Reset all soil temperature sensors because noticed that the 5 cm soil temperature sensor was on the surface, not actually buried.
 - At the end of the visit, precipitation gage still not working, SR50 also wasn't working (because of the new SDI12 address change and sharing the same port as the soil moisture probes). Will come back to troubleshoot precipitation gage and SR50.
-
- Station visited on 12/26/2022 by K. Myers and C. Ross
 - Power off at 9:26
 - All values looked good except for precipitation gage (reading 0) and SR50 (reading NaN)
 - Downloaded data, and uploaded new program (old program = BOYM_202223_V4.CR1X, new final program = BOYM_202223_V5.CR1X)
 - Rewired SR50 into C1 com port (SDI12 address = 0) so that it no longer shared a com port with the soil moisture probes. This worked, and is now reading correctly.
 - Since we couldn't get the Belfort Precipitation gage to work on the C1000X, we added a CR10X to the station to just log the Belfort data using the same exact program as before (BOYM_201718_V1.dld). Next year we can either a) change the CR10X program so that it only is logging precip, b) figure out Belfort wiring for CR1000X, or c) replace precipitation gage with new OTT Pluvio 2 (which does work with a CR1000X). Will have to download precipitation gage data from SM4M.
 - Next year remove upward facing Eppley cable (orange) – couldn't do this because we didn't have the ladder. The downward facing Eppley cable was removed. No Eppley radiation sensors on the station at all anymore.

Lake Brownworth Met Station (BRHM)

Filename: BRHM_202223_PROCESSED.csv
 Author of this report: Krista Myers
 File Period: 1/19/2022 16:15 to 12/13/2022 11:00
 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
	mean solar flux; incoming (up-facing) (W/m ²)	
7	Licor pyranometer; SN: PY51356	ok
	mean solar flux; outgoing (down-facing) (W/m ²)	
8	Licor pyranometer; SN: PY28371	ok
	mean horizontal wind speed (m/s)	
9	RM Young anemometer; SN: WM15190	ok
	resultant mean wind speed (m/s)	
10	RM Young anemometer; SN: WM15190	ok
	resultant mean wind direction (degrees from north)	
11	RM Young anemometer; SN: WM15190	o1
	standard deviation of wind direction (degrees)	
12	RM Young anemometer; SN: WM15190	ok
	maximum wind speed (m/s)	
13	RM Young anemometer; SN: WM15190	ok
	minimum wind speed (m/s)	
14	RM Young anemometer; SN: WM15190	ok
	mean P.A.R. (micromols/s/m ²) –	ok
15	Licor quantum; SN: Q09916	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 12/13/2022 by P Doran, C Ross, L Wilson. Values checked at 11:05, values looked good however ultrasonic still not working
- Power off at 11:11, Power on at 14:29
- Replaced existing Campbell CR10X datalogger (SN = 18805) with new CR1000X datalogger (SN = 40091). This was part of the broader MCM LTER Equipment Upgrade 2022/23
- Old CR10X program = BRHM_201112_V1.dld. New CR1000X program = BRHM_202223__V4.CR1
- Ultrasonic ranger not working (still). Need to replace entire unit next year. Measured to be 58 cm to bottom of sensor
- Replaced upward facing pyranometer, old SN = PY51356, new SN = PY33985
- Replaced downward facing pyranometer, old SN = PY28371, new SN = PY28370
- Replaced quantum sensor (PAR), old SN = Q09916, new SN = Q29764

- Upgraded relative humidity sensor to new HMP155 with new shield (new SN = U2511014). Removed old HMP45 and shield. Set at same height and location as old RH sensor
- Confirmed all soil temperature 107 probe depths
- Installed two new soil moisture probes (Campbell CS655) at 5 cm and 10 cm depth below soil surface. Installed adjacent to the existing soil temperature probes. 5 cm probe, SN = 53911, 10 cm probe SN = 53925
- Replaced wind monitor, old SN = WM15190, new SN = WM17647
- Wind monitor rotated by 36 degrees clockwise using new method of Garmin InReach GPS

