LPM 2005

Field performance summary

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V1.0 15/11/06

CONTENTS

1. Introduction

This report gives an analysis of the 2005 performance of the eleven BAS LPMs operating on the plateau. Also mentioned but analysed in less detail are the performance of the system at Rothera and the four systems operated by the Japanese National Antarctic Institute for Polar Research.

The site positions, names and deployment dates are given in appendix 1.

Recommendations and comments about future work are given in section 6.

2.1 Performance summary

The twelve systems (11 deep field + Rothera) operated 4098 days out of a possible 4377, that is 93.6%.

A figure that gives a good indication of the success (or otherwise) of the year is the percentage of data at 1s resolution compared to that possible if all the systems worked without problems and continuously at 1s sampling - This figure was 91% in 2005 compared with 83% in 2004, 100% in 2003 and 51% in 2002. If this is calculated for the deep field systems (ie ignoring Rothera) then the figures are 2005 93%, 2004 90%, 2003 100%, 2002 51%.

Increasing the on time from 5 to 10 minutes appears to have given better GPS performance this year with just 7% missed fixes, this is discussed in section 2.3.

2.2 Basic Performance details

M68/292 – Nursie (Rothera)

Operated from deployment 9/03/05 until pickup 25/01/06.
322 days from 322 days possible.
No restarts.
13 missed GPS fixes out of 1930 possible.
All data at 1s resolution apart from
5/6/05 to 20/8/05 @ 10s – 76 days

M77/337 - Dr Leech

Operated from deployment 5/01/05 until pickup 25/01/06
390/390 days possible.
No restarts.
1 missed GPS fix out of 2339 possible.
All data at 1s resolution.

M79/336 – Bob – Iridium unit in 2005

Operated from deployment 5/01/05 until pickup 29/01/06
388/388 days possible.
No restarts.
0 missed GPS fixes out of 2325 possible.
All data at 1s resolution.

M81/338 - A80 - Edmund

Operated from deployment 5/01/05 until pickup 29/01/06
389/389 days possible.
No restarts.
89 missed GPS fixes from 2333 possible.
All data at 1s resolution.

M82/003 - A81 - Mrs Miggins

- Operated from deployment 31/01/05 until pickup 14/01/06
- 348/348 days possible.
- No restarts.
- 174 missed GPS fixes out of 2087 possible.
- All data at 1s resolution apart from:
  25/03/05 to 28/03/05 @ 10s – 4 days.

M83/347 - Baldrick

-Operated from deployment 16/01/05 until pickup 29/01/06
- 378/378 days possible.
- 1 restart, 1½ hours after deployment
- 104 missed GPS fixes out of 2267 possible.
- All data at 1s resolution.

M84/336 - Baron Richthoven

Operated from deployment 04/01/05 until pickup 15/01/05
376/376 days possible.
No restarts.
65 missed GPS fixes out of 2254 possible.
All data at 1s resolution.

M85/002 - Lord Melchett

Operated from deployment 4/01/03 until pickup 22/12/06.
352/352 days possible.
No restarts.
178 missed GPS fixes out of 2112 possible.
All data at 1s resolution.

M85/096 - Baby Eating Bishop

Operated from deployment 29/12/04 until pickup 21/12/05.
357/357 days possible.
No restarts.
612 missed GPS fixes out of 2141 possible.
All data at 1s resolution.

M87/028 - Flash Heart

Operated from deployment 28/12/04 until stop at 18/03/05, picked up 23/12/05.
81/360 days possible.
No restarts.
6 missed GPS fixes out of 483 possible.
All Data at 1s resolution.

M87/068 - Speckled Jim

Operated from deployment 28/12/04 until pickup 21/12/05.
358/358 days possible.
No restarts.
392 missed GPS fixes out of 2152 possible.
All data at 1s resolution.

M88/316 - Lord Whiteadder

Operated from deployment 27/12/05 until pickup 20/12/05.
359/359 days possible.
No restarts.
108 missed GPS fixes out of 2154 possible.
All data at 1s resolution.

2.3 Observations on the performance coverage.

2.3.1. GPS coverage.

The GPS coverage in 2005 was 92.9%, compared to 85% in 2004, 53% in 2003 and 99.5% in 2002.

The GPS unit is turned on for a set number of minutes every n hours. The number of minutes of the fix had remained at 5 since from the first prototype in 2000 until 2004. For 2005 the number of minutes was set at 10 in an attempt to increase the chances of a fix. The number of hours between fixes was 4 in 2005, 6 in 2004 and 1 in 2003.

We believe that that the set of GPS cards in the loggers used in 2003 and again in 2005 are worse at getting fixes than the cards in the loggers used in 2002, 2004 and 2006. In the 2006 loggers the GPS antenna has been raised by 30mm which should make fixes easier. Hence overall we should expect better than 93% GPS coverage in 2006.

It is interesting to note that the worst site for GPS coverage in both 2004 and 2005 was M85/096 – despite different loggers obviously.

2.3.2. Rothera system – M68-292

In 2004 the Rothera system spent much of the year at cycling between 1s and 10s sampling – this was traced to a faulty battery box which was repaired. In 2005 the Rothera system spent 76 days at 10s sampling – probably because the batteries were damaged in 2004. In the 2005/6 season the Rothera system had its batteries removed and was put onto a station power supply.

2.4 Podule positions

Table 1 contains the podule serial number at each site.

Site	2001	2002	2003	2004	2005	2006
M78/337	L01	L03	L39/02	L03/00	L38/02	L23/01
M79/336	L02	L04	L40/02	L06/00	Iridium	L06/00
M81/338	L04	L06	L37/02	L22/01	L39/02	L22/01
M82/003	L06	L07	L38/02	L01/00	L33/02	L44/04
M83/347[1]	L07	L01	L41/02	L23/01	L34/02	L35/02
M84/336	L03	L05	L36/02	L04/00	L40/02	L37/02
M85/002	L05	L02	L35/02	L05/00	L41/02	L04/00
M85/096	NA	L22	L32/02	L07/00	L36/02	L05/00
M87/028	NA	L21	L31/02	L02/00	L31/02	L03/00
M87/069	NA	L23	L33/02	L21/01	L32/02	L01/00
M88/316	NA	L24	L34/02	L42/03	L24/01	L02/00
Rothera	NA	NA	AFI/L03/00	L43/03	L44/04	L21/01

Table 1: Podule locations.

Notes 1: M83/348 was replaced in the 2004/5 season with M83/347, for the purpose of this table both sites have been treated as single one.

2.5 Enclosure Heights.

Table 2 shows the height of the bottom of the enclosure off the snow surface(m).

Site	**2003/4**	**2004/5**	**2005/6**	**Ave Accumulation**	**Predict 2006/7**	**Predict 2007/8**
M78/337	1.30	1.13	0.89	0.205	0.69	0.48
M79/336	1.07	0.91	0.63[1]/1.68[2]	0.22	1.46	1.24
M81/338	0.91	0.79	0.51/1.71[2]	0.20	1.51	1.31
M82/003	1.67	1.58	1.61	0.03	1.58	1.55
M83/347 NEW		1.74	1.68	0.06	1.62	1.56
M83/348 OLD	0.72	0.58		0.14		
M84/336	1.75	missed	1.77	0.00	1.76	1.75
M85/002	1.60	missed	0.62/1.72[2]	0.49	1.23	0.74
M85/096	1.17	1.10	0.92	0.125	0.80	0.67
M87/028	1.60[1]	missed	1.56	0.02	1.54	1.52
M87/069	1.20	1.03	0.97	0.115	0.86	0.74
M88/316	0.92	missed	0.67/1.62[2]	0.125	1.49	1.37
Rothera	N/A					

Table 2: Enclosure Heights

Note 1: Estimated.
Note 2: Raised this season.

This suggests that no systems need raising in 2006/7 although it would be wise to be prepared to raise at least M78-337, M85-096 and M87-069.

3. Magnetometer data.

3.1 Previous reports.

Previous reports have contained a spot value from each system (the middle of the second data block) for a sign consistency check and for comparison with the IGRF modelled value as a indication that the measured field is as expected. In addition one data block from each system was examined in detail to identify any possible problems.

3.2 2005 data.

The data processing programs (the Degum suite) now contain many consistency and quality control checks, and the comparison of the measured to IGRF values has been covered in the Low Power Magnetometer Data Verification Report for data recorded 2002-2005.

Table 3 shows values output from the Degum suite. These are: the average values of the GPS position fixes, the rotation angle of the xyz coordinate frame to get it into hdz coordinate frame (this is calculated from the quiet values in table 4 – the value in bold is the value that has been used to rotate the data), the average X, Y and Z values, the variance of X,Y,Z and finally any points of note.

Table 4 shows the average and variance of X,Y,Z during the quietest 24 hour period of the file (the lowest variance).

