

MATeF – 2 Flight Report

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Introduction

This document covers the post-flight analysis of MATeF-2 Test Mission. The main goal of the mission was to test the latest UPRA-ReHAB flight computer.

MATeF-2 and MATeF-3 (Konferencia II) flights were test to prepare the same service module for flights in short (less than 3 weeks) time period.

This flight report gives a summary of the mission: [Objectives](#), [Crew](#) and [Configuration](#), a detailed report of the flight events and the results of the [Post-Flight Analysis](#).

In the end of the document the [Lessons Learned](#) are gathered to improve the workflow and development for the upcoming test flights.

Detailed flight data can be found in *Appendix 1* to *Appendix 3*

1 Mission Summary

1.1 Mission Objectives

O_001	Target altitude: 16000m
O_002	Continuous telemetry downlink
O_003	Tracking via GPS: Latitude, Longitude, Altitude
O_004	Recovery
O_005	Module temperature measurement: OBC, COM
O_006	External temperature measurement
O_007	On-Board data logging
O_008	Backup Tracker test
O_009	Radio Uplink Test
O_010	APRS test

Table 1 Mission Objectives

1.2 Crew

Flight Director	Góczán Bence
Launch Director	Németh Márk
Technical Director	Góczán Bence
Launch staff	Tóth Raymond Ádám
Launch staff	Markos Péter
GND operator	Farkas Tamás
GND operator	Kiss Tamás
GND operator	Móna Dániel
Recovery Lead	Góczán Bence
Recovery staff	Bognár Márton
Recovery staff	Markos Péter
Recovery staff	Rév Balázs
Trajectory analysis	Várhegyi Zsolt

Table 2 Crew List

1.3 Mission Details

Launch Date	2018.03.31
Launch Time	10:26 UTC
Launch Site	N 47.473272, E 19.061722
Ground Station	BME Building Q
Ambient Temperature	17 -21 °C

Table 3 Mission details

1.4 Configuration

Flight System		
OBC	OBC.328	FW:2018_01_10_2129
COM	COM.RF69HCW	FW:2017_11_28_2308
EPS	EPS Proto	V2
GPS		baud: 4800
Backup	TK 102b GSM-GPS	GSM
Antenna	433MHz Groundplane	Yellow
Extras	External Temperature Sensor: MCP9700A	min: -50°C
	DRAPRS - APRS + VHF radio backup	DAPRS_tracker v3.3

Ground Station		
ASR	COM.RF69HCW	FW:2016_10_30_2006
MC	UPRA-PC + EZGND	EZ.2016_10_30_2013
Antenna	GND-Yagi	11 element ~+12dB

RECOVERY		
GND	COM.RF69CW	FW:2016_10_23_0030
SW	EZGND-Proto	EZ.2016_10_30_2013
Antenna	RECO-Yagi	6 element handheld
Extras	Vehicle	Skoda Octavia

Table 4 Flight system configuration

Primary Radio Downlink		Primary Radio Uplink	
Frequency	433.9MHz	Frequency	433.9MHz
Bitrate	1kbps	Bitrate	1kbps
Bandwidth	4kHz	Bandwidth	4kHz
Deviation	2kHz	Deviation	2kHz

Table 5 Primary (UHF) Radio Link

Secondary Radio Downlink (APRS)		Secondary Radio Uplink	
Frequency	144.8MHz	Frequency	-
Bitrate	1200bps	Bitrate	-
Channel space	12.5kHz	Channel space	-

Table 6 Secondary (VHF) Radio Link

Balloon	Totex - TA200
Probe	MATeF POC – Variant B
Payload weight (with parachute)	760 gram
Dry Mass	960 gram

Table 7 Payload train

2 Launch Preparation

- Launch site preparation was successful
- System startup was successful
- Backup tracker was not operational at launch due to SIM activation delay
- APRS tracker was operational
- Radio link was established
- 3120 gram neck-lift was achieved

3 Flight

3.1 Controlled Flight I (Launch – 9300m)

- After Balloon Launch telemetry data was streamed properly
- Telemetry data was collected by primary GND
- APRS was operational

3.2 Controlled Flight II (9300m - Landing)

- Loss of Signal at primary GND
 - Balloon out of line of sight
 - Possible antenna problems on GND
- APRS was still operational
- Descent phase was longer than the simulated trajectory (see 4.5.1 *Descend analysis*)

3.3 Recovery

- Late start of the recovery team due to laptop problems
- GND relocation and extra equipment gathering for recovery
- APRS pinpointed the landing position
- Clear recovery

Balloon was ‘Recovered’

4 Post Flight Analysis

4.1 Objectives

O_001 - Target altitude: 16000m

Passed

To reach 16000m altitude with Totex 200g balloon 7 m/s ascent speed was calculated. 3120 gram neck lift was achieved during inflation which according to the telemetry data provided 7.37 m/s ascent rate was achieved. Balloon burst happened at 14957m altitude.

O_002 - Continuous telemetry downlink

Passed

We had continuous telemetry streamed by the balloon. The data was decoded during the controlled phase I.

O_003 - Tracking via GPS: Latitude, Longitude, Altitude

Passed

Live telemetry data was streamed on the website with live maps, altitude and housekeeping information.

O_004 – Recovery

Passed

Recovery was successful by APRS data.

O_005 - Module temperature measurement: OBC, COM

Passed

Module temperatures were transmitted and logged during the flight.

O_006 - External temperature measurement**Passed**

External temperature was transmitted and logged during the flight. Plausible data was received; fashion of the data matched the official reports of the local weather service.

O_007 - On-Board data logging**Passed**

Proper flight data was stored on the on-board SD card. Data logging was ended when the flight computer switched to 'Beacon' mode (see 5.4 *On-Board Data Logging*)

O_008 - Backup Tracker test**Failed**

Backup tracker SIM card was unregistered at launch, never tried to establish contact with the tracker.

O_009 - Radio Uplink Test**Partial Success**

Uplink was successful at low altitude. No answer at higher altitudes.

O_010 - APRS test**Passed**

APRS tracking was continuous during flight; landing site was pin-pointed.