Canada Glacier Met Station (CAAM)

Filename: CAAM_202223_PROCESSED.csv
 Author of this report: Krista Myers
 File Period: 12/24/2021 10:30 to 12/12/2022 9:45
 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 (%)	Low correction
7	mean air temp. @ 1m (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: WM15828	ok
11	resultant mean wind speed (m/s) Anemometer; old SN: WM15828	o1
12	resultant mean wind direction (degrees from north) Anemometer; SN: WM15828	ok
13	standard deviation of wind direction (degrees) Anemometer; old SN: WM15828	ok
14	maximum wind speed (m/s) Anemometer; old SN: WM15828	ok
15	minimum wind speed (m/s) Anemometer; old SN: WM15828	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 12/12/2022 by C Ross, P Doran, L Wilson. All values look good
- Power off at 09:47, power on at 13:00
- Replaced existing Campbell CR10X datalogger (SN = 26110) with new CR1000X datalogger (SN = 40090). This was part of the broader MCM LTER Equipment Upgrade 2022/23
- Old CR10X program = CAAM_201011_V1.dld. New CR1000X program = CAAM_202223__V1.CR1X, but came back on 12/16/2022 to fix Air Temp 1 m and IRT. Latest program name recorded below in next visit summary.
- Upgraded relative humidity sensor to new HMP155 with new shield (new SN = U2511018). Removed old HMP45 and shield. Set at same height and location as old RH sensor
- Changed upward facing pyranometer, old SN = PY36364, new SN = PY20562. Also replaced entire white nurail mount because they couldn't level it properly with the old mount (levelling screws were stripped)
- Changed downward facing pyranometer, old SN = PY27929, new SN = PY28167
- Wind monitor rotated by 5 degrees counter clockwise using new method of Garmin InReach GPS
- Noticed that historical station tasks sheets listed 'variable 7' as 3 m aspirated air temperature, however this is incorrect and it has been a 1 m air temperature measurement since 1/4/2012. Task sheet was never updated. Now variable 7 is listed as air temp 1 m, and database will be adjusted to reflect the variable name correction.

- Replaced two 12V 100 amphr batteries because voltage was low. Upon arrival field team noted that there was blue liquid inside of the bottom of the white battery box. No cracks or damage observed to the 2 existing batteries, potentially the foam inside of the box somehow became liquid? Collected blue liquid and put into empty P bottle for disposal at camp. Liquid determined to be acidic, but source still unknown. Batteries were retroed to McMurdo Haz Waste. New batteries on station.
- Station legs are wobbly and will need to be redrilled next year / soon. Bring drill and new poles to replace 2 of the 3 tripod legs next year.
- 1 m air temperature was incorrectly written in the code so it didn't work the first station visit. IRT code was also not working. Removed IRT from station, and in the process the shield wire was damaged. Team brought back to Lake Hoare Instrument lab for benchtop testing and repair. Krista repaired wire by soldering new 24 AWG wire to the end of the small resistor that was soldered onto the cable.
- Station visited on 12/16/2022 by C Ross, K Myers, and C Dougherty to update code for air temperature at 1 m and also for the IRT. Both sensors started working with new code. However, telemetry was not working still. Later determined that the telemetry radio times were incorrect in the code, and will have to return to upload new program.
- Station visited on 12/19/2022 b K Myers and C Dougherty – hiked to CAAM on foot from Lake Hoare camp. Only took about an hour and a half – not bad!
- Uploaded new code to the station with correct radio times and telemetry started working properly. Final program name = CAAM_202223_V4.CR1X

Commonwealth Glacier Met Station (COHM)

Filename: COHM_202223_PROCESSED.csv
 Author of this report: Krista Myers
 File Period: 12/24/2021 12:30 to 12/10/2022 09:45
 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 12/10/2022 by K Myers and C Dougherty
- Power off at 09:50, power on at 13:15.
- Replaced existing Campbell CR10X datalogger with new CR1000X datalogger. This was part of the broader MCM LTER Equipment Upgrade 2022/23
- Old CR10X program = COHM_201314_V1.dld. New CR1000X program = COHM_202223__V1.CR1X.