UK Data

Station	Season	Avg Lat(S)	Avg Lon	Rot	Avg X (nT)	Avg Y (nT)	Avg Z (nT)	Var X	Var Y	Var Z	Notes
M65 - 297	2002	64.824	63.492 W (296.508)	**30.633**	19500.6	28.7	-32383.3	1300520.0	42841.7	815293.0	AFI. 14 Restarts after last data blk
M66 - 294	2002	66.033	65.970 W (294.03)	**-38.551**	21949.3	7.3	-37772.4	2647.1	969.1	7754470.0	AFI. Many anomalously short blks
M67 - 292	2002_1	67.57	68.117 W (291.883)	**-41.518**	23139.9	14.6	-33240.4	917.4	898.3	657.0	AFI
	2002_2	67.57	68.117 W (291.883)	-41.369	23090.4	47.2	-33248.3	1330.6	1114.9	344.8	AFI
	2003	67.57	68.117 W (291.883)	-41.582	23052.5	-2.8	-33205.0	1845.2	2101.3	1835.6	AFI. All anomalously short blks
	2004	67.57	68.117 W (291.883)	**-139.760**	20859.4	4.1	-40435.5	119864.0	24865.5	92299200.0	Z bad from 06/11/04
	2005	67.57	68.117 W (291.883)	-140.400	20921.7	0.6	40436.4	554454.0	187108.0	6270.3	Z bad throughout and X/Y at times
M78 - 337	2002	77.511	23.426 W (336.574)	**-43.763**	19031.8	63.2	-40791.3	12580.7	1390160.0	580694.0	
	2003	77.511	23.425 W (336.575)	-43.787	19018.5	0.0	-40562.4	19689.4	4901.9	6040.4	Large Uncertainties(LU) 4225 secs
	2004	77.511	23.425 W (336.575)	-43.910	19015.5	-34.5	-40657.9	9379.6	2546.4	4154.0	
	2005	77.511	23.425 W (336.575)	-44.093	18863.7	-101.7	-40334.1	11199.9	2511.1	4228.4	
M79 - 336	2002	79.076	24.120 W (335.88)	**-2.964**	19750.8	15.7	-41831.9	9152.7	2249.6	4673.5	
	2003	79.077	24.119 W (335.881)	-3.450	19828.0	-143.8	-41817.6	22066.1	5141.9	7162.8	1 Skip Block(SB) at EOF, LU 3517
	2004	79.077	24.119 W (335.881)	-3.415	19810.5	-133.8	-41669.4	11750.2	3067.7	4714.3	
	2005	79.077	24.119 W (335.881)	-3.630	19806.2	-221.9	-41607.8	9577.6	2933.6	4427.4	393 SB
M81 - 338	2002	80.889	22.263 W (337.737)	**-103.770**	19303.5	-3.6	-44029.2	8954.4	2219.9	4491.9	
	2003	80.888	22.264 W (337.736)	-103.736	19144.5	23.9	-43951.9	20380.7	5644.2	8823.5	
	2004										No data as no valid GPS fix
	2005	80.888	22.268 W (337.732)	-104.154	19371.9	-130.2	-43742.9	12523.0	3193.7	6053.0	
M82 - 003	2002	81.492	2.973 E	**-7.478**	19591.5	40.1	-44721.9	7457.1	2175.0	4875.2	1 Restart
	2003	81.492	2.973 E	-7.433	19456.9	48.9	-44339.3	16887.2	5526.1	10800.4	
	2004	81.492	2.972 E	-8.086	19548.6	-166.2	-44366.9	11357.9	4435.3	6990.9	
	2005	81.457	2.970 E	-7.529	19722.6	9.1	-44356.2	10905.3	2549.7	7055.7	
M83 - 347	2005	82.775	13.059 W (346.941)	**179.033**	18551.2	1.5	-45671.7	11531.4	2877.3	7138.7	1 Restart
M83 - 348	2002	82.899	12.244 W (347.756)	**0.854**	18417.5	14.0	-46188.9	9655.7	2941.1	6101.0	
	2003	82.899	12.244 W (347.756)	0.602	18430.1	-58.9	-46226.9	17211.3	5829.0	11494.3	1 SB at EOF, LU 5066
	2004	82.899	12.245 W (347.755)	0.654	18452.8	-34.5	-46215.0	10962.3	3788.7	6541.9	1 SB at EOF
M84 - 336	2002	84.354	23.858 W (336.142)	**-174.745**	17749.5	29.1	-47485.7	9562.6	2445.2	7181.8	
	2003	84.354	23.858 W (336.142)	-174.448	17630.3	116.3	-47396.9	17465.5	5876.6	14134.8	
	2004	84.354	23.859 W (336.141)	-174.526	17573.4	88.1	-47316.8	12028.5	3490.6	11940.2	
	2005	84.354	23.859 W (336.141)	-174.320	17609.8	157.2	-47353.5	12010.8	3679.0	8578.3	
M85 - 002	2002	85.357	2.063 E	**71.936**	17516.4	-34.3	-48722.9	6772.0	2678.1	6492.1	
	2003	85.357	2.063 E	71.782	17871.0	-84.0	-48647.8	15445.1	8951.8	12304.9	1 SB at EOF, LU 1328
	2004	85.357	2.063 E	72.696	17850.2	150.4	-48545.8	12768.1	11538.8	9057.6	LU 2293
	2005	85.357	2.063 E	72.047	17664.3	13.5	-48579.5	11869.8	8999.1	8533.8	
M85 - 096	2002	85.390	95.976 E	**-24.988**	16598.7	36.1	-54394.7	9819.6	6545.6	6046.6	
	2003	85.390	95.975 E	-24.723	16579.1	109.0	-54300.1	8563.0	7008.1	6981.3	LU 7878
	2004	85.390	95.976 E	-25.077	16648.3	24.9	-54459.9	5709.5	5740.9	5156.3	LU 10524
	2005	85.390	95.976 E	-25.062	16643.2	-4.8	-54199.2	5100.1	4671.6	5456.4	1 SB at EOF
M87 - 028	2002	86.999	28.410 E	**179.432**	17116.7	6.8	-50793.3	7855.4	5143.4	8521.0	
	2003	86.999	28.410 E	179.322	17007.8	-29.7	-50665.7	10825.2	5878.3	11335.0	LU 4004
	2004	86.999	28.409 E	179.792	17071.1	84.0	-50530.6	7159.8	3524.4	8143.7	
	2005	86.999	28.409 E	178.986	17026.4	-124.9	-50573.0	9016.0	5073.2	10562.0	
M87 - 068	2002	86.515	68.177 E	**-36.072**	17187.5	2.6	-52363.2	8387.8	4602.0	7928.1	LU 1568
	2003	86.515	68.173 E	-35.859	17338.4	70.9	-52302.4	8917.9	5759.3	10374.8	LU 16362
	2004	86.515	68.172 E	-36.326	17259.7	-63.4	-52254.2	5900.2	3131.1	6927.2	LU 6838
	2005	86.515	68.172 E	-36.063	17208.1	0.4	-51981.9	5962.9	3213.6	7652.2	
M88 - 316	2002	88.027	43.799 W (316.201)	**-179.464**	17274.5	10.7	-50906.7	7916.5	3864.6	9160.9	1 Restart
	2003	88.025	43.867 W (316.133)	-179.725	17253.1	-56.6	-50946.5	11846.1	5668.1	12630.2	LU 18851
	2004	88.025	43.867 W (316.133)	179.541	17271.6	-300.8	-50883.7	8518.6	2911.1	8434.7	
	2005	88.024	43.866 W (316.134)	0.024	-40917.7	352.2	-50970.7	66585.1	3366.5	9593.4	X bad for all year, Y unusable

Japan Data

Station	Season	Avg Lat(S)	Avg Lon	Rot	Avg X (nT)	Avg Y (nT)	Avg Z (nT)	Var X	Var Y	Var Z	Notes
M68 - 041	2003	68.578	41.081 E	**118.682**	19326.3	66.1	-38654.0	20926.2	33760.6	12590.0	
M69 - 041	2003	69.295	41.321 E	**132.701**	19576.2	10.4	-39368.9	18935.9	4165.2	8566.0	4 Restarts
	2004	69.295	41.321 E	132.018	19381.2	-236.1	-39503.0	8470.7	1246.9	3067.7	2 Restarts
	2005A	69.295	41.321 E	131.968	19381.0	-253.2	-39540.0	17737.2	5804.5	15642.4	1 SB, 3 Restarts
	2005C	69.295	41.320 E	131.545	19321.8	-398.2	-39511.6	24328.8	3453.7	9880.1	
M70 - 039	2003	69.673	39.402 E	**33.167**	18155.5	-138.0	-39187.0	18658.1	43145.3	10579.1	
M70 - 044	2005	70.702	44.284 E	**-27.224**	19286.2	8.9	-41133.3	13568.3	3569.5	7245.5	
M74 - 043	2005	74.010	42.992 E	**-5.143**	19066.4	6.2	-42734.5	12358.5	5811.1	11063.8	LU 1289
M77 - 040	2003	77.317	39.709 E	**-68.565**	19362.1	-14.4	-44441.6	21707.8	6461.1	9582.5	
	2004	77.317	39.709 E	-69.052	19430.3	-174.7	-44299.5	11829.8	4022.9	5832.8	LU 18863
	2005	77.317	39.709 E	-69.450	19488.1	-299.9	-44123.9	14790.4	3732.7	6222.0	LU 6473, 1 Restart

Table 3: Average values.

