

## Meteorological Post Processing Documentation and Task Lists for 2018/2019

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

**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\_2018\_19\_PROCESSED  
 Author of this report: Krista Myers  
 File Period: 11/21/2017 16:15 to 11/17/2018 12:00  
 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\_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 (%)	Low correction
7	mean air temp. @ 1 meters (C)	rclow
8	mean solar flux; incoming (up-facing) (W/m2) <b>Licor pyranometer; old SN: PY27937, new SN: PY25306</b>	ok
9	mean solar flux; outgoing (down-facing) (W/m2) <b>Licor pyranometer; SN: PY28170</b>	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) <b>old SN: WM57319, new SN: WM85155</b>	ok
15	minimum wind speed (m/s)	ok
16	mean P.A.R. (micromols/s/m2) <b>Licor quantum; old SN: Q29764, new SN: Q11725</b>	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) <b>Eppley SN: 30831F3</b>	divide by 250; multiply by 277.01
22	mean up-facing pyrgeometer2 (W/m2) <b>Eppley SN: 30831F3</b>	Calculated from thermopile and hemisphere temp
23	mean down-facing pyrgeometer, rad. comp. (W/m2) <b>Eppley old SN: 32059F3, new SN: ?</b>	divide by 250; multiply by 227.79
24	mean down-facing pyrgeometer2 (W/m2) <b>Eppley old SN: 32059F3, new SN: ?</b>	Calculated from thermopile and hemisphere temp
25	sample precipitation (mm)	ok
26	sample of battery voltage	o1

### Notes:

- Station visited on 11/17/2018 by K. Myers, M. Myers and M. Stone. All input values looked good.
- Power off at 12:12; power on at 12:55. Power off again at 15:07 to install new Eppley cable (downward).
- Replaced upward facing Licor pyranometer (old SN: PY27937, new SN: PY25306)
- Replaced upward facing Eppley pyranometer (new SN: 37501F3). This may have been a mistake, because station is supposed to have long wave radiation, not short wave. Will revisit next year and change to pyrgeometer instead of pyranometer. Does not impact this season's data.
- Replaced Campbell SM4M storage module (P8: BOYM\_201718\_V1.dld)

- Replaced Down facing Eppley Pyrgeometer + cable (Existing Pyrgeometer bulb was broken upon arrival. Replaced w/ new but still wasn't working. Removed sensor in case issue was with pyrgeometer. Need to address next season).
- Replaced internal ultrasonic transducer. Working as of 2018.
- Replaced CR10X datalogger (old SN: X35796, new SN: X36197)
- Removed StarDot camera due to ongoing issues and broken wires. No camera data recovered for 2017/18 time period.
- Installed new Campbell camera on station with independent power supply.
- Relative Humidity sensor installed on 11/17/2018 is not working properly – recording negative numbers. Will need to replace next season.

### Lake Brownworth Met Station (BRHM)

Filename: BRHM\_2018\_19\_PROCESSED.csv  
 Author of this report: Krista Myers  
 File Period: 10/30/2017 15:45 to 12/22/2018 13:00  
 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
7	mean solar flux; incoming (up-facing) (W/m <sup>2</sup> ) <b>Licor pyranometer; SN: PY20567</b>	ok
8	mean solar flux; outgoing (down-facing) (W/m <sup>2</sup> ) <b>Licor pyranometer; PY28347</b>	ok
9	mean horizontal wind speed (m/s)	ok
10	resultant mean wind speed (m/s)	ok
11	resultant mean wind direction (degrees from north)	o1
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 <sup>2</sup> ) – <b>Licor quantum; old SN: Q17248, new SN: Q09916</b>	ok multiply by 1.595018 (Q17248)
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 12/22/2018 by K. Myers, M. Myers, M. Stone and J. McClure. All input values looked good, except for ultrasonic which is still not working.
- Need to replace entire ultrasonic next season.
- Power off at 13:11, Power on at 14:10
- Replaced Licor Quantum PAR sensor (old SN: Q17248, new SN: Q09916)
- Replaced Relative Humidity sensor, Vaisala (old SN: Vaisala HMP45AC, V2340002, new SN: Vaisala HMP45D, Y3340029)
- Replaced Campbell SM4M storage module (P8: BRHM\_201112\_V1.dld)
- Wind monitor angle might be 5 degrees off. Need to check the declination of BRHM because didn't have the exact number.