- Upgraded relative humidity sensor to new HMP155 with new shield (new SN = U2511015). Removed old HMP45 and shield. Set at same height and location as old RH sensor
 - Unwired multiplexer. Originally thought we were going to completely remove it, but we ended up needing it (see notes below for return to station)
 - Eppleys still not working. IRT not working either. Need to return to update program.
-
- Station visited again on 1/4/2023 by P Doran and L Wilson
 - Peter thinks the wrong program from Fryxell was uploaded. Unclear what program was uploaded to datalogger on this day
 - Long wave pyrgeometer is hooked up to original multiplexer, which is then wired into the CR1000X
 - Short wave pyranometer is controlled directly by CR1000X, not wired up to the multiplexer.
 - Infrared thermometer wired into the CR1000X
 - Peter had issues with the wiring – didn't have a jumper even though it was in the diagram.
-
- Returned on 1/5/2023 by P Doran and L Wilson
 - Loaded new program on CR1000X, COHM_202223_C2.CR1X
 - Jumper added
 - Multiplexer clear wired into earth ground on CR1000X

Explorers Cove Met Station (EXEM)

Filename: EXEM_202223_PROCESSED
 Author of this report: Krista Myers
 File Period: 12/28/2021 10:45 to 12/9/2022 10:45
 Sampling Frequency: prec every 60 minutes, wind every 4 secs.; others: every 30 secs.
 Averaging and Output Interval: every 15 minutes
 Program Name: EXE1112V1.dld

1	array ID	o1
2	Year	ok
3	Day	ok
4	Time	ok
5	mean air temp. @ 3 meters (C)	rclow
6	mean RH @ 3 meters	lowe correction
7	mean solar flux; incoming (up-facing) (W/m ²) Licor pyranometer; SN: PY41099	ok
8	mean solar flux; outgoing (down-facing) (W/m ²) Licor pyranometer; SN: PY45668	ok
9	mean horizontal wind speed (m/s) RM Young; SN: WM85183	ok
10	resultant mean wind speed (m/s) RM Young; SN: WM85183	o1
11	resultant mean wind direction (degrees from north) RM Young; SN: WM85183	ok
12	standard deviation of wind direction (degrees) RM Young; SN: WM85183	ok
13	maximum wind speed (m/s) RM Young; SN: WM85183	ok
14	minimum wind speed (m/s) RM Young; SN: WM85183	ok
15	mean P.A.R. (micromols/s/m ²) Licor quantum; SN: Q30804	divide by 200, multiply by 233.19 (Q30804)
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)	o1
22	Soil temperature, measured by soil moisture probe (C)	o1

Notes:

- Station visited on 12/9/2022 by K Myers, C Ross, C Dougherty, P Doran, and L Wilson
- Power off at 10:55, power on at 15:36
- Replaced existing Campbell CR10X datalogger with new CR1000X datalogger (SN = 40101). This was part of the broader MCM LTER Equipment Upgrade 2022/23
- Old CR10X program = EXE1112V1.dld. New CR1000X program = EXEM_202223V1_V1.CR1X, but came back on 12/21/2022 to fix precip gage. Final program name recorded was EXEM_202223_V3.CR1X on 12/21/2022.