UK Data, Quiet Period

Station	Season	Avg X (nT)	Avg Y (nT)	Avg Z (nT)	Var X	Var Y	Var Z	Period
M65 - 297	2002	17129.1	10143.6	-33250.5	1122.2	416.0	4028.5	(8:50:35.0 27- 6-2002) - (8:50:36.1 28- 6-2002)
M66 - 294	2002	17209.4	-13714.0	-36106.5	6.7	7.7	4.7	(5:49:50.7 2- 7-2002) - (5:50: 1.5 3- 7-2002)
M67 - 292	2002_1	17337.0	-15348.3	-33228.3	10.8	9.8	2.6	(12:45:55.7 2- 7-2002) - (12:46: 7.1 3- 7-2002)
	2002_2	17315.8	-15249.3	-33245.6	199.5	266.1	67.3	(6: 9:22.3 24- 2-2003) - (6: 9:23.4 25- 2-2003)
	2003	17249.7	-15305.0	-33203.0	14.3	13.7	8.5	(17:46:14.9 7- 7-2003) - (17:46:26.1 8- 7-2003)
	2004	-15888.1	-13445.6	-35395.2	4.9	5.3	9.3	(8:35:31.9 7- 7-2004) - (8:35:37.1 8- 7-2004)
	2005	-15883.8	-13140.4	40600.3	2.5	8.1	174.4	(18:21:22.5 20- 6-2005) - (18:21:29.3 21- 6-2005)
M78 - 337	2002	13758.4	-13176.6	-40796.8	9.4	6.6	15.0	(2: 2: 5.4 28- 6-2002) - (2: 2: 5.9 29- 6-2002)
	2003	13759.0	-13188.4	-40553.3	4.8	12.0	17.1	(2:47:49.5 8- 7-2003) - (2:47:49.7 9- 7-2003)
	2004	13712.3	-13200.2	-40637.0	8.1	4.0	13.4	(3: 4:43.8 22- 6-2004) - (3: 4:43.8 23- 6-2004)
	2005	13559.7	-13136.9	-40330.1	4.2	3.8	33.7	(3:46:15.5 21- 6-2005) - (3:46:15.6 22- 6-2005)
M79 - 336	2002	19735.9	-1022.0	-41822.9	4.4	15.9	5.3	(14:30:41.2 31- 5-2002) - (14:30:41.5 1- 6-2002)
	2003	19825.6	-1195.3	-41793.5	7.8	9.6	23.5	(1:33: 5.8 8- 7-2003) - (1:33: 6.3 9- 7-2003)
	2004	19788.6	-1180.8	-41641.4	6.4	4.1	7.7	(1:26: 6.4 8- 7-2004) - (1:26: 6.6 9- 7-2004)
	2005	19779.5	-1254.8	-41601.8	7.1	3.7	6.3	(23:10:48.1 20- 6-2005) - (23:10:48.7 21- 6-2005)
M81 - 338	2002	-4598.0	-18762.2	-44001.3	5.7	5.0	12.6	(20:39:36.0 27- 6-2002) - (20:39:36.1 28- 6-2002)
	2003	-4554.5	-18633.2	-43933.4	20.0	29.5	31.8	(17: 0:20.6 7- 7-2003) - (17: 0:21.1 8- 7-2003)
	2004							
	2005	-4742.2	-18804.9	-43732.3	2.8	3.9	11.6	(20:19: 7.2 20- 6-2005) - (20:19: 7.2 21- 6-2005)
M82 - 003	2002	19441.1	-2552.0	-44706.4	31.7	16.8	37.7	(7:11:11.5 31- 5-2002) - (7:11:12.0 1- 6-2002)
	2003	19333.8	-2522.3	-44321.2	128.5	90.5	42.8	(20:57:40.7 7- 7-2003) - (20:57:41.3 8- 7-2003)
	2004	19363.1	-2750.9	-44401.8	95.5	30.3	32.4	(16:20:35.9 3- 8-2004) - (16:20:35.9 4- 8-2004)
	2005	19593.5	-2589.6	-44360.9	91.9	26.1	23.7	(19: 9:23.7 20- 6-2005) - (19: 9:24.4 21- 6-2005)
M83 - 347	2005	-18557.4	313.2	-45658.4	18.1	6.6	9.2	(21:26:59.2 20- 6-2005) - (21:27: 0.1 21- 6-2005)
M83 - 348	2002	18409.0	274.5	-46141.3	25.9	11.1	18.3	(18:47:49.3 27- 6-2002) - (18:47:52.2 28- 6-2002)
	2003	18474.4	194.0	-46187.8	80.8	17.7	99.8	(4:41: 7.9 8- 7-2003) - (4:41: 8.6 9- 7-2003)
	2004	18495.2	211.3	-46226.7	15.0	11.9	7.7	(22:38:46.5 3- 8-2004) - (22:38:46.7 4- 8-2004)
M84 - 336	2002	-17672.8	-1625.5	-47424.3	12.5	9.2	11.1	(14:18:15.9 27- 6-2002) - (14:18:17.2 28- 6-2002)
	2003	-17557.4	-1706.7	-47304.0	70.6	19.9	98.6	(21:16:57.5 7- 7-2003) - (21:16:58.3 8- 7-2003)
	2004	-17472.8	-1674.3	-47203.5	13.8	16.6	10.3	(9:13:59.9 3- 8-2004) - (9:14: 0.3 4- 8-2004)
	2005	-17536.1	-1744.1	-47315.7	26.7	8.6	14.3	(10:54:44.5 21- 6-2005) - (10:54:45.2 22- 6-2005)
M85 - 002	2002	5434.3	16661.4	-48739.5	197.8	471.3	147.7	(9:13:30.6 19- 3-2002) - (9:13:30.7 20- 3-2002)
	2003	5610.0	17044.4	-48603.0	160.6	367.1	147.5	(5:50:16.2 7- 9-2003) - (5:50:16.5 8- 9-2003)
	2004	5336.5	17129.9	-48489.3	51.1	162.8	64.1	(18:45:11.2 3- 8-2004) - (18:45:12.0 4- 8-2004)
	2005	5460.1	16851.7	-48572.1	51.0	90.3	45.4	(19:38:26.1 5- 5-2005) - (19:38:26.4 6- 5-2005)
M85 - 096	2002	14999.1	-6990.5	-54400.9	20.4	15.3	26.1	(0:40:25.2 28- 6-2002) - (0:40:48.4 29- 6-2002)
	2003	15071.2	-6939.4	-54285.2	187.2	32.0	171.0	(23:21:30.8 7- 7-2003) - (23:21:31.0 8- 7-2003)
	2004	15072.3	-7053.0	-54443.9	31.1	28.2	18.2	(9:55: 0.1 3- 8-2004) - (9:55: 0.9 4- 8-2004)
	2005	15078.5	-7051.1	-54169.8	8.3	8.3	19.9	(23: 7:16.7 20- 6-2005) - (23: 7:16.9 21- 6-2005)
M87 - 028	2002	-17124.6	169.7	-50812.2	38.2	12.7	35.7	(1:21:42.4 28- 6-2002) - (1:21:56.8 29- 6-2002)
	2003	-17033.3	201.4	-50609.3	102.8	57.8	204.7	(17:43:23.6 7- 9-2003) - (17:43:24.3 8- 9-2003)
	2004	-17079.7	61.9	-50533.5	46.4	18.9	23.5	(15:47:29.1 3- 8-2004) - (15:47:29.7 4- 8-2004)
	2005	-17038.4	301.6	-50518.7	342.3	145.9	254.8	(0:26:39.5 4- 3-2005) - (0:26:39.7 5- 3-2005)
M87 - 068	2002	13897.6	-10123.8	-52328.2	22.0	9.7	16.7	(18: 5: 8.6 27- 6-2002) - (18: 5:26.0 28- 6-2002)
	2003	14083.3	-10179.3	-52273.4	169.0	64.1	109.1	(13:57:51.0 7- 9-2003) - (13:57:51.2 8- 9-2003)
	2004	13913.1	-10230.1	-52244.6	36.5	19.9	20.3	(14:23: 7.9 3- 8-2004) - (14:23: 8.0 4- 8-2004)
	2005	13917.0	-10134.7	-51948.6	18.5	8.9	15.1	(2:28:34.1 21- 6-2005) - (2:28:34.4 22- 6-2005)
M88 - 316	2002	-17255.5	-161.4	-50854.2	91.5	14.2	61.0	(17:24:35.3 31- 5-2002) - (17:24:37.4 1- 6-2002)
	2003	-17298.2	-83.1	-50920.5	95.0	76.8	112.6	(15:38:34.8 7- 9-2003) - (15:38:35.0 8- 9-2003)
	2004	-17272.7	138.5	-50901.8	28.2	24.6	13.1	(9:53:10.2 3- 8-2004) - (9:53:10.8 4- 8-2004)
	2005	41281.6	17.0	-50955.7	26.6	65.5	283.6	(12:31:13.2 23- 5-2005) - (12:31:13.4 24- 5-2005)

Japan Data, Quiet Period

Station	Season	Avg X (nT)	Avg Y (nT)	Avg Z (nT)	Var X	Var Y	Var Z	
M68 - 041	2003	-9285.4	16972.9	-38622.6	6.2	17.7	21.9	(21:29:39.5 7- 7-2003) - (21:29:40.4 8- 7-2003)
M69 - 041	2003	-13295.7	14407.7	-39367.4	6.9	16.0	17.4	(22:16: 3.9 7- 7-2003) - (22:16: 6.5 8- 7-2003)
	2004	-12986.3	14413.8	-39502.1	34.4	42.4	93.3	(10:35:26.9 3- 9-2004) - (10:35:26.9 4- 9-2004)
	2005A	-12979.3	14430.9	-39510.4	118.2	107.6	374.0	(15:55:29.9 5-11-2004) - (15:55:30.2 6-11-2004)
	2005C	-12844.6	14495.4	-39528.3	383.2	384.6	362.3	(5:11:41.5 20- 9-2005) - (5:11:43.1 21- 9-2005)
M70 - 039	2003	15239.2	9959.7	-39158.4	28.1	10.8	39.3	(23:36: 8.7 7- 7-2003) - (23:36:15.3 8- 7-2003)
M70 - 044	2005	17162.2	-8829.4	-41111.7	8.9	6.5	8.3	(1:10: 5.3 26- 5-2005) - (1:10: 5.5 27- 5-2005)
M74 - 043	2005	19030.0	-1712.8	-42711.6	59.8	25.1	21.1	(1: 3:57.5 21- 6-2005) - (1: 3:58.3 22- 6-2005)
M77 - 040	2003	7095.2	-18072.3	-44420.8	340.6	408.4	167.9	(8:25: 6.9 4- 5-2003) - (8:25: 7.5 5- 5-2003)
	2004	6956.0	-18170.3	-44277.5	118.7	132.6	70.9	(2:40: 7.5 2- 4-2004) - (2:40: 7.5 3- 4-2004)
	2005	6850.9	-18275.1	-44105.0	21.8	23.1	10.0	(3: 7:19.1 21- 6-2005) - (3: 7:19.5 22- 6-2005)

Table 4: Quiet Period Values.

In both table 3 and table 4 average or quite period values that are inconsistent with previous years and the IGRF model are highlighted in red. Data from these periods has been examined and has been replaced with the erroneous data value 9999.9 and marked with bit 5 of the status byte (One or more components have been replaced post-processing).

To date, the following data contains replaced samples:

Station	**Year**	**Replaced Data**
M67-292	2004	All Z samples and H, D samples from 04/11/04 onwards
M67-292	2005	All H, D and Z samples
M88-316	2005	All H and D samples

Table 5 Replaced erroneous data

It is likely that the M67-292 system has a faulty sensor or sensor cable (as the fault is multi-year) and this will be replaced asap.

M88-316 may have either a faulty sensor/cable or faulty logger and this should become clear when the data from 2006 is examined – as the fault became apparent when the logger was changed the working assumption is that the fault lies within the logger.

Figure 1 shows the raw outputs of M67-292 in Nov 2004. It is the first indication that the Z channel has a problem. Figure 2 shows the raw outputs of M67-292 in Dec 2004; as the Z channel goes full scale there is some unusual deviations on the X and Y channels. As the fault on the Z channel is unknown we decided to remove all of the Z samples from the released data for 2004, and all H and D samples (which are derived from X,Y) from when there was any indication of a problem with the Z channel. This data is still available in a pre-processed form.