4.2 Raw Telemetry Data

On-Board data in *Appendix 1*

GND data in *Appendix 2*

APRS data in *Appendix 3*

4.3 Altitude and Route

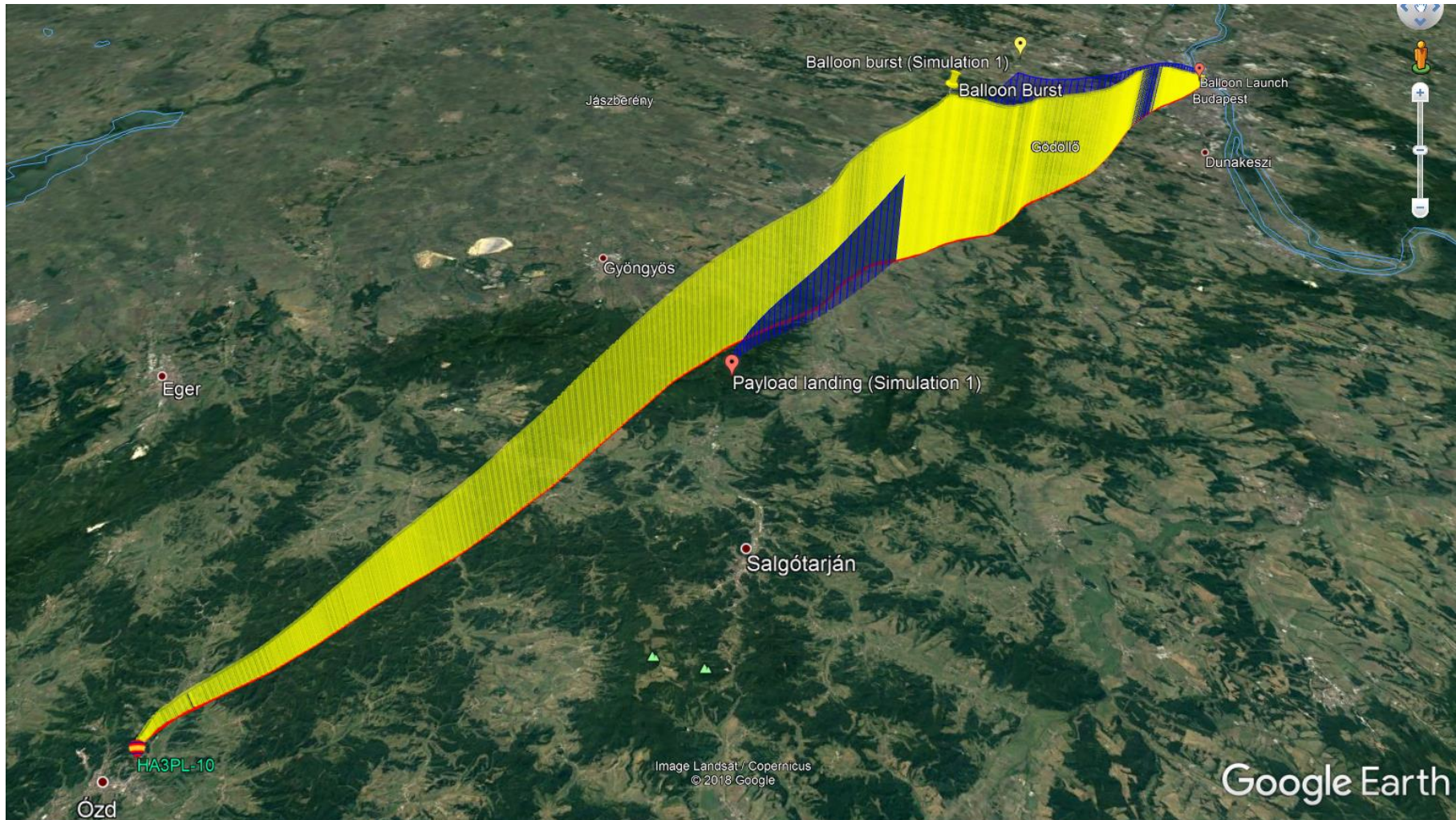


Figure 1 Yellow: On-Board Data | Red: APRS Data | Blue: Simulation

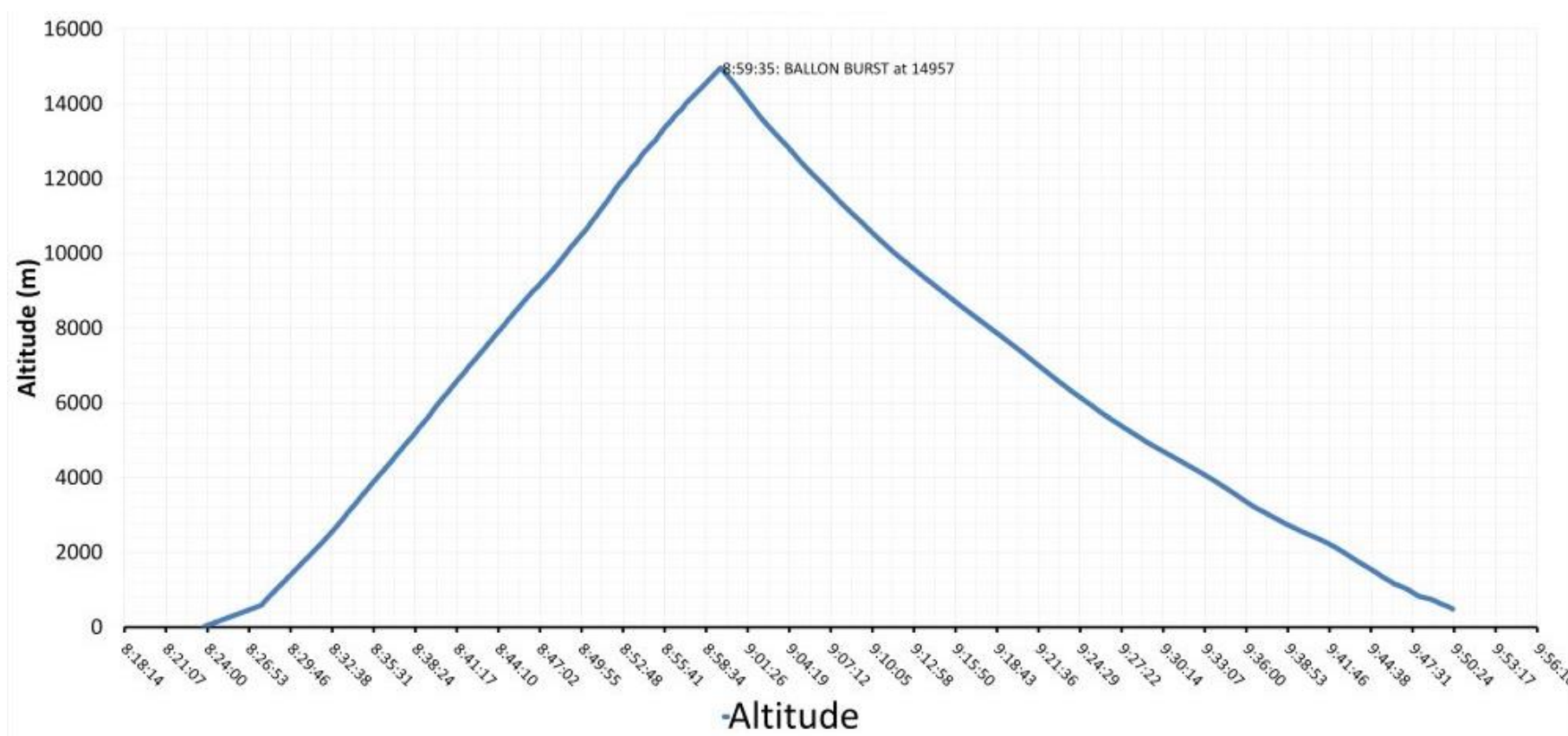


Figure 2 Altitude vs. Time

4.4 Temperature

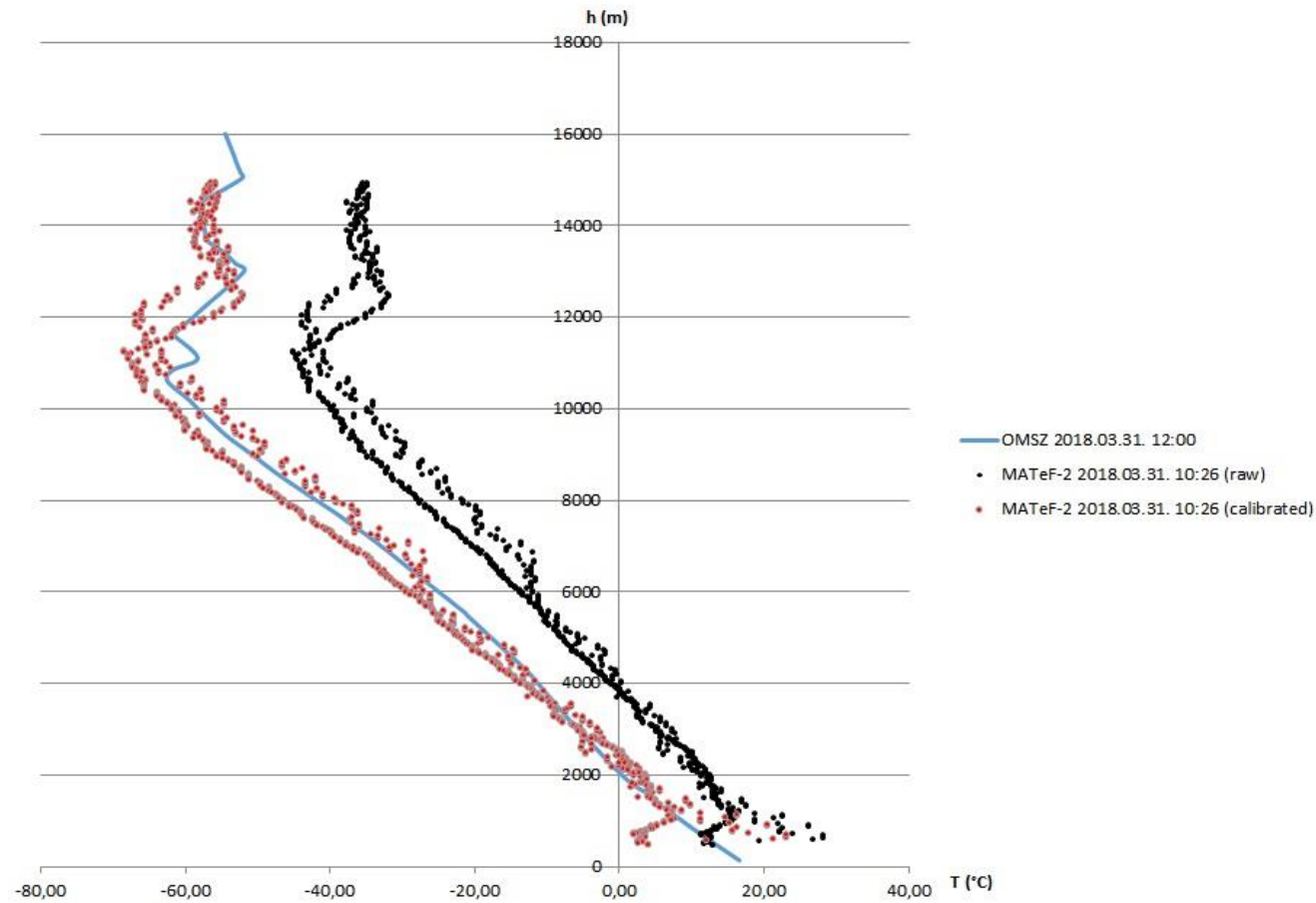


Figure 3 External Temperature

- Fashion of the external temperature data matched the official temperature data from the local weather service Z12 flight
- Post flight processing is needed on our temperature data to compensate self-heating effect of the sensor configuration