- Gap in data from 12/23/2021 10:00 – 12/28/2021 10:45, station had issues and was throwing an error after the soil moisture probe was damaged. Had to return on 12/28/2021 to load old version of the program and then it started working.
- Upgraded relative humidity sensor to new HMP155 with new shield (new SN = U2511017). Removed old HMP45 and shield. Set at same height and location as old RH sensor
- Replaced upward facing Licor pyranometer (old SN: PY41699, new SN: PY28169)
- Replaced downward facing Licor pyranometer (old SN: PY45668, new SN: PY28170)
- No Eppley radiation sensors on station
- Replaced quantum PAR sensor (old SN: Q30804, new SN: Q33906)
- Replaced 3m wind monitor (new SN: WM15361)
- Installed two new soil moisture probes (Campbell CS655) at 5 cm and 10 cm depth, near existing soil temperature probes.
- The only sensor that was not working was the precipitation gage. The Belfort Rain Gage is super old, and did not work with the new CR1000X code that was written. Came back on 12/21/2022 to fix it, and to drill a new hole in the bottom of the enclosure to fit the cable. However we realized that the very old grey cable on the precip gage was permanently damaged in the process of taking it in and out of the box (conductors at end of cable) – so currently not recording data. Will need to either replace cable next year or get a new precipitation gage.
- Downloaded CC5MPX camera at Explorer's Cove Met on 12/9/2022. Huge gap in data from May through October. No images recorded to camera during that time (winter). Perhaps because of battery voltage, but we changed the battery last year?
- Was trying to get all sensors swapped to get on new schedule.

Mt. Fleming Met Station (FLMM)

Filename: FLMM_202223_PROCESSED
 Author of this report: Krista Myers
 File Period: 12/27/2021 14:45 to 12/19/2022 08:15*
 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 (%)	Low correction
7	wspd_U_WVT (m/s) RM Young; SN: WM17804	ok
8	wspd_U_WVT (m/s) RM Young; SN: WM17804	o1
9	WDir DU (degrees) RM Young; SN: WM17804	ok
10	WDir Std Dev RM Young; SN: WM17804	ok
11	WSpd Max (m/s) RM Young; SN: WM17804	ok
12	WSpd Max (m/s) RM Young; SN: WM17804	ok
13	Pressure (mbar)	ok
14	Voltage	o1

Notes:

- ***Data used for processing was from telemetry data – could not download SM4M data for unknown reason. Used telemetry data which only went through 12/19/2022 08:15. In order to retrieve the gap in data from 12/19/2022 to 12/30/2022 (while station was still on CR10X), will need to somehow get data off of SM4M.**
- Station visited on 12/30/2022 by K Myers and C Ross
- Power off at 10:34, power on time not recorded
- Replaced existing Campbell CR10X datalogger with new CR1000X datalogger (SN = 40102). This was part of the broader MCM LTER Equipment Upgrade 2022/23
- Old CR10X program = FLMM_201213_V2.dld. New CR1000X program = FLMM_202223_V2.CR1X
- Upgraded relative humidity sensor. Used the sensor that was installed on Lake Vida (VIAM) in 2021/22, HMP155 with new shield (SN = T2920234). Removed old HMP45 and shield. Set at same height and location as old RH sensor
- The Vida RH data looks a bit unreliable though – probably should replace entire unit to be consistent with the rest of the network (the current sensor has different wiring than the rest of the new RH network sensors)
- Replaced anemometer (new SN: WM31284)
- Removed barometer because it was very old and out of calibration. Did not have a spare – replace next year?
- Removed net radiometer from station (very old, and the only net radiometer on any of the stations) & shield
- The only temperature being recorded on the station currently is from the RH sensor
- Need to bring a new Campbell 107 temperature probe and shield down to install on station next season
- Did not align wind monitor using Garmin method – did not have time to do because weather started coming in. Need to align wind next year.
- Changed (2) 100 Ahr batteries due to low winter voltages

Lake Fryxell Met Station (FRLM)