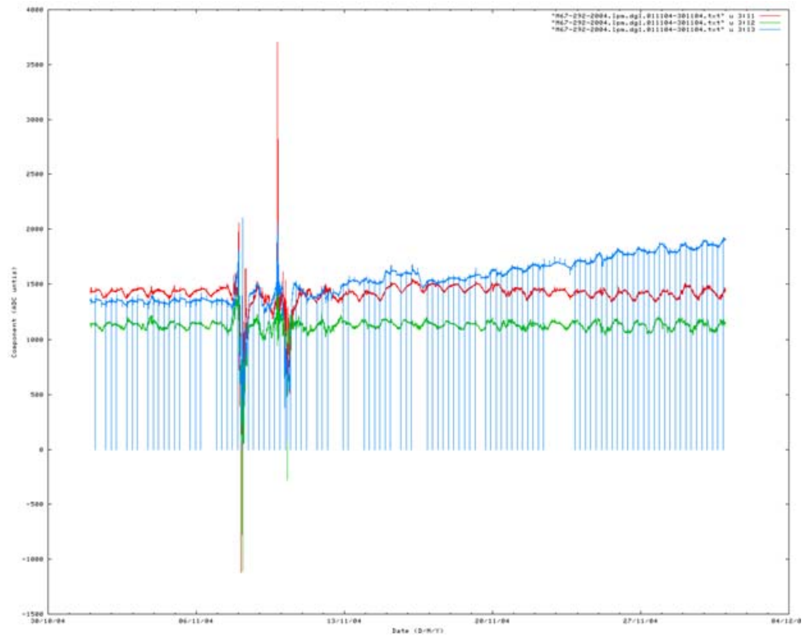

Figure 1. M67-292 raw X(red), Y(green), Z(blue) outputs in Nov 2004. Values before 4/11/04 have not been included in the released database.

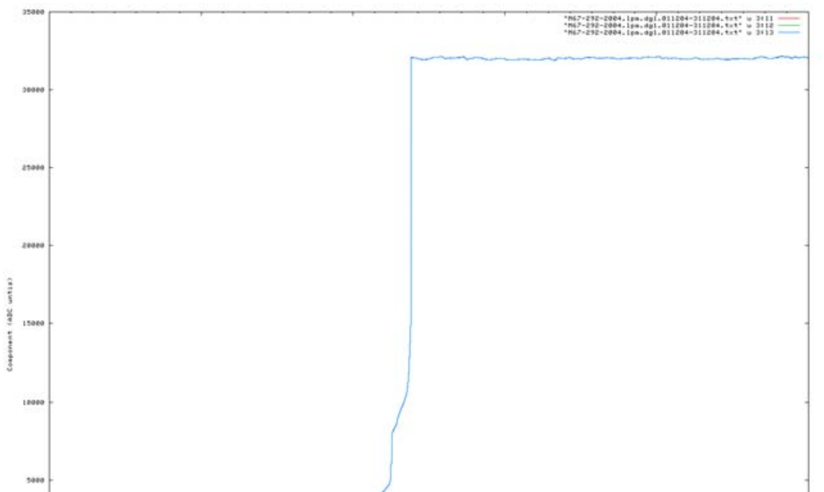

Figure 2. M67-292 raw outputs in December when the Z channel went to full scale. The X and Y channels show some unusual deviations.

4.0 Housekeeping data.

In 2005 the loggers recorded housekeeping every 4 hours, compared with every 6 hours in 2004, 12 hours in 2003 and every hour in 2002. This is also the interval between GPS fixes.

Housekeeping data consists of battery voltage, solar panel voltage, wind generator voltage and a variety of temperatures from around the system and the environment.

4.1 Temperature data

Temperature data recorded are:

a/ Outside temperature – measured behind solar panel.
b/ Enclosure temperature – in most instances identical to outside temperature.
c/ Logger temperature.
d/ 1m depth snow temperature – useful as an indication of magnetometer temperature.
e/ First battery box temperature.

Table 6 is a summary of the temperature information from each site.

The Logger Min is the minimum temperature recorded in the logger electronics, M85-096 has the coldest operational temperature so far at –78.8°C which it reached in both 2003 and 2005. The intention is to put a meteorological grade temperature sensor on this site and M87-069.

'Ave Delta' is the difference between the average logger temperature and the average outside temperature, a positive temperature indicates the logger is warmer than the outside.

The battery minimum and maximum show the extreme of temperatures measured within the first battery box. The battery Delta max shows the maximum warming inside the battery box due to charging.

LPM	Logger Min	Outside Min	Outside Max	Ave Delta	Batt Min	Batt Max	Batt Delta Max	Notes
M68-292	-31.4	-34.8	+8.1	2.32	-18.7	+16.4	26.9	2
M78-337	-52.4	-54.4	+9.6	2.48	-43.1	-6.0	21.0	2
M79-336	-44.6	-48.0	+10.1	5.35	-34.3	-2.1	22.9	2
M81-388	-56.3	-60.7	+9.6	4.05	-36.3	-4.5	25.3	2
M82-003	-64.1	-68.5	-4.1	4.37	-52.9	+15.0	54.7	
M83-348	-58.7	-60.7	-5.0	2.91	-50.9	+8.6	VOID	
M84-336	-56.8	-59.2	-8.0	3.01	-50.9	+30.1	60.5	
M85-002	-72.9	-75.8	-8.0	3.66	-60.7	+30.6	68.4	3,4
M85-096	-77.3	-78.8	-6.5	2.89	-63.1	-3.6	42.5	
M87-028	-51.9	-53.9	-9.9	4.46	-40.7	-2.1	28.8	
M87-069	-75.3	-76.8	-1.6	2.54	-62.2	+8.6	54.7	
M88-316	-66.6	-69.5	-9.9	2.97	-53.8	+11.1	54.7	

Table 6a. **2005** temperature information summary.
Note 1, No previous values.
Note 2, Cellyte rather than Sunlyte batteries.
Note 3, New outside coldest record for this site.
Note 4, Warmest ever battery temperature.

LPM	Logger Min	Outside Min	Outside Max	Ave Delta	Batt Min	Batt Max	Batt Delta Max	Notes
M68-292	-23.6	-25.0	+11.6	1.78	-14.8	+10.6	14.2	1,2
M78-337	-50.4	-52.4	+8.6	2.96	-37.8	-5.5	18.6	2
M79-336	-47.5	-50.4	+14.0	2.91	-36.8	-3.6	24.4	2
M81-388	-57.8	-60.2	+9.1	2.63	-38.7	-6.0	19.0	2
M82-003	-63.1	-67.0	-2.1	3.99	-53.3	+12.1	50.3	
M83-348	-60.7	-64.1	+5.7	4.46	-47.5	+9.6	48.3	3
M84-336	-59.7	-63.1	-15.3	4.29	-52.9	+22.3	46.8	3
M85-002	-70.0	-72.9	-2.6	3.60	-61.7	+19.8	59.0	3
M85-096	-73.4	-76.8	-10.9	3.55	-62.7	0.0	45.9	
M87-028	-67.5	-71.4	-1.1	4.34	-57.7	+4.2	35.2	3
M87-069	-74.9	-77.8	-5.0	3.95	-61.7	+7.6	54.2	
M88-316	-67.5	-70.5	-3.1	3.17	-55.8	+11.1	52.7	3

Table 6b. **2004** temperature information summary.
Note 1, No previous values.
Note 2, Cellyte rather than Sunlyte batteries.
Note 3, New outside coldest record for this site.

LPM	Logger Min	Outside Min	Outside Max	Ave Delta	Batt Min	Batt Max	Batt Delta Max	Notes
M78-337	-50.9	-54.8	-2.2	3.27	-38.7	-2.1	20.0	2, 3
M79-336	-50.4	-52.8	+9.6	1.53	-37.3	-1.6	22.0	2
M81-388	-57.8	-61.2	+6.7	3.06	-40.2	-4.5	21.0	2
M82-003	-68.0	-70.9	-8.45	2.57	-52.9	6.2	43.9	3
M83-348	-60.2	-63.1	-11.9	3.12	-45.1	8.1	44.4	3
M84-336	-55.3	-58.7	-13.3	1.57	-48.0	14.0	44.9	
M85-002	-67.5	-70.5	-19.2	3.69	-60.2	14.0	55.2	3
M85-096	-76.3	-78.8	-22.1	2.88	-68.0	-3.5	47.9	1,3,4
M87-028	-65.6	-69.0	-13.8	3.13	-57.8	2.8	43.9	1,3
M87-069	-74.4	-78.3	-17.2	4.28	-64.1	4.2	50.7	1,3
M88-316	-65.1	-66.5	-8.0	2.67	-57.3	7.2	49.8	1,3

Table 6c. **2003** temperature information summary.
Note 1, No previous outside min temps.
Note 2, Cellyte rather than Sunlyte batteries.
Note 3, New outside coldest record for this site.
Note 4, New absolute outside coldest recorded for any site to 2003.

System M83-347 has a non-working 1m temperature measurement – if this is also apparent in the 2006 data then the sensor and cable will be replaced.

System M87-068 has a non working temperature sensor in the outer enclosure – if this is also apparent in the 2006 data then it should be possible to fix on site but at low priority.

M84-336 and M85-002 show very high battery temperatures in 2005. Figure 3 shows the battery temperature during the year (black) along with the solar panel charge voltage (upper blue, solar panel voltage + 40) and the wind generator charge voltage (lower blue, wind generator charge voltage –70) for M85-002 in 2005. Figure 4 shows the a zoomed in version of the last part of figure 3 – the period when the battery temperature exceeded 20°C and reached 30.6°C. It is apparent from figure 3 that the wind generator did not provide any power during the winter, therefore the batteries required substantial charge when the sun returned in spring and hence rapidly warmed. Once fully charged they warm more slowly (current into the battery box and hence power dissipated is reduced), but the availability of wind power means that the charge voltage is higher (upto 22v) and the voltage drop on the charge regulator in the battery box will be higher – hence the power dissipated in the battery box is higher. When the battery box reaches approximately 30°C then the dump circuit operates to pull the solar panel and wind generator voltages down to about 5V which removes any power dissipation in the battery box.