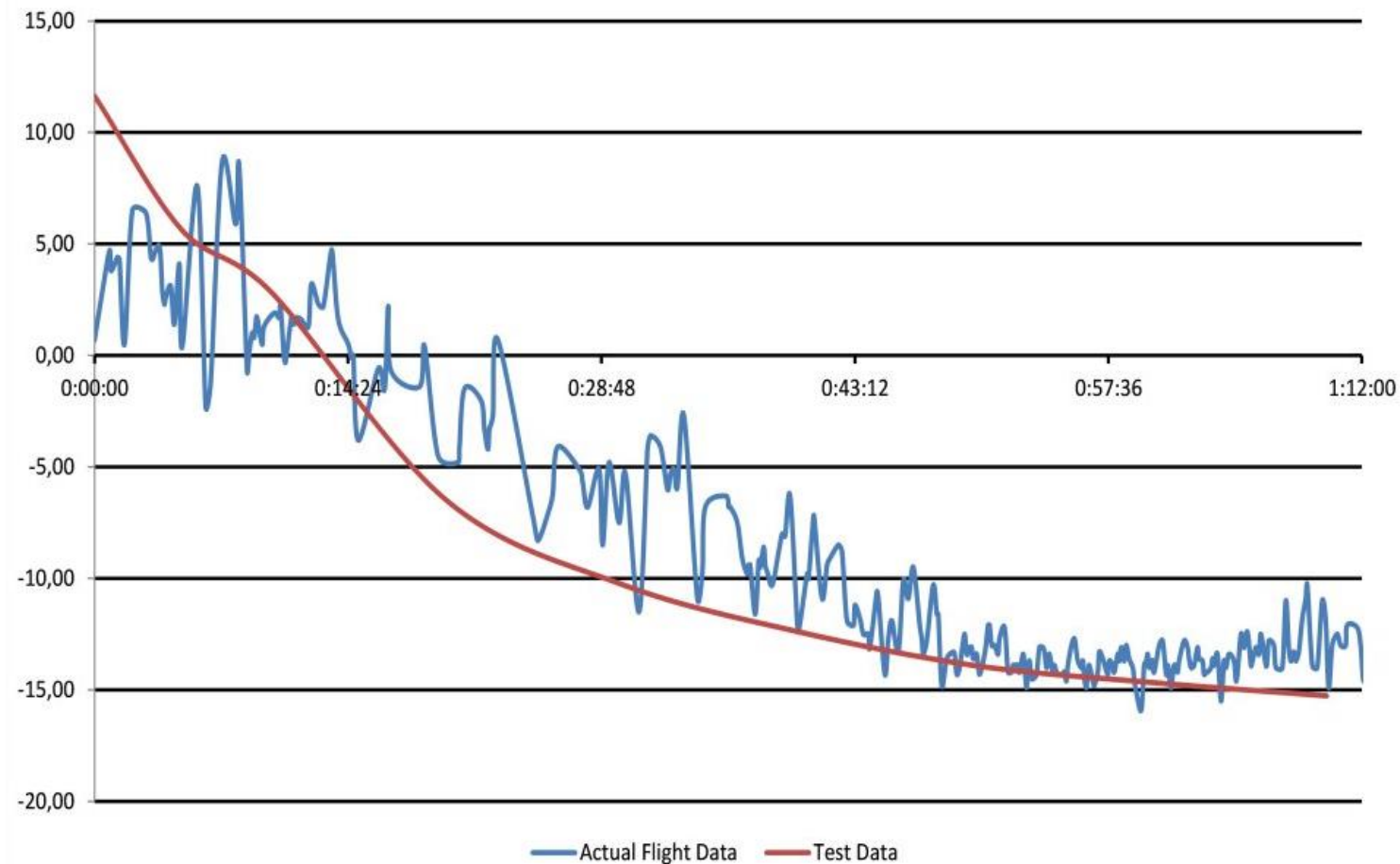


Figure 4 OBC Temperature: Collected vs. Test Data

- Collected OBC temperature data matched the Thermal Chamber test data
- Dispersion of the collected data is due to the properties of the internal sensor of the MCU and the period of the measurement
- COM module temperature data was not useful, temperature sensor recalibration is needed

4.5 Vertical speed

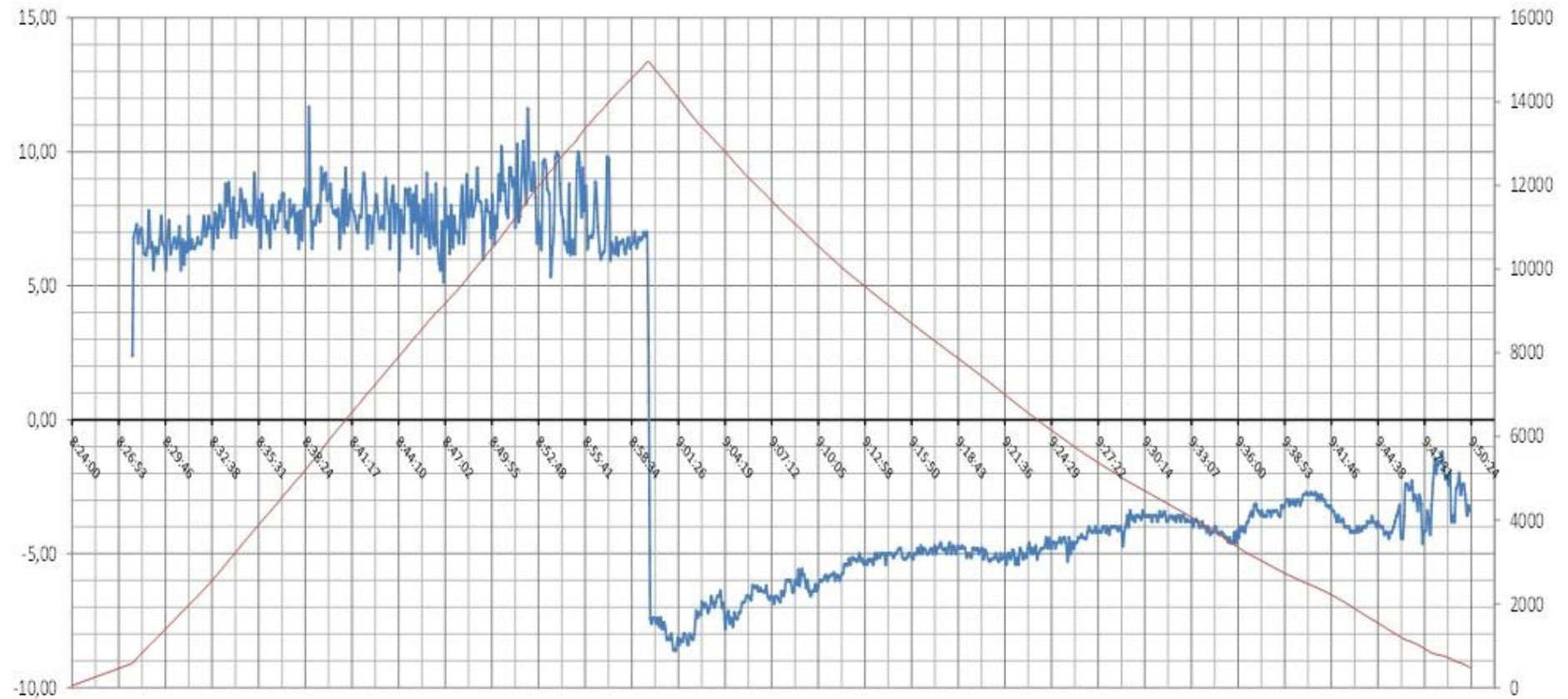


Figure 5 Vertical speed

- Dispersion of the ascend speed is due to airflow effects in the Troposphere. This effect ceased as the balloon reached the depth of the Tropopause
- Surface wind effects increased as the balloon returned below 2km altitude

4.5.1 Descend analysis

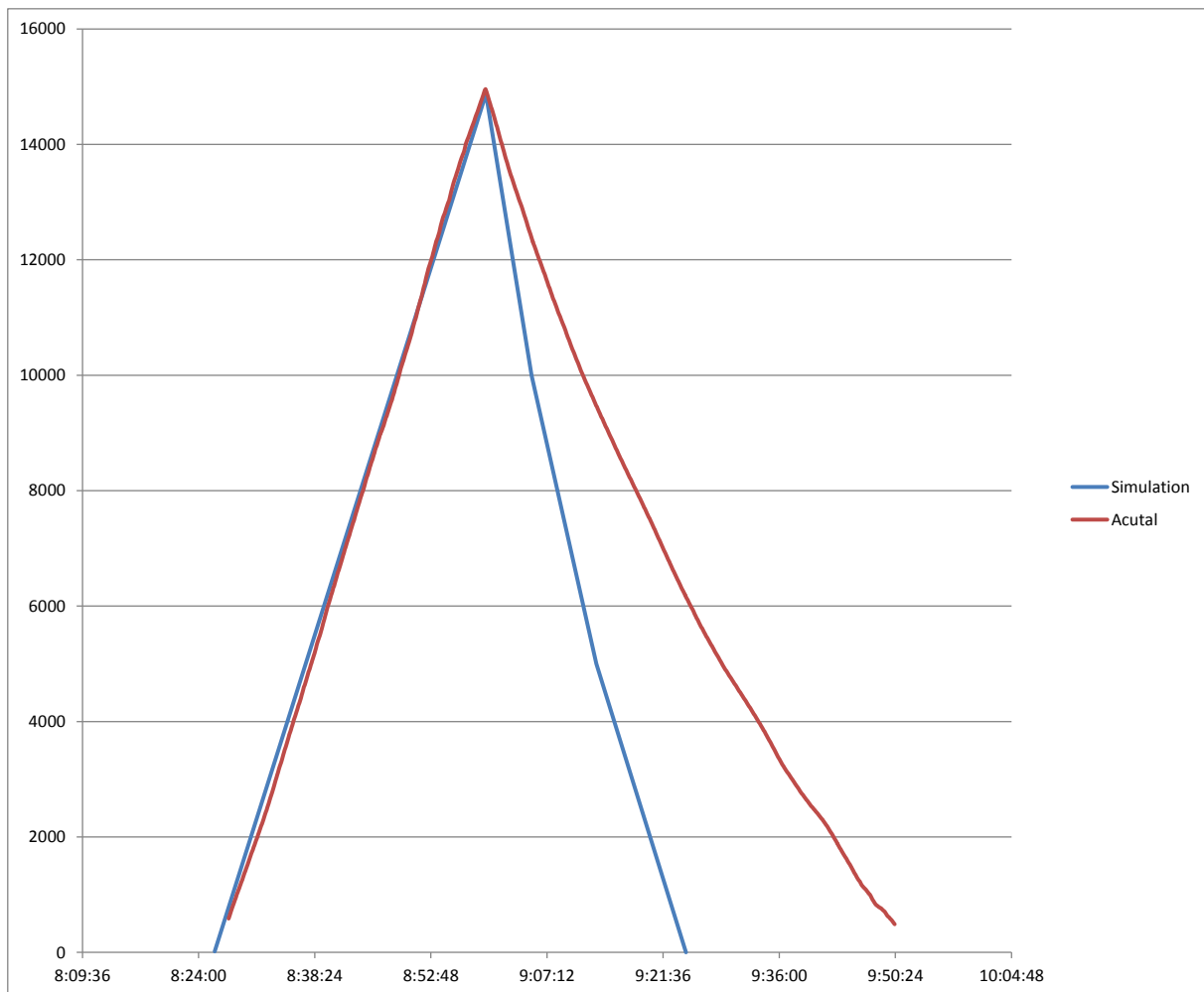


Figure 6 Simulated and Actual data with original pre-flight simulation data

Parachute properties (datasheet)		
Parachute mass	187	g
Parachute canopy cut construction	Flat circular	
Parachute diameter	0.9	m
Parachute drag coefficient (Cd)	0.6	-

Table 8 Parachute factory data

- For the original simulation the parachute datasheet given values were used
- The parachute diameter in the datasheet is referred to the inflated canopy section diameter, but the simulator uses the flat canopy diameter. This led to a significant calculation error in descent simulation.