Filename: FRLM_202223_PROCESSED.csv
 Author of this report: Krista Myers
 File Period: 12/28/2021 12:00 to 12/10/2022 10:00
 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.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 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 12/10/2022 by C Ross, P Doran, and L Wilson
- Power off at 10:08, power on at 13:52.
- Replaced existing Campbell CR10X datalogger (old SN = 14271) with new CR1000X datalogger (SN = 40087). This was part of the broader MCM LTER Equipment Upgrade 2022/23
- Old CR10X program = FRL_201112_V2.dld. New CR1000X program = FRLM_202223_V1.CR1X.
- Upgraded relative humidity sensor to new HMP155 with new shield (new SN = U2511016). Removed old HMP45 and shield. Set at same height and location as old RH sensor
- Relative humidity sensor had a lot of bad values that were out of range and obviously an error with the sensor. Manually deleted and flagged as B for bad. Sensor failure occurred intermittently between 12/28/2021 to 2/13/2022, and again from 11/29/2022 to 12/10/2022. Sensor and cable completely removed on 12/10/2022.
- Installed a new Vaisala Barometer (model # PTB110, SN = U1410827). Station did not have a barometer before. Barometer was not working properly though and no data was being collected.
- Ultrasonic manually measured to be 55 cm above the ground.
- Installed two new soil moisture probes (Campbell CS655) at 5 cm and 10 cm depth, near existing soil temperature probes.
- Replaced (2) 12V 100 Ahr batteries.

- Station visited on 12/15/2022 by L Wilson and P Doran to fix the soil moisture probe SDI12 addresses, and final program was uploaded: FRLM_202223_V2.CR1X.
- Re-set all soil temperature sensors to correct depths. 0, 5, and 10 cm
- Rotated wind monitor by 44 degrees counter clockwise. Upon arrival the wind monitor box was pointing to 224 degrees and rotated it to 180 degrees (P Doran). This was done using the new method of using the Garmin InReach GPS to determine north.

- Station visited on 12/21/2022 by K Myers, C Dougherty, and C Ross because telemetry was not working. K Myers discovered that the radio power was not plugged into the datalogger. Removed the Crydom relay from enclosure (previously used to control radio power), and wired radio power cable directly into Switched 12V control. Telemetry started working after this!
- K Myers also noticed that the barometer (which was not working) was plugged in backwards on the actual sensor. Flipped orientation of cable plug and barometer started working.

Friis Hills Met Station (FRSM)

Filename: FRSM_202223_PROCESSED_telemetry.csv
 Author of this report: Krista Myers
 File Period: 12/27/2021 13:00 to 12/19/2022 07:00*
 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) RM Young; SN: WM38186	ok
10	WSpd_U_WVT L RM Young; SN: WM38186	o1
11	Resultant mean wind direction (degrees from north) RM Young; SN: WM38186	ok
12	Standard deviation of wind direction (degrees) RM Young; SN: WM38186	ok
13	Wind Speed Max (m/s) RM Young; SN: WM38186	ok
14	Wind Speed Min (m/s) RM Young; SN: WM38186	ok
15	Pressure (mbar)	ok

Notes:

- ***Data used for processing was from telemetry data – could not download SM4M data for unknown reason. No gaps in data observed. There will be a small gap between end of telemetry and actual station visit (12/19/2022 to 12/30/2022) – will need to circle back to this and may require getting data off of SM4M.**
- Station visited on 12/30/2022 by K Myers and C Ross
- Power off at 13:46. Did not record power on time
- Replaced existing Campbell CR10X datalogger with new CR1000X datalogger (SN = 40086). This was part of the broader MCM LTER Equipment Upgrade 2022/23
- Old CR10X program = FRSM_201920_V1.dld. New CR1000X program = FRSM_202223_V1.CR1X.
- Upgraded relative humidity sensor to new HMP155 with new shield (new SN = U2511022). Removed old HMP45 and shield. Set at same height and location as old RH sensor
- Replaced RM Young wind monitor, new SN = WM38188
- Rotated wind monitor by 20 degrees clockwise using new Garmin InReach GPS method
- Removed net radiometer because not sure what model number and code to use for CR1000X upgrade.
- No 107 temperature probe on station, will use Vaisala RH probe for temperature online
- Need to bring 107 probe and radiation shield next year to install on station
- Need to bring a new wind monitor cable, the bare wires are too short to re-strip
- Took GPS measurement (using Garmin InReach), S 77.747372, E 161.516265