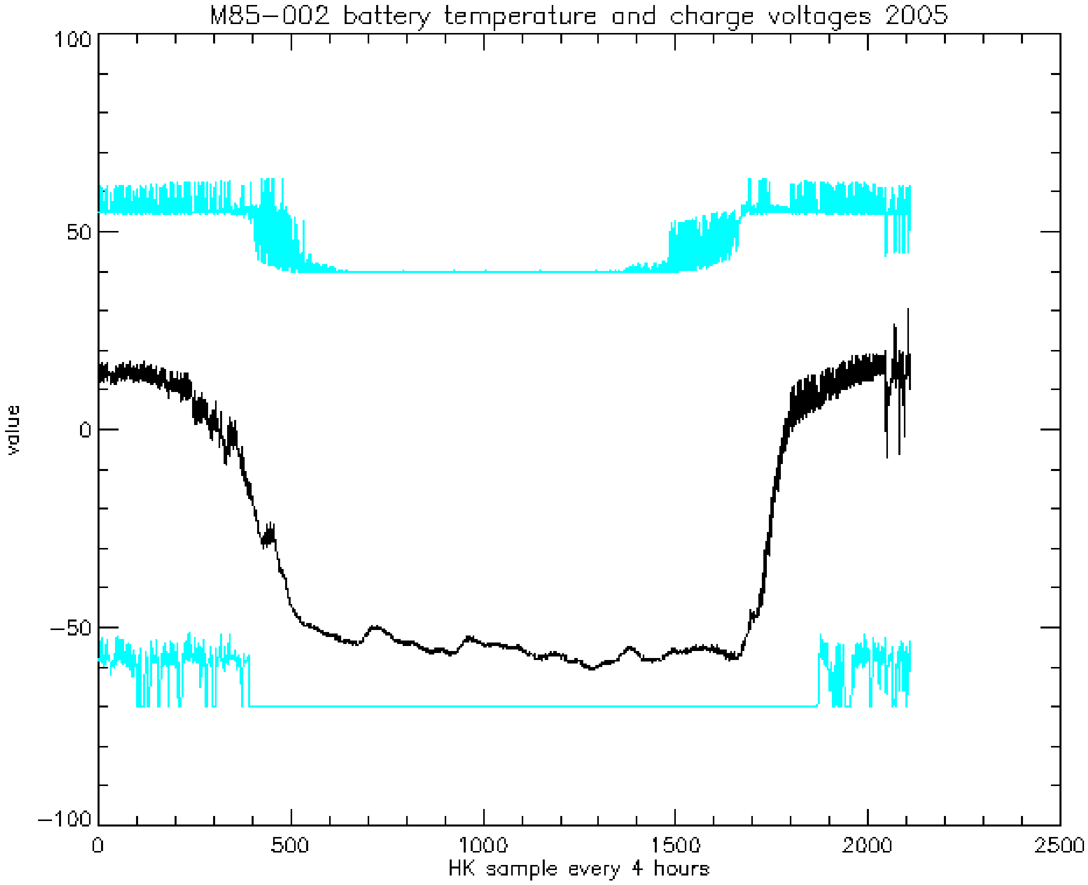

Figure 3, M85-002 battery temperature during the year (black) along with the solar panel charge voltage (upper blue, solar panel voltage + 40) and the wind generator charge voltage (lower blue, wind generator charge voltage –70).

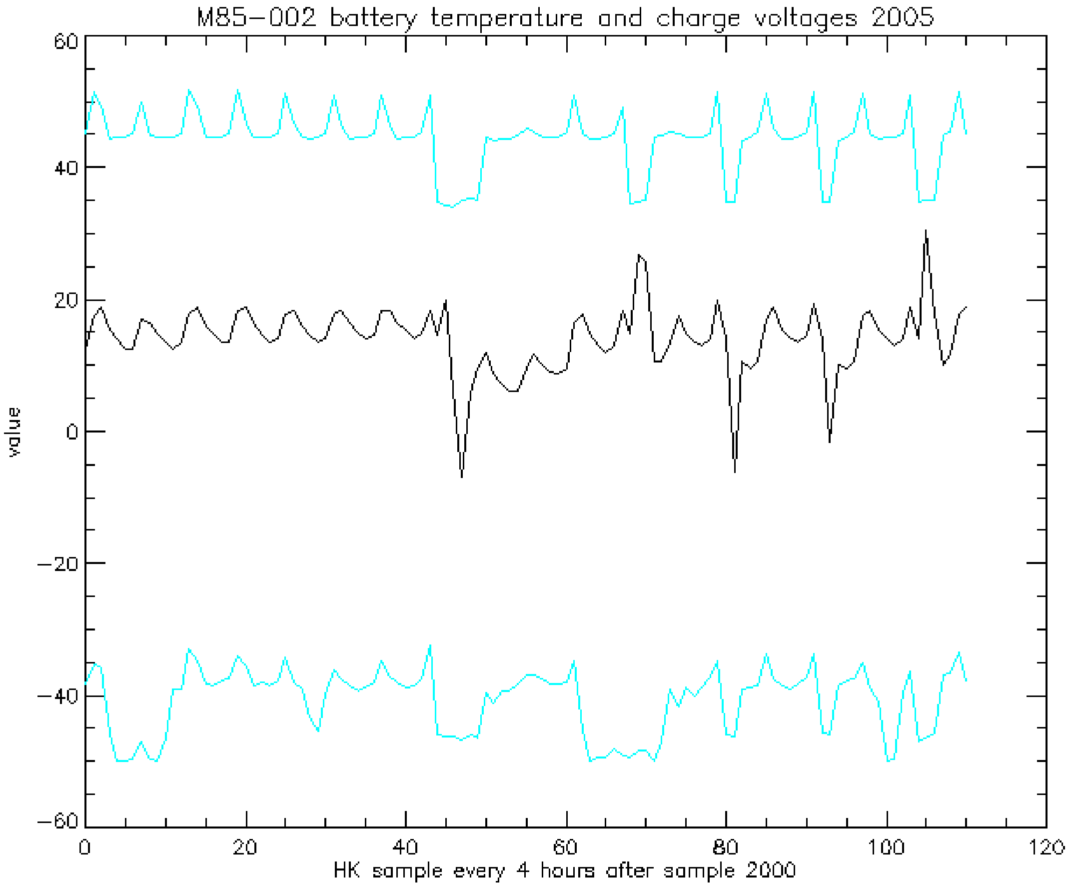

Figure 4, M85-002 battery temperature at the latter part of the year (black) along with the solar panel charge voltage (upper blue, solar panel voltage + 30) and the wind generator charge voltage (lower blue, wind generator charge voltage –50). This is the section of figure 3 from sample 2000 onwards.

Figure 4 shows the operation of the dump circuit. The temperature sensor in the battery box is on the regulator PCB and effectively measures the air temperature below the main regulator plate. The over temperature switch and the power transistor which is the main source of heat are directly mounted on the regulator plate. The batteries sit on top of the regulator plate. This means that the temperature sensor does not directly monitor the same temperature as that seen by the over temperature switch, the over temperature switch also has a large degree of hysteris, it switches on at 30+/-4°C and switches off at 20+/-4°C. At around sample 43 the over temperature switch activates the dump box and the solar panel and wind generator voltage are dragged down to about 5V, the temperature (as measured by the sensor) rapidly drops and then recovers again when the over temperature switch resets and allows further charging to take place. The cycle is then repeated. Figure 5 shows the same end of year data for site m84-336 where the dump cycle is repeated a number of times.

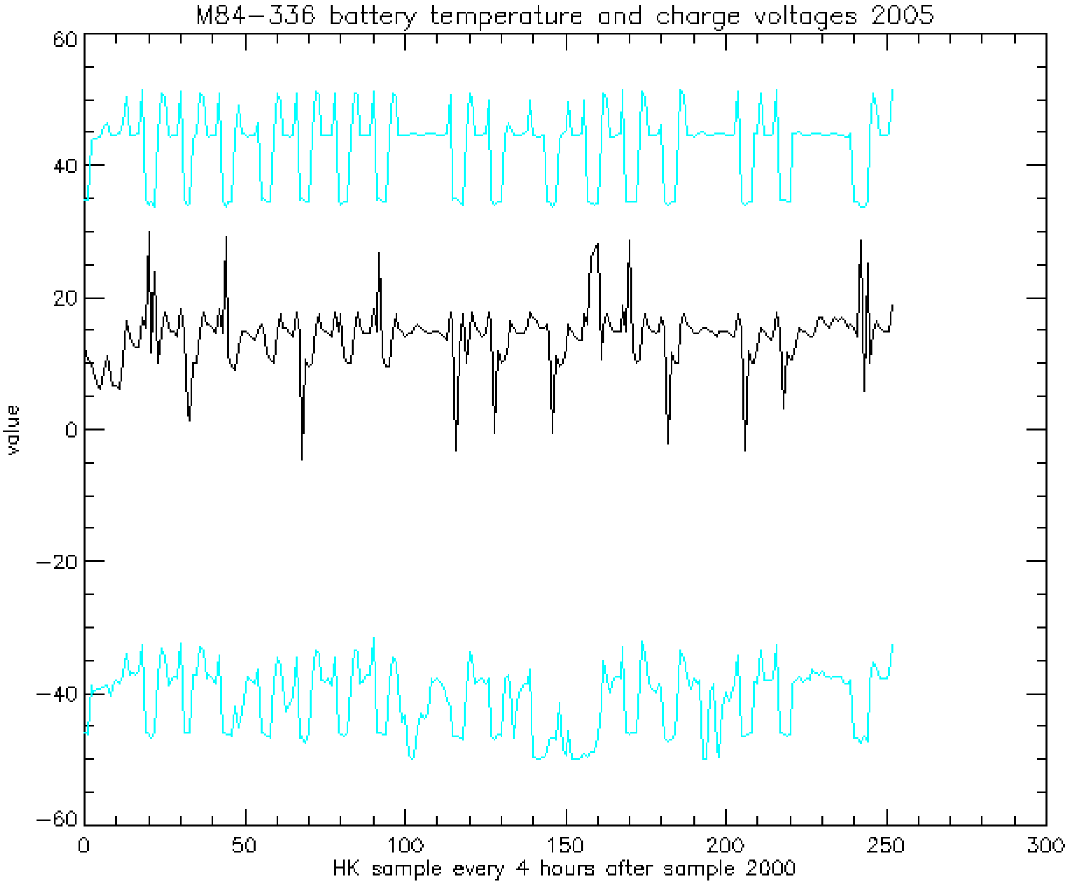

Figure 5, M84-336 battery temperature at the latter part of the year (black) along with the solar panel charge voltage (upper blue, solar panel voltage + 30) and the wind generator charge voltage (lower blue, wind generator charge voltage –50).