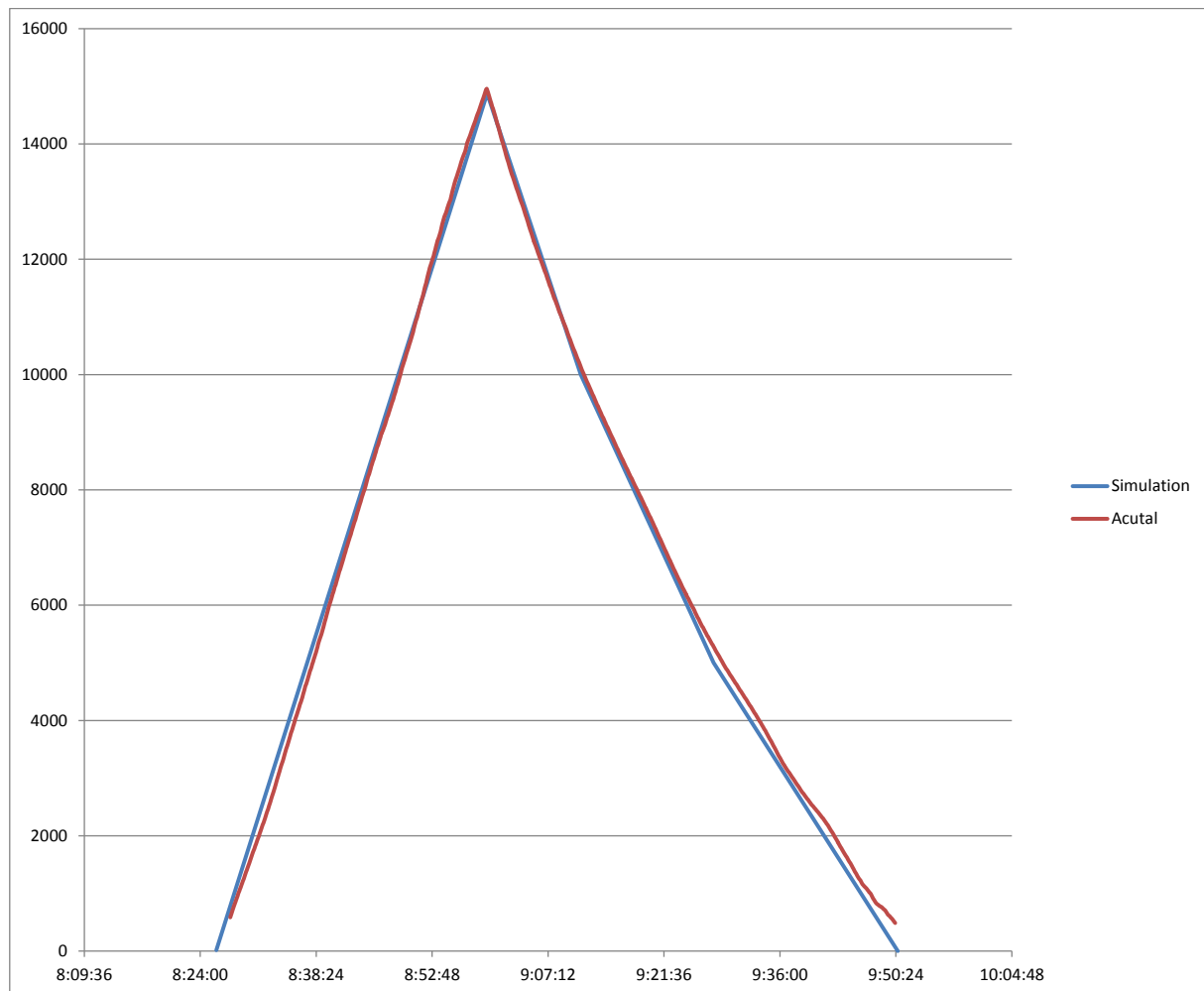


Figure 7 Simulated and Actual data with measured parachute properties

Parachute properties (measured)		
Parachute mass	187	g
Parachute canopy cut construction	Sectioned octagon	
Parachute flat diameter (circular equivalent)	1.85	m
Parachute drag coefficient (Cd)	0.6	-

Table 9 Parachute measured properties

- The significant simulation error suggested that the parachute properties should be measured
- In the post-flight simulations a (circular equivalent) flat diameter was used that was calculated from the actual measured parameters of the parachute
- The parachute has a special canopy construction based on a flat squared shape and inflated in a sectioned octagon shape. This parachute model should be added to the simulation for better results

4.6 Radio Signal

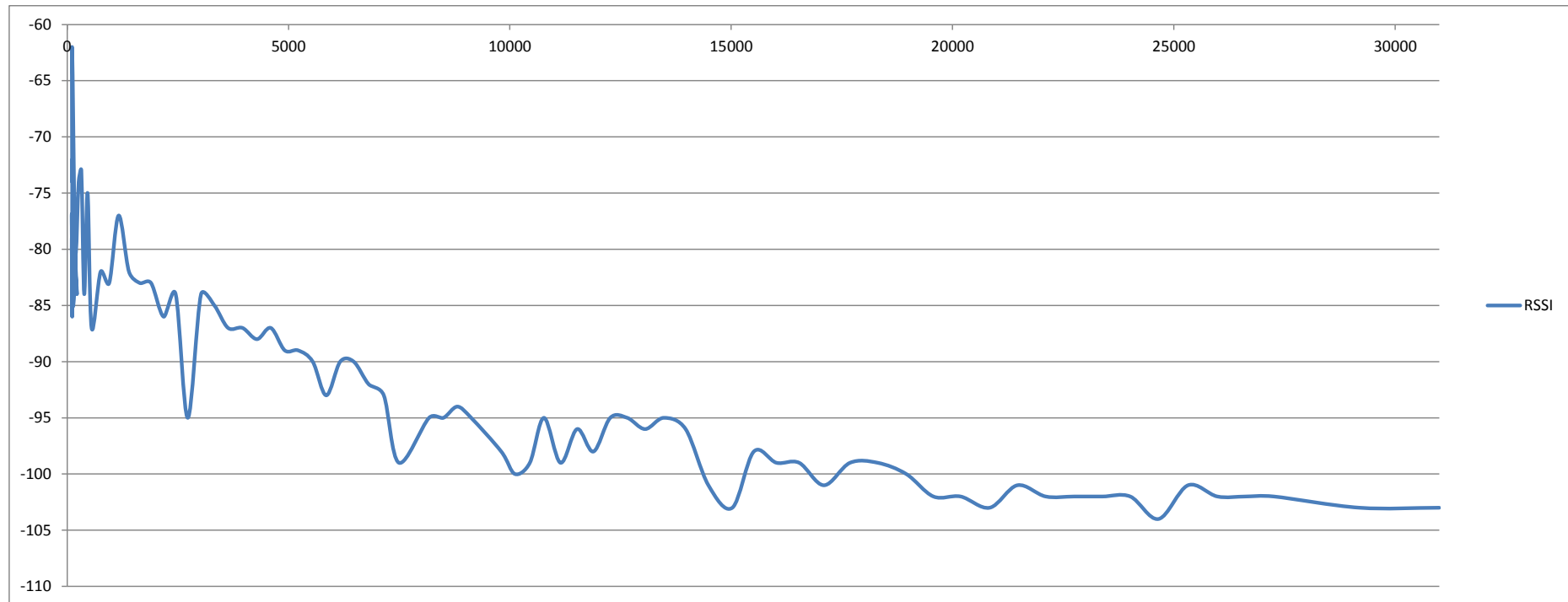


Figure 8 Radio Signal Strength vs. Balloon distance

4.7 Recovery



Figure 9 Landing site

- Recovered device was in good health, still operational, sound beacon was activated and noticed
- No damage was found neither on the capsule nor on the flight computer after inspection
- The parachute was intact. No damage was caused by the tree landing
- All element of the payload train declared reusable with minor maintenance for the next flight