## Canada Glacier (CAAM)

Filename: CAAM\_2018\_19\_PROCESSED  
 Author of this report: Krista Myers  
 File Period: 11/27/2017 12:15 to 11/27/2018 15:15  
 Sampling Frequency: wind speed every 4 sec; all other every 30 sec  
 Averaging and Output Interval: every 15 minutes  
 Program Name: CAAM\_201112\_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 <sup>2</sup> ) <b>Licor pyranometer; SN: PY28349</b>	ok
9	mean solar flux; outgoing (down-facing) (W/m <sup>2</sup> ) <b>Licor pyranometer; SN: PY23271</b>	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) <b>Anemometer; SN: WM31283</b>	ok
15	minimum wind speed (m/s)	ok
16	mV_therm_average	o1
17	mV_tpilc_AVG	o1
18	Ice surface temp (C)	ok
19	sample battery voltage	o1

### Notes:

- Station visited on 11/27/2018 by K. Myers, M. Myers, and M. Stone. All input values looked good.
- Power off at 15:30, power on at 15:40
- Replaced Vaisala Relative Humidity sensor (old SN: U1140044, new SN: U2730016)
- Station lowered by average ~15.2 cm and levelled.
- Downward facing pyranometer ~60.5 cm from ice before station was lowered, 46 cm from ice after station was lowered.
- Replaced Campbell SM4M storage module (P8: CAAM\_201011\_V1.dld)

## Commonwealth Glacier Met Station (COHM)

Filename: COHM\_2018\_19\_PROCESSED  
 Author of this report: Krista Myers  
 File Period: 11/27/2017 15:00 to 11/27/2018 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 (%) <b>Vaisala HMP45AC; new SN: V1110042</b>	lowe correction
7	mean air temp. @ 1 meters (C)	rclow
8	mean solar flux; incoming (up-facing) (W/m <sup>2</sup> ) <b>Eppley pyranometer; old SN: 29776F3, new SN: 35071F3</b>	divide by 100; multiply by 119.62
9	mean solar flux; outgoing (down-facing) (W/m <sup>2</sup> ) <b>Eppley pyranometer; new SN: 30853F3</b>	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 <sup>2</sup> ) - <b>32348F3</b>	divide by 250; multiply by 262.47
17	mean incoming IR pyrgeometer output2 (W/m <sup>2</sup> ) - <b>32348F3</b>	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 <sup>2</sup> ) - <b>29786F3</b>	divide by 250; multiply by 276.24
21	mean outgoing IR pyrgeometer output (W/m <sup>2</sup> ) - <b>29786F3</b>	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 11/27/2018 by K. Myers, M. Myers and M. Stone. All input values looked good.
- Power off at 10:46, power on at 12:52.
- Replaced upward facing Eppley Pyranometer (old SN: 29776F3, new SN: 35071F3).
- Replaced ultrasonic transducer because wasn't working properly in last season's data. Distance to Ultrasonic before lowering 76 cm, after lowering 69 cm.
- Replaced Vaisala Relative Humidity sensor (new SN: V1110042).
- Replaced RM Young anemometer (new SN: WM10384).
- Replaced Campbell SM4M storage module with same program (P8: COHM\_201314\_V1.dld).

- Station lowered by 9.17 cm average and levelled.
- Southern leg of tripod pole was removed due to ablation.
- Upward facing Eppley pyranometer was stripped and unable to remove the screws from the mounting plate. Removed entire sensor and brought back to camp to fix. Station was revisited on 12/20/2018 by M. Stone and R. Brown. Gap in upward pyranometer data for next year's data processing (11/27/2018 – 12/20/2018).



## Explorers Cove Met Station (EXEM)

Filename: EXEM\_2018\_19\_PROCESSED  
 Author of this report: Krista Myers  
 File Period: 11/22/2017 13:45 to 12/20/2018 10:15  
 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 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	lowe correction
	mean solar flux; incoming (up-facing) (W/m <sup>2</sup> )	
7	<b>Licor pyranometer; SN: PY23277</b>	ok
	mean solar flux; outgoing (down-facing) (W/m <sup>2</sup> )	
8	<b>Licor pyranometer; SN: PY41090</b>	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	<b>Young Anemometer; SN: WM15361</b>	ok
14	minimum wind speed (m/s)	ok
	mean P.A.R. (mmols/s/m <sup>2</sup> )	
15	<b>Licor quantum; old SN: Q30804, new SN: Q33906</b>	divide by 200, multiply by 229.63 (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	ok