The data from 2006 will be examined to see if the cyclic operation of the dump circuit has any detrimental effect.

The performance of the wind generators will be discussed in section 4.3

4.2 Battery voltage data

Battery voltage is important as it indicates the charge state of the batteries. If the batteries are too deeply discharged then they will have a shortened life (which could be as short as one discharge in the severe case). As the method of retaining battery charge is to slow down the sampling rate of the magnetometer, too conservative estimation of battery voltage will result in reduced high resolution data coverage.

Voltage itself is not important for correct operations of the instrument as all power supplies are derived from DC-DC converters that are specified down to 8v.

Figure 6 shows the battery voltage at M78-337 for the year.

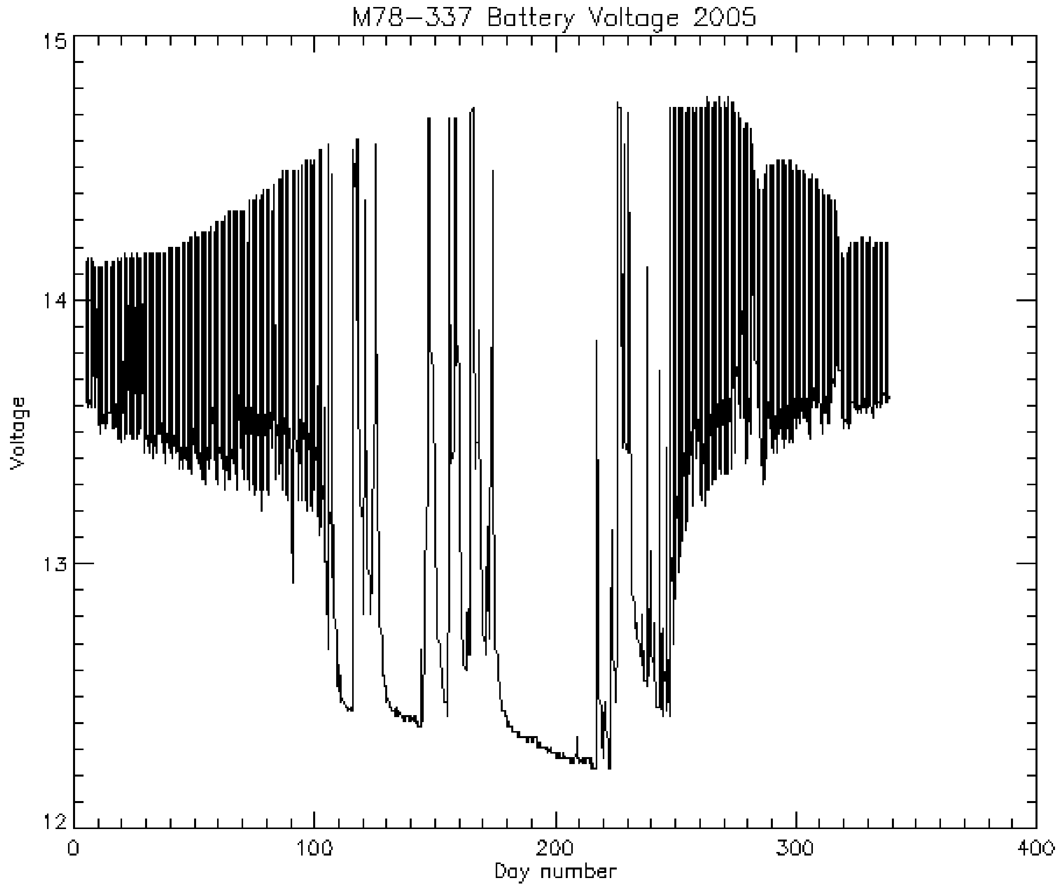

Figure 6. Battery voltage at M78-337.

Of chief importance is the state of charge of the batteries. At room temperature, 13V would indicate 100% available, and 12V 20% available. It is therefore possible to calculate how much battery power has been used during periods of no charge and compare this with the calculated usage. During 2005 with 1s sampling and a 10minute GPS fix every 4 hours the calculated power consumption is 458mW and this can be compared to the voltage decline of the batteries between day number 180 and day number 218. The ratio of calculated use to measured use is presented in table 7.

From figure 6 it is also possible to estimate the contribution from the wind generator between day 145 and day 180 by calculating what the battery voltage would have been at day 180 if it had carried on the trend at from day 145. In this case the 400Ahr batteries are 6.4% higher than they would have been if they had carried on the day 145 trend line. This equates to 0.37W, therefore the generator (on average) must have been producing at least the 0.46W use and the 0.37W stored – in practice the generator must have been producing more than this as the battery storage efficiency would be far less than 100%.

These calculations are not possible when the wind generator performance is good such as at M81-338 shown in figure 7.

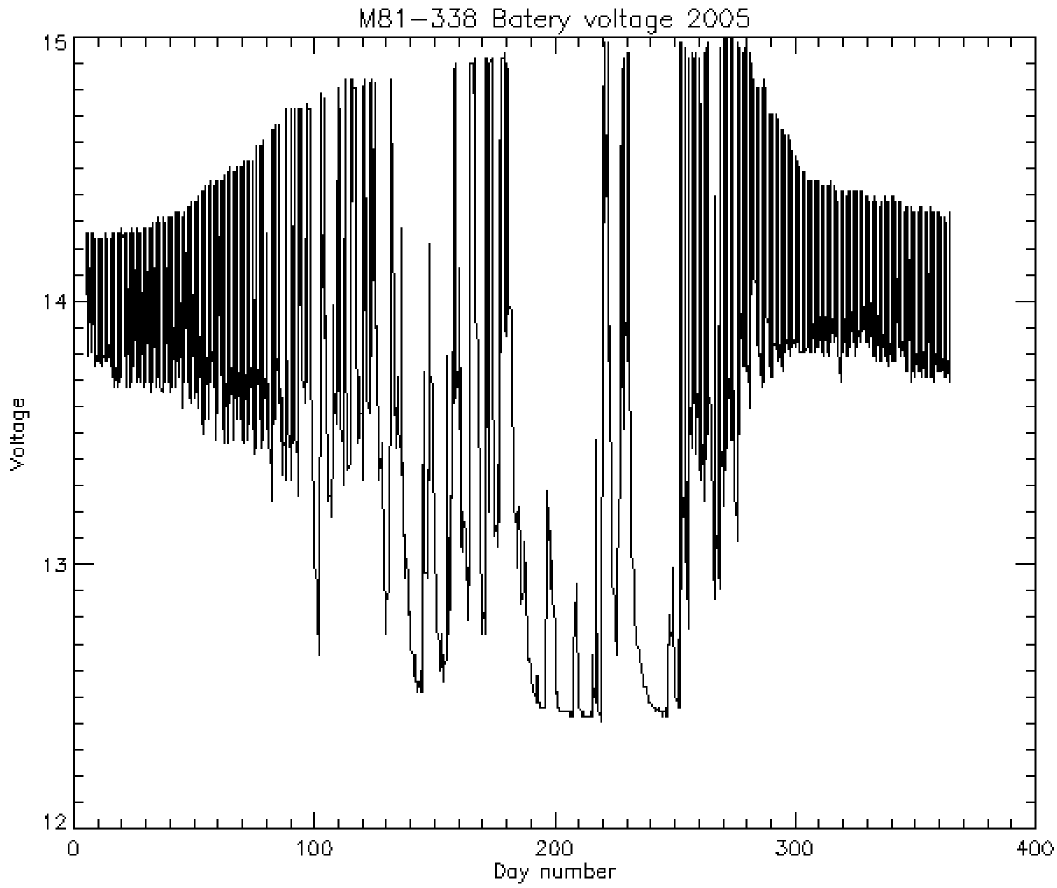

Figure 7. Battery voltage at M81-338.

LPM	Use Ratio	Use calc@ sample rate	Min Volts	mid V	mid T	Notes
M78-337	0.91	1s	12.22	*	*	1,2,3
M79-336	0.71	1s	12.15	*	*	1,2,3
M81-388	*	*	12.40	*	*	1,3
M82-003	1.06	1s	11.52	11.74	-48.0	
M83-347	1.32	1s	11.78	11.89	-48.0	
M84-336	*	*	11.77	*	*	1
M85-002	0.85	1s	11.33	11.66	-54.4	
M85-096	1.04	1s	11.50	11.67	-57.8	
M87-028	N/A	N/A	N/A	N/A	N/A	4
M87-069	1.04	1s	11.50	11.76	-54.8	
M88-316	1.08	1s	11.68	11.80	-50.9	

Table 7a. Battery data in **2005**
Note 1. Wind generator coverage makes * invalid.
Note 2, Usage calculation during pause in wind generation
Note 3, Cellyte rather than Sunlyte batteries.
Note 4, Short period of operation.

LPM	Use Ratio	Use calc@ sample rate	Min Volts	mid V	mid T	Notes
M68-292	0.13	10s	11.91			
M78-337	0.85	1	12.11	12.36	-34.3	3
M79-336	0.80	1	11.99	12.29	-32.9	3
M81-388	0.68	1	11.95	12.29	-35.8	3
M82-003	0.94	1	11.68	11.86	-49.5	
M83-347	*	*	11.86	*	*	1
M84-336	*	*	11.88	*	*	1
M85-002	0.68	1	11.43	11.72	-56.3	2
M85-096	0.73	1	11.60	11.68	-62.2	2
M87-028	1.23	1	11.64	11.76	-61.2	2
M87-069	0.93	1	11.58	11.68	-65.6	2
M88-316	1.04	1	11.76	11.86	-56.3	2

Table 7b Battery data in **2004**
Note 1. Wind generator coverage makes * invalid.
Note 2, Usage calculation during pause in wind generation
Note 3, Cellyte rather than Sunlyte batteries.