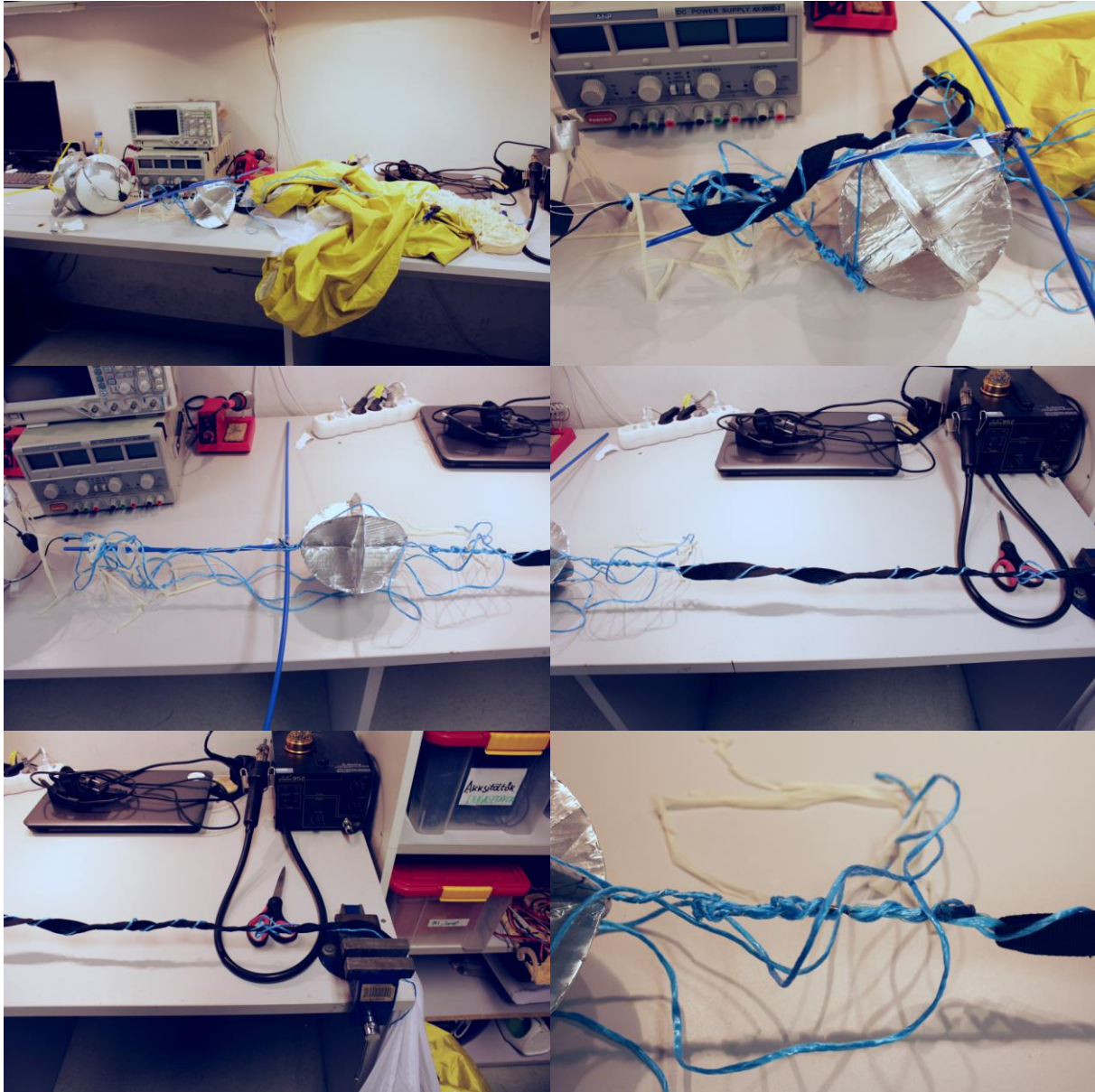


Figure 10 Recovered payload train and tangled balloon cord

- It was clear at the landing site that the cord connected the balloon and the parachute was completely tangled around the payload train
- The parachute construction prevented the cord to tangle on the parachute canopy so it could be fully inflated during descent
- The remains of the balloon was not tangled on the payload train but hanged under the main capsule. This could cause a 'sail-effect' which could lead to elongated horizontal travel distance in windy conditions (see 5.3 Descent Simulation and dealing with balloon remains)

5 Lessons Learned

5.1 Integration

- installation of empty SD-Card should be added to checklist
 - (in this flight we didn't format the card prior integration, but storage wasn't run out)
 - (added as a note, final integration manual will be updated after MATeF-3)

5.2 Radio Link and Ground Station

Better placement of the primary antenna should be considered for better line of sight

5.2.1 UHF Link

- GND HW configuration should be checked (weak signal processing)
- RSSI Threshold should be adjusted (**DONE**)
- MAX power output should be set and measured on COM-HW (**DONE: +18dBm**)
- consider better antenna for control radio (DVB-T + SDRSharp) (**CONCLUSIONS AFTER MATeF-3**)

5.2.2 APRS

- altitude data should be added (**DONE**)
- change SSID to 11 (balloon and aircraft) (**DONE**)
- APRS data should also be added to GND-SW for proper antenna rotation
- Additional data should be considered in APRS messages

5.3 Descent Simulation and dealing with balloon remains

- New parachute model should be added to the simulator based on the post-flight measurements of the parachute.
- Due to the windy weather and the 'sail-effect' of the balloon remains the horizontal travel distance was increased
- Methods to eliminate the 'sail-effect' should be considered
 - Shorten balloon cord length (9m was used for this flight)
 - Cut off balloon remains after burst

5.4 On-Board Data Logging

- initialization altitude should be changed to 0m (**DONE**)
- COM temperature sensor should be recalibrated
- on board logging stops at landing mode
 - Should be continued? (**YES**)
 - Stop condition? (**NO**)
 - storage space issues (**NO ISSUES WITHOUT ICS**)

5.5 Recovery

- Recovery team should take off as soon as possible after launch
- Recovery team must have the circuit breaker pins to shut down all the devices

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8 List of Abbreviations

APRS	Automatic Packet Reporting System
BME	Budapesti Műszaki és Gazdaságtudományi Egyetem (Budapest University of Technology and Economics)
Cd	Parachute drag coefficient
COM	Communication Module
DVB-T	Digital Video Broadcasting — Terrestrial
EPS	Electric Power Sub-system
Ext.Temp	External Temperature
FW	Firmware
GND	Ground Station
GPS	Global Positioning System
GSM	Global System for Mobile communications
HW	Hardware
MATeF	Mid-Altitude Test Flight
MCU	Microcontroller Unit
OBC	On-Board Computer
OMSZ	Országos Meteorológiai Szolgálat (Hungarian Meteorological Service)
POC	Proof of Concept
RSSI	Received Signal Strength Indication
SIM	Subscriber Identification Module
SSID	Service Set Identifier
UHF	Ultra High Frequency
UPRA	Universal Platform for Robotics and Aerospace
UTC	Coordinated Universal Time
VHF	Very High Frequency

Appendix 1

On-Board Data

Time (UTC)	Latitude (NMEA)	Longitude (NMEA)	Altitude (m)	Ext.Temp (°C)	OBC Temp (°C)	COM Temp (°C)	Vertical Speed (m/s)
08:23:46	+4728.41362	+01903.52326	15	19.2	4.6	0.1	0.00
08:27:43	+4728.58185	+01903.62920	584	44.9	0.7	0.2	2.40
08:27:48	+4728.60590	+01903.64261	618	26.6	-3.8	0.2	6.80
08:27:53	+4728.63489	+01903.64871	653	28	4.3	0.2	7.00
08:28:00	+4728.67262	+01903.66043	704	44.7	7.2	0.1	7.29
08:28:05	+4728.69322	+01903.67596	737	23.8	31.5	0.1	6.60
08:28:10	+4728.72451	+01903.68954	772	22.1	2.9	0.1	7.00
08:28:17	+4728.76170	+01903.70915	822	47.3	1.1	0	7.14
08:28:22	+4728.78571	+01903.72649	855	22.5	7	0	6.60
08:28:27	+4728.82583	+01903.73748	886	26	8.1	0	6.20
08:28:34	+4728.86669	+01903.77039	929	45.2	4.7	0.2	6.14
08:28:39	+4728.90306	+01903.78664	961	21.8	3.8	0.2	6.40
08:28:44	+4728.93596	+01903.81369	1000	18.6	0.8	0.2	7.80
08:28:51	+4728.98264	+01903.85380	1045	46.3	4.1	0.1	6.43
08:28:56	+4729.01378	+01903.89526	1078	21.3	8.7	0.1	6.60
08:29:01	+4729.04920	+01903.90727	1106	22.5	4.4	0.1	5.60
08:29:08	+4729.09419	+01903.95188	1151	203	4.3	0.2	6.43
08:29:13	+4729.12457	+01903.98038	1183	18.6	0.8	0.2	6.40
08:29:18	+4729.16470	+01904.01090	1214	16.4	2.8	0.2	6.20
08:29:25	+4729.22107	+01904.06566	1261	42	0.5	0.2	6.71
08:29:30	+4729.25154	+01904.10543	1299	15.6	4.7	0.2	7.60
08:29:35	+4729.28270	+01904.15824	1332	17.4	11.8	0.2	6.60
08:29:42	+4729.32801	+01904.21820	1377	41.5	4.7	0.1	6.43
08:29:47	+4729.36032	+01904.25401	1405	15	6.2	0.1	5.60
08:29:52	+4729.39294	+01904.30047	1439	16.9	6.5	0.1	6.80
08:29:59	+4729.44063	+01904.35633	1491	38	0.5	0	7.43
08:30:04	+4729.47134	+01904.39041	1522	11.6	11.7	0	6.20
08:30:09	+4729.49994	+01904.43768	1554	13.1	1.3	0	6.40
08:30:16	+4729.54823	+01904.49864	1601	36.7	2	0.4	6.71
08:30:21	+4729.58583	+01904.54484	1635	12.8	0.2	0.4	6.80
08:30:26	+4729.61722	+01904.59564	1667	14	2.5	0.4	6.40
08:30:33	+4729.66287	+01904.66468	1714	35.1	4.7	0.1	6.71
08:30:38	+4729.70107	+01904.71344	1750	10.9	6.4	0.1	7.20
08:30:43	+4729.72626	+01904.77308	1778	11.3	3.5	0.1	5.60
08:30:50	+4729.77630	+01904.85263	1825	35.1	1.6	0.1	6.71
08:30:55	+4729.80537	+01904.89411	1854	11	4.4	0.1	5.80