### Notes:

- Station visited on 12/20/2018 by K. Myers, M. Myers and M. Stone. All input values looked good.
- Power off at 10:20; power on at 11:35. Power off at 11:40, power on at 11:45. Power off at 11:50.
- Replaced Licor quantum PAR sensor (old SN: Q30804, new SN: Q33906). Cannot find new calibration sheet, likely in McMurdo.
- Added layer of mineral oil (50 – 100 mL) to precipitation gauge to prevent evaporation. (12/20/2019)
- Added 1800 mL of water to precipitation gauge to calibrate gauge (12/20/2019)
- Replaced Campbell SM4M storage module with program P8: EXE1112V1.dld
- Added Campbell camera facing east to tripod, plus independent power supply (1 battery, 1 10W solar panel, voltage regulator)
- Station visited second time on 12/29/2018 by M. Myers and M. Stone. All input values looked good.
- Power off at 13:49.
- Visit was planned to install new soil moisture probe on station (M. Myers Master's Thesis project).
- Replaced Campbell SM4M storage moduel with new program to include soil moisture probe. Data downloaded from this time (12/20/2018 to 12/29/2018) will be reported in next year's data processing because we do not have the calibration sheet for the quantum sensor (in MCM)

## Mt. Fleming Met Station (FLMM)

Filename: FLMM\_2018\_19\_PROCESSED  
Author of this report: Krista Myers  
File Period: 11/30/2017 13:15 to 12/18/2018 15:45  
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)	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 12/18/2018 by K. Myers, M. Myers, M. Stone, and J. McClure. All input values looked good.
- Power off at 15:15, power on at 1610.
- Anemometer was broken upon arrival. Wind data deleted and flagged as bad (B) from 4/14/2018 23:30 through 12/18/2018 15:45. Anemometer replaced on 12/18/2018 during station visit (new SN: WM12802).
- Replaced Campbell SM4M storage module, same program P8: FLMM\_201213\_V2.dld

## Lake Fryxell Met Station (FRLM)

Filename: FRLM\_2018\_19\_PROCESSED.csv  
 Author of this report: Krista Myers  
 File Period: 12/11/2017 15:45 to 12/6/2018 12:45  
 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 <b>Vaisala HMP45AC; new SN: U2730007</b>	lowe correction
7	mean solar flux; incoming (up-facing) (W/m <sup>2</sup> ) <b>Licor pyranometer; old SN: PY45665, new SN: PY18400</b>	ok
8	mean solar flux; outgoing (down-facing) (W/m <sup>2</sup> ) <b>Licor pyranometer; old SN: PY40423, new SN: PY20562</b>	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 <sup>2</sup> ) <b>Licor quantum; old SN: Q28259</b>	divide by 200, multiply by 234.84 (Q28259)
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 12/6/2018 by K. Myers, and J. McClure. All input values looked good.
- Power off at 12:50, power on at 13:40.
- Visited station again 12/7/2018 to install new pyranometer, quantum, CR10X.
- Removed StarDot camera on 12/6/2018 because cables were damaged, not working properly. Installed new Campbell CC5MPX camera on 12/7/2018.
- Replaced CR10X, new SN: X40645
- Replaced Relative Humidity sensor, Vaisala HMP45AC, new SN: U2730007.
- Replaced RM Young anemometer (wind); new SN: WM20111.
- Pyranometer screws were stripped, took off.
- Quantum stopped working on 12/6/2018, came back on 12/7/2018 to replace. Started working.
- Replaced Campbell SM4M storage module with same program P8: FRL\_201112\_v2.dld
- GPS position: (Lat: 77° 36.678, Long: 163° 10.204)

## Friis Hills Met Station (FRSM)

Filename: FRSM\_2018\_19\_PROCESSED  
Author of this report: Krista Myers  
File Period: 11/30/2017 11:45 to 12/18/2018 15:00  
Sampling Frequency: wind every 4 sec; others: every 30 sec  
Averaging and Output Interval: every 15 min  
Program Name: FRSM\_201314\_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 <sup>-2</sup> )	ok
8	NetRad (W m <sup>-2</sup> ) 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 12/18/2018 by K. Myers, M. Myers, M. Stone, and J. McClure. All input values looked good.
- Power off at 15:05 to 15:10
- Replaced Campbell SM4M storage module with same program (P8: FRSM\_201314\_V1.dld)
- Showed up and top of one of battery boxes (wooden rock box) was blown off and found nearby. Replaced and put rocks on top of it. Need to bring nails / screws next year to secure lid.