LPM	Use Ratio	Use calc@ sample rate	Min Volts	mid V	mid T	Notes
M78-337	0.56	1	12.09	12.34	-34.3	3
M79-336	0.62	1	12.03	12.25	-33.8	3
M81-388	0.62	1	12.01	12.27	-36.3	3
M82-003	1.13	1	11.52	11.64	-49.5	
M83-348	*	*	11.97	*	*	1
M84-336	*	*	12.36	*	*	1
M85-002	1.01	1	11.45	11.54	-57.8	2
M85-096	1.51	1	11.25	11.39	-64.6	2
M87-028	1.69	1	11.48	11.60	-56.3	2
M87-069	1.93	1	11.36	11.48	-60.7	2
M88-316	1.23	1	11.64	11.76	-55.3	2

Table 7c Battery data in **2003**

Note 1. Wind generator coverage makes * invalid.

Note 2, Usage calculation during pause in wind generation

Note 3, Cellyte rather than Sunlyte batteries.

LPM	Use Ratio	Use calc@ sample rate	Min Volts	mid V	mid T	Notes
M78-337	1.02	1	12.13	12.40	-32.9	3
M79-336	0.97	1	12.13	12.48	-31.4	3
M81-388	1.13	1	12.13	12.25	-34.8	3
M82-003	0.41	3	11.98	11.99	-43.1	1
M83-348	0.54	3	11.91	12.03	-42.1	
M84-336	1.05	3	11.91	12.05	-42.1	
M85-002			12.13			1
M85-096	0.50	3	11.64	11.91	-58	2
M87-028	0.40	3	11.86	11.95	-50	2
M87-069	1.12	60	11.74	11.91	-47	2
M88-316						1

Table 7d. Battery data in **2002**
Note 1, Not a whole year.
Note 2, Mid T is Logger Temperature
Note 3, Cellyte rather than Sunlyte batteries.

The use ratio (calculated use/measured use) has to be interpreted with some caution, the batteries' voltage changes are actually quite small and this figure cannot be considered accurate. However tentative conclusions can be drawn:

1. The long term average use ratio of the Sunlyte batteries is 1.01 – which indicates that we get close to the rated AHrs from the batteries. The very low discharge currents compensating for the low temperatures. The long term average use ratio for the Cellytes is 0.81 – this may indicate that they have poorer performance.

2. This years average use ratio of the Sunlytes is 1.07 and for the Cellytes 0.81, when compared to previous years values in table 8 there is no evidence of battery degregation.

Battery type	To 2003	2004	2005
Cellytes	0.82	0.78	0.81
Sunlytes	1.04	0.93	1.07

Table 8. Average use ratio of the battery types.

The voltage and the temperature during the midpoint of winter (when all systems should be more or less at the same state of discharge) can be used to estimate the temperature coefficient of measuring the battery charge state by voltage. Figure 8 shows the voltage v temperature data for the systems in 2002 to 2005. The equation of the overall trend line is:

13.1V – 25mV/°C

The loggers use currently 25mV/°C as temperature compensation below –30°C.

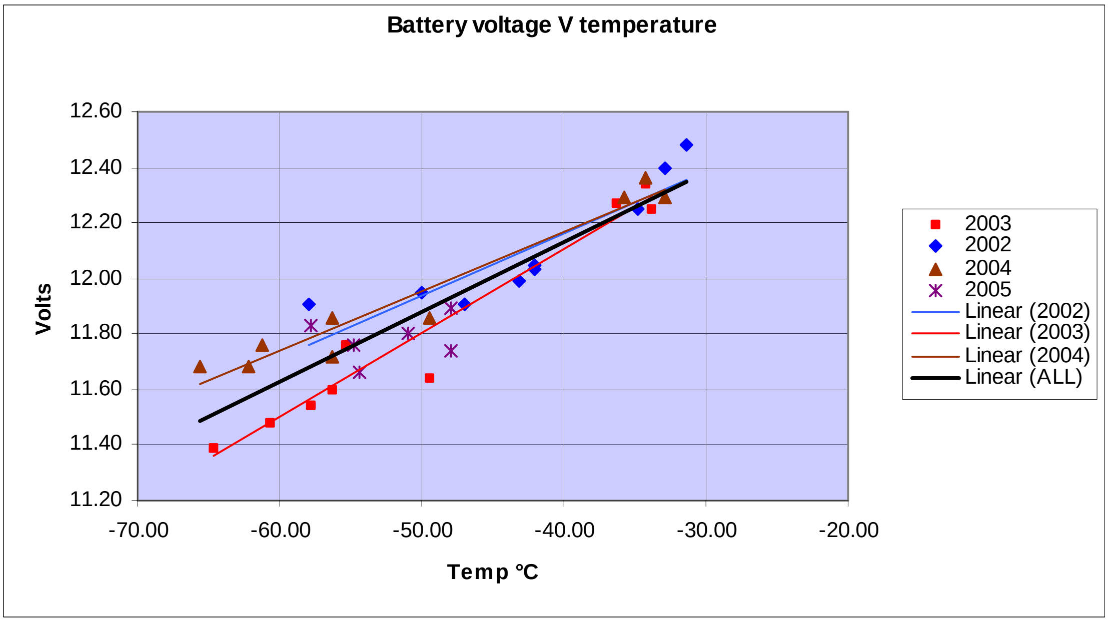

Figure 8. Winter midpoint battery voltage v battery temperature.

4.3 Wind generators.

The wind generators fitted in the 2002/3 season were rated to –40°C, and did not spin continuously at the cold sites. For instance, figure 9 shows that the wind generator at M85-096 in 2004 did not spin for the whole winter. Whether a wind generator spins or not is a function of both the windspeed (which we don't have a record of) and temperature, but in general the –40°C rated generators seemed to work down to about –50°C.

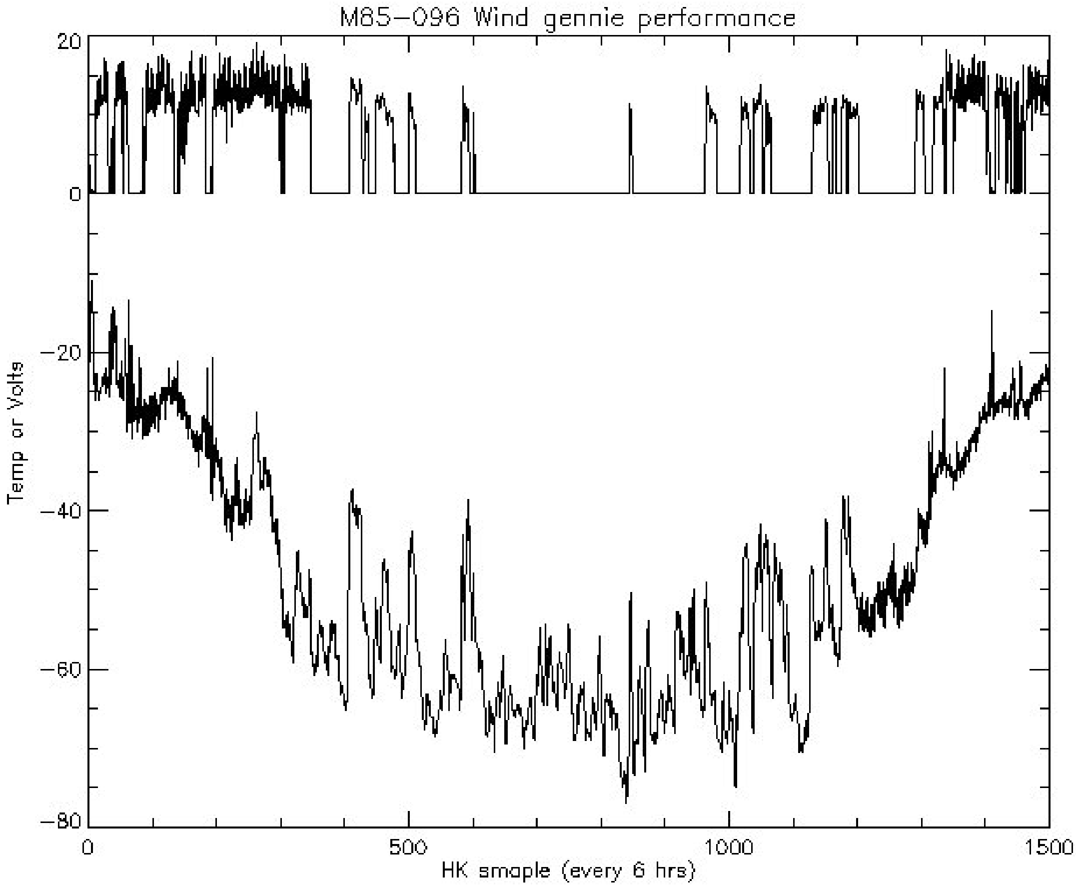

Figure 9. Temperature (bottom line) and windgenerator voltage (top) at M85-096 in 2004. The windgenerator had bearings rated at –40°C

In the 2004/5 season Wind generators with –60°C rated were deployed at the colder sites (see table 9). There is no evidence that the –60°C generators work any better in the extreme temperatures than the –40°C rated units. Figure 10 shows the same site (M85-096) for 2005 (-60°C generator) as for figure 9 in 2004 (-40°C generator).