08:31:00	+4729.84246	+01904.94537	1887	12.3	4.3	0.1	6.60
08:31:07	+4729.89509	+01905.01991	1931	250.6	19.4	0.2	6.29
08:31:12	+4729.92866	+01905.06676	1969	12	7.8	0.2	7.60
08:31:17	+4729.96065	+01905.13525	2001	11.1	0.8	0.2	6.40
08:31:24	+4730.00790	+01905.20206	2048	33.9	4.9	0.2	6.71
08:31:29	+4730.04934	+01905.25738	2080	10.6	2.9	0.2	6.40
08:31:34	+4730.07977	+01905.32156	2112	10	2.9	0.2	6.40
08:31:41	+4730.12503	+01905.39398	2158	34.2	2.3	0.2	6.57
08:31:46	+4730.16077	+01905.43579	2192	8.8	2.6	0.2	6.80
08:31:51	+4730.19136	+01905.49338	2225	9.5	0.5	0.2	6.60
08:31:58	+4730.24532	+01905.56926	2271	32.7	3.8	0.1	6.57
08:32:03	+4730.27654	+01905.61148	2306	8.3	3.1	0.1	7.00
08:32:08	+4730.30244	+01905.67005	2344	201.2	0.8	0.1	7.60
08:32:15	+4730.34306	+01905.74461	2392	31.6	1.4	0.1	6.86
08:32:20	+4730.37244	+01905.80562	2427	9.3	0.2	0.1	7.00
08:32:25	+4730.39510	+01905.85861	2465	5.9	8.5	0.1	7.60
08:32:32	+4730.44371	+01905.94053	2515	31.5	4.1	0.1	7.14
08:32:37	+4730.47939	+01905.98867	2551	6.5	2.3	0.1	7.20
08:32:42	+4730.50364	+01906.05317	2583	5.4	0.4	0.1	6.40
08:32:49	+4730.54672	+01906.12839	2637	31.6	2	0.2	7.71
08:32:54	+4730.57832	+01906.16735	2675	6.5	4.7	0.2	7.60
08:32:59	+4730.60155	+01906.23018	2709	5.6	-1.5	0.2	6.80
08:33:06	+4730.64130	+01906.29122	2765	185.3	28.1	0	8.00
08:33:11	+4730.67290	+01906.34536	2804	7.7	-6.9	0	7.80
08:33:16	+4730.71119	+01906.39343	2840	5.6	3.7	0	7.20
08:33:23	+4730.75100	+01906.46037	2892	30.5	5.2	0	7.43
08:33:28	+4730.77462	+01906.51886	2936	7.5	10.6	0	8.80
08:33:33	+4730.80395	+01906.57107	2976	7.2	7.6	0	8.00
08:33:40	+4730.84813	+01906.65255	3038	30.9	-1.1	0.3	8.86
08:33:45	+4730.88618	+01906.71335	3077	5.2	1.6	0.3	7.80
08:33:50	+4730.90787	+01906.77053	3111	6.3	2.5	0.3	6.80
08:33:57	+4730.95084	+01906.85409	3169	30.3	-0.9	0.3	8.29
08:34:02	+4730.98395	+01906.93122	3205	5.6	-2.3	0.3	7.20
08:34:07	+4731.00643	+01906.99245	3239	206.4	16.1	0.3	6.80
08:34:14	+4731.04975	+01907.07843	3293	28.2	1.7	0.1	7.71
08:34:19	+4731.08028	+01907.14429	3331	4.7	-1.2	0.1	7.60
08:34:24	+4731.10299	+01907.20958	3374	3.6	4	0.1	8.60
08:34:31	+4731.14187	+01907.29888	3431	27.6	2.6	0	8.14
08:34:36	+4731.17574	+01907.35576	3467	4	-1.1	0	7.20
08:34:41	+4731.20780	+01907.42588	3508	4.2	6.7	0	8.20
08:34:48	+4731.24072	+01907.51550	3562	27.3	3.1	0.1	7.71
08:34:53	+4731.26786	+01907.56772	3599	2	11.2	0.1	7.40
08:34:58	+4731.29652	+01907.64036	3637	1.6	8.7	0.1	7.60
08:35:05	+4731.33084	+01907.72918	3688	26.4	28.3	0	7.29

08:35:10	+4731.36642	+01907.77726	3726	-0.5	1.1	0	7.60
08:35:15	+4731.38678	+01907.84051	3772	0.3	-0.3	0	9.20
08:35:22	+4731.42470	+01907.92028	3825	25.3	-3.2	0.4	7.57
08:35:27	+4731.45301	+01907.98429	3861	1.2	9.1	0.4	7.20
08:35:32	+4731.47445	+01908.03888	3902	-0.2	4	0.4	8.20
08:35:39	+4731.51822	+01908.11113	3947	24.9	2.2	0.1	6.43
08:35:44	+4731.53972	+01908.17150	3989	-0.6	5.9	0.1	8.40
08:35:49	+4731.56133	+01908.23394	4027	0.2	7.8	0.1	7.60
08:35:56	+4731.59118	+01908.31918	4080	23.2	8.5	-0.1	7.57
08:36:01	+4731.62328	+01908.39152	4115	-1	6.2	-0.1	7.00
08:36:06	+4731.64007	+01908.45279	4152	161.5	25.6	-0.1	7.40
08:36:13	+4731.69588	+01908.54521	4197	23.7	0.4	0.3	6.43
08:36:18	+4731.71609	+01908.61547	4236	-0.5	-0.6	0.3	7.80
08:36:23	+4731.74690	+01908.67545	4276	-0.7	-0.7	0.3	8.00
08:36:30	+4731.76891	+01908.76581	4326	24.2	0.1	0.1	7.14
08:36:35	+4731.79556	+01908.81648	4363	-1.3	3.5	0.1	7.40
08:36:40	+4731.82309	+01908.88008	4400	-2.4	1	0.1	7.40
08:36:47	+4731.85634	+01908.95235	4457	21.9	0.8	0.1	8.14
08:36:52	+4731.89364	+01909.01054	4496	-4.3	1.4	0.1	7.80
08:36:57	+4731.91874	+01909.08496	4538	-2.6	1.7	0.1	8.40
08:37:04	+4731.95462	+01909.15346	4597	22.7	3.5	0	8.43
08:37:09	+4731.99150	+01909.21135	4633	-3.8	12.7	0	7.20
08:37:14	+4732.01959	+01909.26205	4670	-2.1	0.5	0	7.40
08:37:21	+4732.06383	+01909.35563	4719	21.4	1.3	0	7.00
08:37:26	+4732.10138	+01909.42249	4760	-2.2	-6.3	0	8.20
08:37:31	+4732.14021	+01909.48011	4798	-3.1	8.4	0	7.60
08:37:38	+4732.20241	+01909.57768	4853	20.3	0.4	0	7.86
08:37:43	+4732.23171	+01909.63533	4893	-6.1	5.6	0	8.00
08:37:48	+4732.27432	+01909.68286	4928	-5.7	-1.2	0	7.00
08:37:55	+4732.32715	+01909.76998	4982	19.3	1.9	0	7.71
08:38:00	+4732.35901	+01909.84466	5014	-4.9	4	0	6.40
08:38:05	+4732.39306	+01909.89958	5053	-5.9	23	0	7.80
08:38:12	+4732.44793	+01909.98702	5100	18.3	1.7	0.7	6.71
08:38:17	+4732.48136	+01910.06542	5139	-6.9	2.2	0.7	7.80
08:38:22	+4732.51090	+01910.12865	5182	-7.5	1.1	0.7	8.60
08:38:29	+4732.56455	+01910.21814	5238	16.5	-0.1	0.3	8.00
08:38:34	+4732.60760	+01910.29426	5278	-8.8	-0.3	0.3	8.00
08:38:37	+4732.63933	+01910.34904	5313	-8.7	8.1	0.3	11.67
08:38:44	+4732.69674	+01910.45893	5368	16.5	1.4	0.2	7.86
08:38:49	+4732.73343	+01910.51005	5400	-9	6.1	0.2	6.40
08:38:54	+4732.77570	+01910.58295	5437	-8.7	1.7	0.2	7.40
08:39:01	+4732.82842	+01910.68163	5488	16	1.4	0.1	7.29
08:39:06	+4732.87656	+01910.74401	5527	156.9	20.7	0.1	7.80
08:39:11	+4732.92164	+01910.82229	5567	-9.9	1.7	0.1	8.00

08:39:18	+4732.99054	+01910.91412	5619	15.3	0.2	-0.1	7.43
08:39:23	+4733.04949	+01910.99410	5666	-11.2	3.7	-0.1	9.40
08:39:28	+4733.10626	+01911.08739	5709	-11.3	1.6	-0.1	8.60
08:39:35	+4733.18700	+01911.19282	5773	14.8	-2.1	0	9.14
08:39:40	+4733.24251	+01911.27769	5819	-11.4	2.8	0	9.20
08:39:45	+4733.30649	+01911.35234	5860	-11.3	-5.1	0	8.20
08:39:52	+4733.39670	+01911.46012	5918	14.9	1.3	0.2	8.29
08:39:57	+4733.45310	+01911.54294	5962	-11.3	2.9	0.2	8.80
08:40:02	+4733.52007	+01911.63316	6002	-12.1	3.2	0.2	8.00
08:40:09	+4733.60810	+01911.72916	6056	14.4	8.5	0.1	7.71
08:40:14	+4733.65879	+01911.81469	6095	-13	-5.4	0.1	7.80
08:40:19	+4733.70751	+01911.89094	6133	-12.4	4.9	0.1	7.60
08:40:26	+4733.79835	+01911.99828	6188	15.3	2.3	0	7.86
08:40:31	+4733.85073	+01912.06338	6220	-12.3	-5.3	0	6.40
08:40:36	+4733.91900	+01912.14891	6256	-11.7	-0.7	0	7.20
08:40:43	+4734.00110	+01912.24862	6316	13.5	2.2	0.1	8.57
08:40:48	+4734.05791	+01912.33616	6351	-13.2	-3.6	0.1	7.00
08:40:53	+4734.11490	+01912.41951	6398	-12.4	-3.5	0.1	9.40
08:41:00	+4734.21637	+01912.53251	6449	13.9	2.8	0.1	7.29
08:41:05	+4734.28102	+01912.62675	6487	-12.9	22.7	0.1	7.60
08:41:10	+4734.35070	+01912.69426	6529	-12.4	4.7	0.1	8.40
08:41:17	+4734.45754	+01912.81535	6584	12.7	4.1	0	7.86
08:41:22	+4734.52633	+01912.90756	6623	-13.4	-3.2	0	7.80
08:41:27	+4734.60472	+01912.97812	6661	-12	-0.9	0	7.60
08:41:34	+4734.71620	+01913.10236	6711	13	1.6	0	7.14
08:41:39	+4734.79577	+01913.17574	6746	-13.9	-1.8	0	7.00
08:41:44	+4734.87989	+01913.27733	6784	-14.1	14.3	0	7.60
08:41:51	+4735.00136	+01913.39985	6837	12.5	3.5	0	7.57
08:41:56	+4735.07943	+01913.48775	6880	-12.2	-4.4	0	8.60
08:42:01	+4735.16688	+01913.57264	6926	-15.8	-2.6	0	9.20
08:42:08	+4735.27392	+01913.68307	6984	182.6	0.5	0.1	8.29
08:42:13	+4735.36115	+01913.78130	7016	-15.3	-6.8	0.1	6.40
08:42:18	+4735.44064	+01913.85340	7054	-13.7	-0.1	0.1	7.60
08:42:25	+4735.55407	+01913.96516	7107	10.8	0	0.1	7.57
08:42:30	+4735.63814	+01914.06389	7140	-16.2	1.7	0.1	6.60
08:42:35	+4735.71881	+01914.13055	7176	-17.2	6.2	0.1	7.20
08:42:42	+4735.83734	+01914.24645	7232	9.4	-3.8	0	8.00
08:42:47	+4735.92203	+01914.33388	7274	-18	0.5	0	8.40
08:42:52	+4736.01268	+01914.42733	7313	-19.7	-6.3	0	7.80
08:42:59	+4736.13044	+01914.53235	7363	7.6	3.5	0	7.14
08:43:04	+4736.20825	+01914.62579	7399	-16.9	7.2	0	7.20
08:43:09	+4736.29962	+01914.70145	7437	-19.2	-3.8	0	7.60
08:43:16	+4736.42111	+01914.82056	7487	7.4	-1.1	-0.1	7.14
08:43:21	+4736.50241	+01914.91902	7532	-20	2.3	-0.1	9.00