New Lake Hoare Met Station (HO2M)

Filename: HO2M_202223_PROCESSED
 Author of this report: Krista Myers
 File Period: 11/24/2021 20:30 to 11/22/2022 10:30
 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: PY18400	ok
9	mean solar flux; outgoing (down-facing) (W/m2) Licor pyranometer; SN: PY40424	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: WM31282	ok
15	minimum wind speed (m/s)	ok
16	mean P.A.R. (micromols/s/m2) Licor quantum; SN: Q20266	divide by 200, multiply by 273.87 (Q20266)
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 11/22/2022 by K Myers and C Ross
- Power off and power on times not recorded
- Realized that precip data has been reported incorrectly the entire time! Look at Accum variables instead of the bucket RT
- Replaced existing Campbell CR10X datalogger with new CR1000X datalogger. This was part of the broader MCM LTER Equipment Upgrade 2022/23
- Old CR10X program = HOEM_201920v1.dld. New CR1000X program = HO2M_202223_V1.CR1X

- Installed two new soil moisture probes (Campbell CS655) at 5 cm and 10 cm depth, near existing soil temperature probes. Serial numbers not recorded.
- Upgraded relative humidity sensor to new HMP155 with new shield (new SN = U2511019). Removed old HMP45 and shield. Set at same height and location as old RH sensor

Howard Glacier Met Station (HODM)

Filename: HODM_202223_PROCESSED_telemetry
 Author of this report: Krista Myers
 File Period: 1/20/2022 13:15 to 12/19/2022 07:15*
 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:

- ***Data used for processing was from telemetry data – could not download SM4M data for unknown reason. No gaps in data observed.**
- Station visited on 12/19/2022 by K Myers, C Ross, and C Dougherty
- Power off at 10:06, power on 13:32
- Replaced existing Campbell CR10X datalogger with new CR1000X datalogger. This was part of the broader MCM LTER Equipment Upgrade 2022/23
- Old CR10X program = HODM_201314_V1.dld. New CR1000X program = HODM_202223_V2.CR1X
- Upgraded relative humidity sensor to new HMP155 with new shield (new SN = U2511021). Removed old HMP45 and shield. Set at same height and location as old RH sensor
- Removed 1 m RH sensor from station – all stations only have one RH sensor now
- Removed crydom relay from station (previously controlling the telemetry radio). Now the telemetry is plugged directly into the switched 12V port
- Upward and downward pyranometers need a tap and die set for next year or new mounts
- Changed anemometer, new SN = WM85158
- Also removed 2 ice temperature sensors which were just laying on the ice (totally ablated out). White cables. Taken off the station
- Removed upward and downward facing Eppley pyranometers.
- Installed two new Licor pyranometers – however these types of pyranometers have a millivolt adapter (different from the ones on the rest of the stations). This requires slightly different code – two wire leads (blue and green) instead of the typical red black clear white ones that are on the older version pyranometers

- Station is VERY tall! Lowered station by approximately 17 cm.
- Howard only has one battery – bring more rope next year to secure battery box even better / reinforce
- Ultrasonic measured to be 1.36 m from ice surface before lowering. Ultrasonic measured to be 1.19 m after lowering

Miers Valley Met Station (MISM)

Filename: MISM_202223_PROCESSED_telemetry
 Author of this report: Krista Myers
 File Period: 1/21/2022 16:00 to 12/18/2022 09:30*
 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: Q114258	divide by 200, multiply by 235.1745936 (Q114258)
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:

- ***Data used for processing was from telemetry data – could not download SM4M data for unknown reason. No gaps in data observed. There will be a small gap between end of telemetry and actual station visit (12/18/2022 to 12/28/2022) – will need to circle back to this and may require getting data off of SM4M.**
- Station visited on 12/28/2022 by K Myers, C Ross, and H Miner (BFC Helper)
- Power off at 19:48, did not record power on time
- Replaced existing Campbell CR10X datalogger with new CR1000X datalogger (SN = 40105). This was part of the broader MCM LTER Equipment Upgrade 2022/23
- Old CR10X program = MISM_201112_v1.dld. New CR1000X program = MISM_202223_V1.CR1X
- Currently the station has program MISM_202223_V1.CR1X loaded, however we updated the code to MISM_202223_V2.CR1X but did not have the correct file during station visit. Update to V2 next season. Program V1 has soil temp 5 m in it, however this station only has (2) soil temp probes installed at 0 and 10 cm depth.
- Upgraded relative humidity sensor to new HMP155 with new shield (new SN = U2511025). Removed old HMP45 and shield. Set at same height and location as old RH sensor
- Installed two new soil moisture probes (Campbell CS655) at 5 cm and 10 cm depth, near existing soil temperature probes. Serial numbers not recorded.
- Telemetry not working for all of Miers Valley

- Did not align wind monitor – ran out of time. Do next year.
- No ultrasonic ranger installed on station

Taylor Glacier Met Station (TARM)

Filename: TARM_202223_PROCESSED_telemetry
 Author of this report: Krista Myers
 File Period: 12/27/2021 09:30 to 12/20/2022 07:15*
 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) – Eppeley pyranometer; SN: 33733F3	divide by 100; multiply by 121.36 (33733F3)
10	mean solar flux; outgoing (pointing down) (W/m ²) – Eppeley pyranometer; SN: 31435F3	divide by 100; multiply by 129.03 (31435F3)
11	mean horizontal wind speed (m/s) Anemometer; SN: WM47474	ok
12	resultant mean wind speed (m/s) Anemometer; SN: WM47474	o1
13	resultant mean wind direction (degrees from north) Anemometer; SN: WM47474	ok
14	standard deviation of wind direction (degrees) Anemometer; SN: WM47474	ok
15	maximum wind speed (m/s) Anemometer; SN: WM47474	ok
16	minimum wind speed (m/s) Anemometer; SN: WM47474	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)	multiply by -100
21	sample of battery voltage	ok

Notes:

- ***Data used for processing was from telemetry data – could not download SM4M data for unknown reason. One gap in telemetry data observed (12/31/2021 13:45 – 12/31/2021 14:00). Additional gap between end of telemetry and actual station visit (12/20/2022 to 12/29/2022) – will need to circle back to this and may require getting data off of SM4M.**
- Station visited on 12/29/2022 by K Myers, C Ross, and H Miner (BFC Helper)
- Power off at 22:52. Did not record power on time...night flight...very sleepy!
- Replaced existing Campbell CR10X datalogger with new CR1000X datalogger. This was part of the broader MCM LTER Equipment Upgrade 2022/23
- Old CR10X program = TARM_201112_V1.dld. New CR1000X program = TARM_202223_V1.CR1X
- Upgraded relative humidity sensor to new HMP155 with new shield (new SN = U251103). Removed old HMP45 and shield. Set at same height and location as old RH sensor
- Removed 1 m RH sensor – all stations only have 1 RH sensor now

- Did not lower station – will need to lower next year
- Recorded ultrasonic transducer to be 84 cm from ice to bottom of sensor
- Did not check wind alignment (ran out of time) – need to check next year

Lake Vanda Met Station (VAAM)