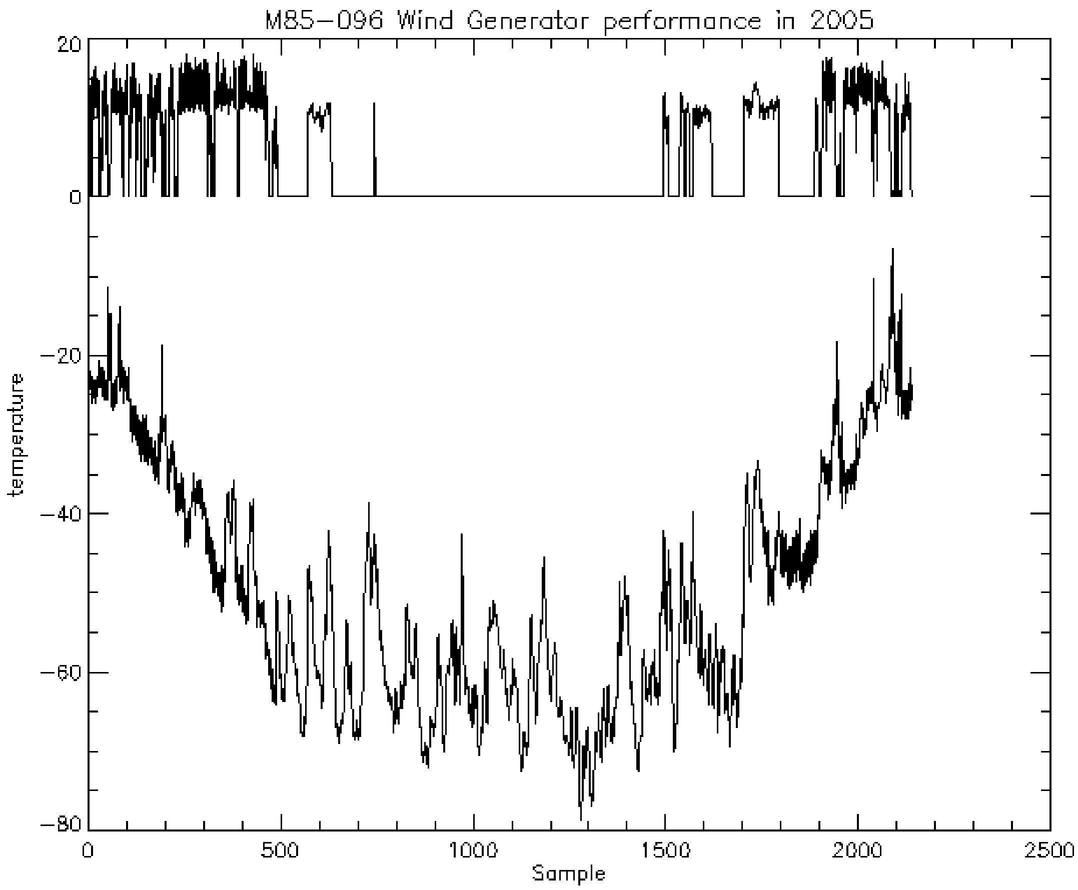

Figure 10. Temperature (bottom line) and wind generator voltage (top) at M85-096 in 2005. The windgenerator had bearings rated at –50°C.

In terms of the LPM the wind generators do not add much to the performance. A separate study will be made as to the performance of the Forgens for other applications.

Site	2003	2004	2005
M68-292	Not fitted	Not fitted	Not fitted
M78-337	Not fitted	Not fitted	WG12/04-40C
M79-336	Not fitted	Not fitted	WG13/04-40C
M81-388	Not fitted	Not fitted	WG20/04-40C
M82-003	Not fitted	Not fitted	WG19/04-60C
M83-347/8	WG07/02-40C	WG07/02-40C	WG15/04-60C
M84-336	WG??/02-40C	WG??/02-40C	WG21/04-60C
M85-002	WG??/02-40C	WG??/02-40C	WG17/04-60C
M85-096	WG02/02-40C	WG02/02-40C	WG18/04-60C
M87-028	WG04/02-40C	WG04/02-40C	WG14/04-60C
M87-069	WG03/02-40C	WG03/02-40C	WG24/04-60C
M88-316	WG01/02-40C	WG01/02-40C	WG16/04-60C

Table 9: Wind generators at each site.

LPM	Rating of wind generator	Winter Performance	Wind Operating temperatures	Estimated Average Power from Wind	Notes
M78-337	-40C	Some	>-40°C	0.83W	
M79-336	-40C	Some	>-35°C	1.23W	
M81-388	-40C	Reasonable	>-50°C	*	1
M82-003	-60C	None	>-40°C	*	1
M83-347	-60C	Some early	>-55°C	*	1
M84-336	-60C	Lots	>-60°C	*	1
M85-002	-60C	None	>-45°C	*	1
M85-096	-60C	Practically None	>-55°C	*	1
M87-028	-60C	N/A	N/A	N/A	2
M87-069	-60C	None	>-45°C	*	1
M88-316	-60C	None	>-45°C	*	1

Table 10. Wind generator performance in 2005.

None < practically none < some < reasonable < lots
Note 1, Wind generator coverage (high or low) makes * invalid.
Note 2, Short period of operation.

5.0 Site work performed the in 2005/6 season.

1. All podules replaced as normal
2. All podules now fitted with a 30mm GPS antenna extension.
3. Sites M79-336, M81-338, M85-002, M88-316 raised.
4. Rothera system, batteries removed and unit placed on base supply.

6.0 Summary of work planned for 2006/7 season and 2007.

1. System M83-347 has a non-working 1m temperature measurement in 2005, this will be investigated in the data from 2006.

2. It is likely that the M67-292 system has a faulty magnetometer sensor or sensor cable and this will be replaced asap.

3. M88-316 may have either a faulty magnetometer sensor/cable or faulty logger and this should become clear when the data from 2006 is examined.

4. The intention is to put a meteorological grade temperature sensor on M85-096 and M87-069 in the 2007/8 season

5. The data from 2006 will be examined to see if the cyclic operation of the dump circuit has any detrimental effect.

6. System M87-068 has a non working temperature sensor in the outer enclosure – if this is also apparent in the 2006 data then it should be possible to fix on site but at low priority.

7. A separate study will be made as to the performance of the Forgen wind generators for other applications.

APPENDIX 1

LPM Positions

BAS Low Power Magnetometer Positions

Site	Name	1st Deployed	Latitude	Longitude	Elevation ft	IGRF Declination	IGRF H in nT	IGRF Z in nT
M68/292	Nursie (Rothera)	18/03/03	67°34'11"S	68°07'00"W	50	+20°46	21396	36279
M78/337	Dr Leech	04/01/01	77°30'40"S	23°25'31"W	5200	-3°12'	19590	40978
M79/336	Bob	03/02/00	79°04'36"S	24°07'11"W	4000	-2°34'	19490	42566
M81/338	Edmund	07/01/01	80°53'18"S	22°15'50"W	3860	-3°59'	19251	44348
M82/003	Mrs Miggins	21/01/01	81°29'33"S	02°58'23"E	7900	-24°21'	18974	45079
M83/348	Baldrick	23/01/01- 16/01/05	82°53'57"S	12°14'39"W	6900	-12°21'	18837	49960
M83/347[1]	Baldrick	16/01/05	82°46'30"S	13°03'07"W	6900	-12°21'	18837	49960
M84/346	Baron Richthoven	15/01/01	84°21'14"S	23°51'30"W	6700	-2°58'	18519	47860
M85/002	Lord Melchett	23/01/01	85°21'26"S	02°03'47"E	8800	-25°57'	18139	48909
M85/096	Baby Eating Bishop	22/01/02	85°21'23"S	95°58'32"E	10500	-118°12'	15752	54672
M87/028	Flash Heart	19/01/02	86°59'58"S	28°24'37"E	9330	-51°09'	17495	50792
M87/068	Speckled Jim	22/01/02	86°30'53"S	68°10'19"E	10650	-90°51'	16678	52773
M88/316	Lord Whiteadder	19/01/02	88°01'30"S	43°52'02"W	8370	+16°08'	17276	51644

Positions are from a single GPS fix from the logger in Jan 2003.
Note 1. M843/348 was removed on 16/1/05 and replaced with M83/347
Elevations are those given by the airunit (estimated for Rothera).
IGRF values are those quoted 31/01/2000.
Rothera is included from the date it became a standard LPM.

AFI/BAS Low Power Magnetometer Sites

These are 0.1nT/5s variants of the normal LPMs.

Site	**Name**	**1st Deployed**	**Latitude**	**Longitude**	**Elevation ft**	**IGRF Declination**	**IGRF H in nT**	**IGRF Z in nT**
Lockroy	Percy	29/11/00	64°49’28”S	63°29’20”W	10	+16°08’	21223	33010
Trump Island	Queenie	01/12/00	66°01’57”S	65°58’12”W	10	+18°27’	21366	34544
Rothera	Nursie	12/12/00	67°29’18”S	68°09’47”W	50	+20°46	21396	36279

Positions are those given by the deployment teams.
Elevations are estimated.
IGRF values are those quoted 31/01/2000.

JAPANESE NIPR/BAS Low Power Magnetometer Sites

Site	Name	1st Deployed	Latitude	Longitude	Elevation ft	IGRF Declination	IGRF H in nT	IGRF Z in nT
J70/039	Skallen	15/01/03	69°40’23”S	39°24’06”E	30	-48°41”	19206	39127
J68/041	Omega	31/01/03	68°34’39”S	41°04’53”E	140	-49°39”	19171	38842
J69/041	H100	01/01/03	69°17’44”S	41°19’15”E	4260	-50°05”	19198	39375
J77/035	DomeF	06/02/03	77°19’02”S	39°42’33”E	12340	-52°48”	18969	44686

Positions are from a single GPS fix from the logger in Jan/Feb 2003.
Elevations are estimated from a single GPS fix from the logger in Jan/Feb 2003.
IGRF values are those quoted 01/02/2003.

BAS Low Power Radiometer Sites

Site	Site Name	Equipment Name	1st Deployed	Latitude	Longitude	Elevation ft	IGRF Declination
R71/292	Fossil Bluff	Sergeant Wilson	02	71°20 S	68°17 W	320	+28°
R75/289	Sky-Blu	Private Pike	03	74°58 S	70°46 W	4500	+23°
R81/338	A80	Private Frazer	03	80°53’30” S	22°14'48"W	3800	-4°
R84/336	A84	Corporal Jones	03	84°21’34” S	23°51'06"W	6700	-3°

Positions and elevations are estimated.
IGRF value 2000-2003 epoch.

Mike Rose, 2/03/2005

APPENDIX 2

Document History

V1.0 15/12/06 1st Public version