08:43:26	+4736.58711	+01914.98388	7573	-20.1	-8.5	-0.1	8.20
08:43:33	+4736.69912	+01915.11261	7627	7.4	3.4	0.1	7.71
08:43:38	+4736.78943	+01915.18749	7659	-20	-7.5	0.1	6.40
08:43:43	+4736.86982	+01915.28368	7700	-19.3	-2	0.1	8.20
08:43:50	+4736.98828	+01915.40938	7761	7.7	-0.6	0.1	8.71
08:43:55	+4737.06683	+01915.48091	7796	-19.9	-2	0.1	7.00
08:44:00	+4737.15354	+01915.56811	7836	-20	4	0.1	8.00
08:44:07	+4737.26863	+01915.68490	7892	208.3	12.6	0.2	8.00
08:44:12	+4737.35282	+01915.75300	7920	-20.9	-1.5	0.2	5.60
08:44:17	+4737.43458	+01915.85226	7959	-21.8	1.1	0.2	7.80
08:44:24	+4737.54698	+01915.98083	8009	5	2.2	0.1	7.14
08:44:29	+4737.63634	+01916.06633	8044	-22	0.4	0.1	7.00
08:44:34	+4737.71201	+01916.15111	8087	-23.3	-0.7	0.1	8.60
08:44:41	+4737.82708	+01916.27374	8147	3	-3.9	0	8.57
08:44:46	+4737.91948	+01916.38380	8187	-24.5	-4.8	0	8.00
08:44:51	+4737.99317	+01916.47228	8230	-23.8	-7.5	0	8.60
08:44:58	+4738.10747	+01916.60815	8275	1.7	-1.5	0.3	6.43
08:45:03	+4738.19110	+01916.68826	8317	-25.1	3.8	0.3	8.40
08:45:08	+4738.26915	+01916.80279	8354	130	1	0.3	7.40
08:45:15	+4738.37648	+01916.92310	8415	2.6	3.7	0.1	8.71
08:45:20	+4738.45782	+01917.03453	8446	-24.1	6.2	0.1	6.20
08:45:25	+4738.53599	+01917.11471	8486	-24.1	2.5	0.1	8.00
08:45:32	+4738.63995	+01917.25083	8535	2.2	-5.3	0	7.00
08:45:37	+4738.73013	+01917.34936	8572	-27.4	-2.7	0	7.40
08:45:42	+4738.79835	+01917.43607	8613	-26.2	1.6	0	8.20
08:45:49	+4738.91958	+01917.57806	8661	1.5	0.8	0	6.86
08:45:54	+4738.99764	+01917.67632	8707	-25.4	1.6	0	9.20
08:45:59	+4739.07834	+01917.76387	8743	-27.8	-4.2	0	7.20
08:46:06	+4739.18276	+01917.92209	8788	166	17	0	6.43
08:46:11	+4739.25261	+01918.00893	8830	-27.7	-1.4	0	8.40
08:46:16	+4739.32451	+01918.12530	8866	-27.3	-3.5	0	7.20
08:46:23	+4739.41982	+01918.25334	8912	-1.2	0	-0.2	6.57
08:46:28	+4739.48936	+01918.36068	8956	-30.4	0.4	-0.2	8.80
08:46:33	+4739.56478	+01918.46113	8989	-31	-3.8	-0.2	6.60
08:46:40	+4739.64043	+01918.61892	9030	-1	-2.6	0.1	5.86
08:46:45	+4739.70160	+01918.71168	9058	-30	-5.4	0.1	5.60
08:46:50	+4739.77577	+01918.82668	9095	-30.2	-9.5	0.1	7.40
08:46:57	+4739.84640	+01918.97911	9131	-2.1	4.1	0	5.14
08:47:02	+4739.89966	+01919.09799	9174	-29.7	1	0	8.60
08:47:07	+4739.96944	+01919.20603	9210	153	12	0	7.20
08:47:14	+4740.04879	+01919.37901	9263	-2.1	-4.5	-0.2	7.57
08:47:19	+4740.11794	+01919.48601	9294	-30.4	4.1	-0.2	6.20
08:47:24	+4740.17046	+01919.58949	9334	-30.9	-6.2	-0.2	8.00
08:47:31	+4740.25597	+01919.76678	9379	-4.4	-2.7	0	6.43

08:47:36	+4740.31919	+01919.87138	9417	-32.3	0.8	0	7.60
08:47:41	+4740.37526	+01919.97325	9452	-32.8	4	0	7.00
08:47:48	+4740.46454	+01920.12983	9501	-4.8	1.6	0	7.00
08:47:53	+4740.53593	+01920.24987	9534	-30.9	-11	0	6.60
08:47:58	+4740.58291	+01920.37387	9572	-33	-9.5	0	7.60
08:48:05	+4740.67403	+01920.52859	9633	-3.5	13.3	0.2	8.71
08:48:10	+4740.71985	+01920.66014	9666	-32	-1.1	0.2	6.60
08:48:15	+4740.78759	+01920.77077	9702	-34.1	-1.1	0.2	7.20
08:48:22	+4740.86619	+01920.93623	9766	-5.3	-4.8	0	9.14
08:48:27	+4740.92247	+01921.06001	9804	-33.9	-4.1	0	7.60
08:48:32	+4740.98698	+01921.19444	9842	-36.9	-8.6	0	7.60
08:48:39	+4741.06702	+01921.35796	9902	-6.1	-2	-0.1	8.57
08:48:44	+4741.11321	+01921.47715	9940	-34.5	-1.5	-0.1	7.60
08:48:49	+4741.17282	+01921.61860	9979	-35	-8.3	-0.1	7.80
08:48:56	+4741.24545	+01921.81705	10037	-7.6	-10.6	0.1	8.29
08:49:01	+4741.31143	+01921.94370	10084	-34.2	4.1	0.1	9.40
08:49:06	+4741.36415	+01922.08083	10125	129.5	12.4	0.1	8.20
08:49:13	+4741.45423	+01922.27310	10182	-6.9	-6.6	-0.1	8.14
08:49:18	+4741.50178	+01922.39583	10221	-36.6	-4.2	-0.1	7.80
08:49:23	+4741.57141	+01922.52973	10251	-37.2	-5.4	-0.1	6.00
08:49:30	+4741.64444	+01922.73358	10304	-8.4	-6	0	7.57
08:49:35	+4741.70704	+01922.86516	10345	-38.1	1.1	0	8.20
08:49:40	+4741.76232	+01923.00433	10384	-36.8	-2	0	7.80
08:49:47	+4741.84888	+01923.20593	10438	-8.4	-0.7	0	7.71
08:49:52	+4741.91381	+01923.35214	10472	-39.1	-3.3	0	6.80
08:49:57	+4741.95958	+01923.48446	10514	-38.9	1.9	0	8.40
08:50:04	+4742.02897	+01923.64106	10560	-8.3	-4.2	-0.1	6.57
08:50:09	+4742.07018	+01923.77104	10598	-37.8	-3.3	-0.1	7.60
08:50:14	+4742.12386	+01923.91501	10634	-37.7	5.2	-0.1	7.20
08:50:21	+4742.20700	+01924.09329	10698	-10	-2.7	-0.3	9.14
08:50:26	+4742.26668	+01924.19042	10739	-40.5	2.2	-0.3	8.20
08:50:31	+4742.31739	+01924.29369	10790	-41.4	1.4	-0.3	10.20
08:50:38	+4742.39041	+01924.44014	10850	-11.4	0.7	-0.1	8.57
08:50:43	+4742.45386	+01924.53392	10894	-40.1	-5.1	-0.1	8.80
08:50:48	+4742.50165	+01924.61563	10933	-41.7	6.2	-0.1	7.80
08:50:55	+4742.59377	+01924.73424	10986	-11	-3.6	-0.2	7.57
08:51:00	+4742.64283	+01924.81235	11033	-40.6	-2.3	-0.2	9.40
08:51:05	+4742.71628	+01924.89692	11080	-41	12.7	-0.2	9.40
08:51:12	+4742.79256	+01925.00823	11141	-12.3	-6.5	0.4	8.71
08:51:17	+4742.85839	+01925.09675	11186	-42.7	5.5	0.4	9.00
08:51:22	+4742.91028	+01925.15803	11222	-41	-0.4	0.4	7.20
08:51:29	+4743.00428	+01925.24037	11294	-13.1	-4.4	-0.1	10.29
08:51:34	+4743.06627	+01925.30883	11331	-42.8	2	-0.1	7.40
08:51:39	+4743.14393	+01925.35088	11369	-42.3	-8.3	-0.1	7.60