## New Lake Hoare Met Station (HO2M)

Filename: HO2M\_2018\_19\_PROCESSED  
 Author of this report: Krista Myers  
 File Period: 12/2/2017 14:45 to 12/17/2018 10:00  
 Sampling Frequency: wind every 4 sec.; others: every 30 sec.  
 Averaging and Output Interval: every 15 minutes  
 Program Name: HOEM\_201718\_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	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) <b>Licor pyranometer; SN: PY23276</b>	ok
9	mean solar flux; outgoing (down-facing) (W/m2) <b>Licor pyranometer; SN: PY20561</b>	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) <b>RM Young Anemometer; SN: WM80553</b>	ok
15	minimum wind speed (m/s)	ok
16	mean P.A.R. (micromols/s/m2) <b>Licor quantum; old SN: Q29766, new SN: 32567</b>	divide by 200, multiply by 236.18 (Q29766)
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 12/17/2018 by K. Myers and J. McClure. All input values looked good.
- Power off at 10:01, power on at 10:40
- Replaced Licor Quantum PAR sensor (old SN: Q29766, new SN: Q32567)
- Replaced ultrasonic internal transducer
- Replaced Campbell SM4M storage module (P8: HOEM\_201718\_V2.dld)
- Manual measurement of ultrasonic 97.5 cm above ground.
- Refilled precipitation gauge w/ ~1 gallon glycol and ~150 mL layer of mineral oil

## Howard Glacier Met Station (HODM)

Filename: HODM\_2018\_19\_PROCESSED  
 Author of this report: Krista Myers  
 File Period: 11/27/2017 15:45 to 11/27/2018 13:45  
 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 <sup>2</sup> ) <b>Eppley pyranometer; SN: 33733F3</b>	divide by 100; multiply by 121.51
8	mean solar flux; outgoing (down-facing) (W/m <sup>2</sup> ) <b>Eppley pyranometer; new SN: 30884F3, old SN: 29777F3</b>	divide by 100; multiply by 121.21 (29777F3)
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 11/27/2018 by K. Myers, M. Myers and M Stone. All input values looked good.
- Power off at 13:49; on at 14:47
- Replaced Campbell SM4M storage module with same program (P8: HODM\_201314\_V1.dld)
- Manual measurement of Ultrasonic 87 cm above snow (lots of snow around the station)
- Could not lower station
- Replaced downward facing Eppley pyranometer (old SN: 29777F3, new SN: 30884F3)
- Replaced relative humidity sensor 3 m (new SN: U2730013)
- Replaced relative humidity sensor 1 m (new SN: U2340010)
- Replaced RM Young Anemometer (wind) 3 m (new SN: WM27726)
- Replaced CR10X datalogger (new SN: X40361)

## Miers Valley Met Station (MISM)

Filename: MISM\_2018\_19\_PROCESSED  
 Author of this report: Krista Myers  
 File Period: 12/29/2017 09:45 to 12/5/2018 10:30  
 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 <sup>2</sup> ) <b>Licor pyranometer; old SN: PY40424, new SN: PY18656</b>	ok
8	mean solar flux going up; outgoing (down-facing) (W/m <sup>2</sup> ) <b>Licor pyranometer; old SN: PY45668, new SN: PY28167</b>	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) <b>Anemometer; SN: WM80545</b>	ok
14	minimum wind speed (m/s)	ok
15	mean P.A.R. (micromols/s/m <sup>2</sup> ) <b>Licor quantum; SN: Q23210</b>	Divide by 200, multiply by 271.938 (Q23210)
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 12/5/2018 by K. Myers, M. Myers and M. Stone. All input values looked good.
- Power off at 10:33, power on at 11:03
- Replaced upward facing Licor pyranometer (new SN: PY18656)
- Replaced downward facing Licor pyranometer (new SN: PY28167)
- Replaced Vaisala Relative Humidity sensor (new SN: U2730014)
- Replaced Campbell SM4M storage module with same program (P8: MISM\_201112\_V1.dld)
- Barometer accuracy needs to be checked next season
- Station blew over in December 2018. Station was revisited and re-established January 11, 2019 by J. Lawrence and J. McClure. Will have data gap in next season's data.