Filename: VAAM_202223_PROCESSED.csv
 Author of this report: Krista Myers
 File Period: 1/19/2022 14:15 to 12/13/2022 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 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: PY23277)	ok
7	mean solar flux going up (W/m ²) Licor pyranometer; SN: PY28374	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 12/13/2022 by K Myers and C Dougherty
- Power off at 10:54, power on at 13:20
- Replaced existing Campbell CR10X datalogger with new CR1000X datalogger (SN = 40096). This was part of the broader MCM LTER Equipment Upgrade 2022/23
- Old CR10X program = VAAM_201112_V1.dld. New CR1000X program = VAAM_202223_V3.CR1X
- Upgraded relative humidity sensor to new HMP155 with new shield (new SN = U2511020). Removed old HMP45 and shield. Set at same height and location as old RH sensor
- Replaced Licor quantum PAR (old SN = Q29766, new SN = Q99253)
- Installed two new soil moisture probes (Campbell CS655) at 5 cm and 10 cm depth, near existing soil temperature probes. Serial numbers not recorded.
- Ultrasonic ranger started failing and a lot of the data was reading 0. Removed all zeros and flagged data as B.
- Need to replace ultrasonic transducer next year. Did not have enough SR50 internal transducers this year to replace.
- Rotated wind monitor 5 – 8 degrees clockwise using Garmin InReach GPS method
- Measured ultrasonic to be 60 cm from sediment surface

Lake Vida Met Station (VIAM)

Filename: VIAM_202223_PROCESSED_noRH
 Author of this report: Krista Myers
 File Period: 1/19/2022 12:45 to 12/14/2022 10:00
 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 (%)	Low correction
	mean solar flux; incoming (up-facing) (W/m ²)	
7	Licor pyranometer; SN: PY23250	ok
	mean solar flux; outgoing (down-facing) (W/m ²)	
8	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
	maximum wind speed (m/s)	
13	Anemometer; SN: WM27720	ok
14	minimum wind speed (m/s)	ok
	mean P.A.R. (micromols/s/m ²)	
15	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 12/14/2022 by C Ross, P Doran, L Wilson
- Power off at 10:16, power on at 12:25
- Replaced existing Campbell CR10X datalogger (old SN = 18804) with new CR1000X datalogger (SN = 40100). This was part of the broader MCM LTER Equipment Upgrade 2022/23
- Old CR10X program = VIA1213V1.dld. New CR1000X program = VIAM_202223_V1.CR1X.
- Upgraded relative humidity sensor to new HMP155 with new shield (new SN = U2511026). Removed “newer” model, HMP155A-L. New SN: T2920234 because the program was made for the new model and wasn’t compatible with the existing sensor.
- Checked temp sensors – all sensors are 107 probes
- Install new air temp 3 m 107 probe next season - currently barely fits into the box because cable is so short. Bring longer cable next year.
- Soil temp sensor 0 cm insulation is failing – put electrical tape to cover. Bring new 107 probe next year to replace.
- Existing relative humidity sensor (HMP155) is reporting values that are way lower than the HMP45 sensors. Not including data until we can figure this out. No RH data reported for period 1/19/2022 12:45 to 12/14/2022 10:00.
- Reset all soil temperature sensors. 0 was set back to 0 cm, 5 cm sensor was 4 cm before maintenance, and 10 cm sensor was at 7 cm. All set to correct depths.

- Replaced upward facing Licor pyranometer, old SN = PY23250, new SN = PY20222
- Replaced downward facing Licor pyranometer, old SN = PY25307, new SM = PY18656
- Replaced Licor quantum PAR, old SN = Q29765, new SN = Q32567
- Replaced wind monitor, old SN = WM17401, new SN = WM31283
- Rotated wind monitor 20 degrees clockwise using new Garmin InReach GPS method
- Ultrasonic measured to be 60 cm from ground
- Installed two new soil moisture probes (Campbell CS655) at 5 cm and 10 cm depth, near existing soil temperature probes. Soil moisture probe @ 5 cm SN = 53923. Soil moisture probe at 10 cm SN = 53912
- Replaced (2) 100 Ahr batteries due to low winter voltages.

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