## Taylor Glacier Met Station (TARM)

Filename: TARM\_2018\_19\_PROCESSED  
 Author of this report: Krista Myers  
 File Period: 11/30/2017 10:30 to 12/18/2018 13:45  
 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 <sup>2</sup> ) – <b>Eppley pyranometer; old SN: 31437F3, new SN: 29763F3</b>	divide by 100; multiply by 125.47 (31437F3)
10	mean solar flux; outgoing (pointing down) (W/m <sup>2</sup> ) – <b>Eppley pyranometer; old 31435F3, new SN: 29762F3</b>	divide by 100; multiply by 130.38 (31435F3)
11	mean horizontal wind speed (m/s)	ok
12	resultant mean wind speed (m/s)	o1
13	resultant mean wind direction (degrees from north)	ok
14	standard deviation of wind direction (degrees)	ok
	maximum wind speed (m/s)	
15	<b>Anemometer; SN: WM47856</b>	ok
16	minimum wind speed (m/s)	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 12/18/2018 by K. Myers, M. Myers, M. Stone, and J. McClure. All input values looked good.
- Power off at 13:50, power on at 14:24
- Station lowered by 16.9 cm average and levelled.
- Replaced upward facing Eppley pyranometer (new SN: 29763F3)
- Replaced downward facing Eppley pyranometer (new SN: 29762F3)
- Replaced Campbell SM4M storage module with same program (P8: TARM\_201112\_V1.dld)
- Manual measurement of Ultrasonic 89.5 cm above ice before lowering.
- (2) batteries observed, last changed Nov 2012



## Lake Vanda Met Station (VAAM)

Filename: VAAM\_2018\_19\_PROCESSED  
 Author of this report: Krista Myers  
 File Period: 12/18/2017 11:30 to 11/22/2018 11:30  
 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 <sup>2</sup> ) <b>Licor pyranometer; old SN: PY27929, new SN: RMA 27666 Line#22)</b>	ok
7	mean solar flux going up (W/m <sup>2</sup> ) <b>Licor pyranometer; old SN: PY28348, new SN: PY33985</b>	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) <b>Anemometer; SN: WM85158</b>	ok
13	minimum wind speed (m/s)	ok
14	mean P.A.R. (micromols/s/m <sup>2</sup> ) <b>Licor quantum; SN: Q20266</b>	divide by 200, multiply by 279.195 (Q20266)
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 12/22/2018 by K. Myers, M. Myers, M. Stone and J. McClure. All input values looked good.
- Had to cross Onyx River from helo landing site – raging river!!
- Power off at 11:45; power on at 12:03
- Replaced upward facing Licor pyranometer (old SN: PY27929). New SN not visible on sensor, instead labled as “RMA 27666 Line# 22.
- Replaced downward facing Licor pyranometer (old SN: PY28348, new SN: PY 33985)
- Replaced Campbell SM4M storage module with same program (P8: VAAM\_201112\_v1.dld)
- Manual measurement of ultrasonic = 58.5 cm above ground

## Lake Vida Met Station (VIAM)

Filename: VIAM\_2018\_19\_PROCESSED  
 Author of this report: Krista Myers  
 File Period: 12/18/2017 12:45 to 12/19/2018 14:15  
 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 <sup>2</sup> )	
7	<b>Licor pyranometer; old SN: PY20523, new SN: PY23250</b>	ok
	mean solar flux; outgoing (down-facing) (W/m <sup>2</sup> )	
8	<b>Licor pyranometer; old SN: PY56364, new SN: PY25307</b>	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	<b>Anemometer; SN: WM47480</b>	ok
14	minimum wind speed (m/s)	ok
	mean P.A.R. (micromols/s/m <sup>2</sup> )	
15	<b>Licor quantum; old SN: Q30805, new SN: Q29765</b>	divide by 200, multiply by 136.80 (Q30805)
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 12/19/2018 by K. Myers, M. Myers, M. Stone and J. McClure. All input values looked good.
- Power off at 14:20, power on at 14:46
- Replaced upward facing Licor pyranometer (new SN: PY23250)
- Replaced downward facing Licor pyranometer (new SN: PY25307)
- Replaced Licor quantum PAR sensor (new SN: Q29765)
- Replaced Vaisala HMP45AC Relative Humidity sensor (new SN: Y2850111)
- Replaced Campbell SM4M storage module with same program (P8: VIA1213V1.dld)
- Manual measurement of ultrasonic 60 cm above 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 Sensity	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