08:51:46	+4743.25546	+01925.45375	11433	-13.5	-8.8	-0.1	9.14
08:51:51	+4743.34131	+01925.52528	11485	-43	0.4	-0.1	10.40
08:51:56	+4743.41243	+01925.61717	11531	-42.8	1.4	-0.1	9.20
08:52:03	+4743.53650	+01925.73158	11588	-13.1	-6.8	0	8.14
08:52:08	+4743.62756	+01925.81219	11646	114.6	-0.3	0	11.60
08:52:13	+4743.71092	+01925.89665	11695	-42.1	-5	0	9.80
08:52:20	+4743.82969	+01926.01467	11755	-13.9	-5.9	0	8.57
08:52:25	+4743.90336	+01926.13061	11798	-43.4	-1.2	0	8.60
08:52:30	+4743.97651	+01926.21835	11846	-44	-5.7	0	9.60
08:52:37	+4744.04864	+01926.36331	11904	-13.9	-7.2	0	8.29
08:52:42	+4744.10139	+01926.44886	11937	-43.1	5.3	0	6.60
08:52:47	+4744.16214	+01926.54002	11974	-43.3	-5.3	0	7.40
08:52:54	+4744.27124	+01926.71685	12023	-13.4	-8.3	-0.1	7.00
08:52:59	+4744.34715	+01926.84945	12055	-44	-10.3	-0.1	6.40
08:53:04	+4744.40613	+01926.97315	12103	-43.3	-1.5	-0.1	9.60
08:53:11	+4744.47759	+01927.11637	12171	-12.1	-2.3	0.3	9.71
08:53:16	+4744.52463	+01927.22357	12218	-41	-1.5	0.3	9.40
08:53:21	+4744.58283	+01927.28678	12261	-43	-6.2	0.3	8.60
08:53:28	+4744.66909	+01927.37383	12320	-11.7	-11.9	-0.1	8.43
08:53:33	+4744.73086	+01927.45161	12347	-40.8	-6.9	-0.1	5.40
08:53:38	+4744.78545	+01927.51493	12378	-40.1	-8.5	-0.1	6.20
08:53:45	+4744.86244	+01927.61563	12428	-10.8	-6.2	0	7.14
08:53:50	+4744.91920	+01927.67742	12477	-40.4	-2.1	0	9.80
08:53:55	+4744.97637	+01927.77086	12527	-39.3	-3	0	10.00
08:54:02	+4745.03074	+01927.89301	12596	-10.2	-4.1	0	9.86
08:54:07	+4745.06862	+01927.98685	12640	137	5.8	0	8.80
08:54:12	+4745.10881	+01928.10715	12679	-37	0.7	0	7.80
08:54:19	+4745.16050	+01928.25540	12731	-8.7	-6.2	-0.1	7.43
08:54:24	+4745.18312	+01928.34129	12764	-36.6	0.2	-0.1	6.60
08:54:29	+4745.19979	+01928.42626	12797	-36.9	-6.5	-0.1	6.60
08:54:36	+4745.21899	+01928.55316	12841	-6.5	-8.6	-0.2	6.29
08:54:41	+4745.22109	+01928.64228	12885	-34.8	-9.4	-0.2	8.80
08:54:46	+4745.22537	+01928.73287	12916	-36.2	-0.7	-0.2	6.20
08:54:53	+4745.23912	+01928.85387	12963	-6.4	-7.5	-0.2	6.71
08:54:58	+4745.24741	+01928.94191	12994	-34.9	-13.3	-0.2	6.20
08:55:03	+4745.25681	+01929.02756	13025	-34.7	-3.6	-0.2	6.20
08:55:10	+4745.26908	+01929.15138	13090	-5.5	-7.5	0.4	9.29
08:55:15	+4745.27707	+01929.23436	13140	-34.4	-5.1	0.4	10.00
08:55:20	+4745.28948	+01929.29083	13188	-33.9	-2.7	0.4	9.60
08:55:27	+4745.32583	+01929.40151	13241	-5	-5.7	0	7.57
08:55:32	+4745.33931	+01929.47252	13288	-35.8	-3.2	0	9.40
08:55:37	+4745.34120	+01929.56229	13327	-34.2	-7.8	0	7.80
08:55:44	+4745.36158	+01929.65152	13388	-6	-6.8	0	8.71
08:55:49	+4745.36667	+01929.71645	13420	-34.9	-14.6	0	6.40

08:55:54	+4745.38200	+01929.77838	13454	-33.6	-10.1	0	6.80
08:56:01	+4745.40609	+01929.86313	13502	-5.2	-3.9	-0.2	6.86
08:56:06	+4745.42004	+01929.92995	13536	133.1	9.7	-0.2	6.80
08:56:11	+4745.43361	+01929.99845	13571	-35	-10	-0.2	7.00
08:56:18	+4745.45538	+01930.10313	13633	-5.6	-3.8	-0.2	8.86
08:56:23	+4745.46370	+01930.19986	13675	-35	-5.1	-0.2	8.40
08:56:28	+4745.47967	+01930.29190	13711	-36	-8	-0.2	7.20
08:56:35	+4745.50084	+01930.39646	13755	-6.6	-8.5	-0.1	6.29
08:56:40	+4745.51942	+01930.47588	13785	-35.8	-10.4	-0.1	6.00
08:56:45	+4745.53803	+01930.55302	13816	-35.3	-5.4	-0.1	6.20
08:56:52	+4745.56418	+01930.66141	13860	-7.1	-4.2	-0.1	6.29
08:56:57	+4745.58266	+01930.73157	13896	-34.7	-4.8	-0.1	7.20
08:57:02	+4745.60127	+01930.80083	13945	-35.3	-7.4	-0.1	9.80
08:57:09	+4745.62328	+01930.88908	14013	-6.5	-11.5	-0.1	9.71
08:57:14	+4745.65261	+01930.94628	14043	-37.2	2	-0.1	6.00
08:57:19	+4745.67580	+01931.01741	14076	-36.3	-3.5	-0.1	6.60
08:57:26	+4745.69953	+01931.11861	14120	-7.2	-7.2	0	6.29
08:57:31	+4745.71567	+01931.19768	14151	-35.3	-7.5	0	6.20
08:57:36	+4745.73297	+01931.28402	14185	-36.4	2.9	0	6.80
08:57:43	+4745.76346	+01931.40026	14228	-7.4	-9.8	-0.3	6.14
08:57:48	+4745.78202	+01931.47695	14261	-36.4	2.6	-0.3	6.60
08:57:53	+4745.80260	+01931.54995	14294	-37.5	-5.3	-0.3	6.60
08:58:00	+4745.82996	+01931.63806	14341	-6.7	-2.7	-0.1	6.71
08:58:05	+4745.85426	+01931.69786	14373	-37.2	7.6	-0.1	6.40
08:58:10	+4745.87693	+01931.75884	14404	-36.5	-9.1	-0.1	6.20
08:58:17	+4745.90731	+01931.85097	14451	-6.4	-6.8	-0.2	6.71
08:58:22	+4745.92694	+01931.91017	14485	-37	-11.5	-0.2	6.80
08:58:27	+4745.94493	+01931.96523	14517	-37.8	-6.5	-0.2	6.40
08:58:34	+4745.97289	+01932.03545	14563	-6.9	-8.6	-0.5	6.57
08:58:39	+4745.99051	+01932.09078	14596	-36.5	-11.5	-0.5	6.60
08:58:44	+4746.01038	+01932.14348	14631	-36.3	1.7	-0.5	7.00
08:58:51	+4746.04416	+01932.21432	14676	-6.4	-5.7	-0.2	6.43
08:58:56	+4746.06935	+01932.26486	14709	-36.3	-10.1	-0.2	6.60
08:59:01	+4746.09669	+01932.31157	14743	-36.3	-2.1	-0.2	6.80
08:59:08	+4746.13492	+01932.37999	14790	166.3	-4.2	-0.2	6.71
08:59:13	+4746.16220	+01932.43943	14824	-35.4	-10.9	-0.2	6.80
08:59:18	+4746.18851	+01932.49967	14859	-35.9	-3.6	-0.2	7.00
08:59:25	+4746.22162	+01932.58381	14907	-5.6	-7.8	0	6.86
08:59:30	+4746.24984	+01932.65025	14942	-35.6	-15.4	0	7.00
08:59:35	+4746.27816	+01932.72536	14957	-35.1	-9.5	0	3.00
08:59:42	+4746.31941	+01932.81926	14905	-6.3	-5.1	-0.2	-7.43
08:59:47	+4746.34502	+01932.88248	14867	-35.6	-15.7	-0.2	-7.60
08:59:52	+4746.37106	+01932.93773	14830	-35.7	-4.1	-0.2	-7.40
08:59:59	+4746.41215	+01933.01161	14778	-5.9	-8.5	-0.3	-7.43

09:00:04	+4746.43871	+01933.05908	14740	-36.1	-7.4	-0.3	-7.60
09:00:09	+4746.46361	+01933.11111	14703	-34.8	-11.6	-0.3	-7.40
09:00:16	+4746.49413	+01933.18542	14649	-5.7	-6	-0.2	-7.71
09:00:21	+4746.51499	+01933.23999	14612	-35.5	-10.9	-0.2	-7.40
09:00:26	+4746.53613	+01933.29661	14573	-35	-5.3	-0.2	-7.80
09:00:33	+4746.56296	+01933.37743	14520	-6.1	-11.8	-0.5	-7.57
09:00:38	+4746.58491	+01933.44288	14481	-35.8	-5.1	-0.5	-7.80
09:00:43	+4746.60569	+01933.50401	14440	-35.1	-1.5	-0.5	-8.20
09:00:50	+4746.63326	+01933.59571	14383	-6.1	-5.9	-0.2	-8.14
09:00:55	+4746.65175	+01933.66559	14342	-35.5	-10	-0.2	-8.20
09:01:00	+4746.66837	+01933.73953	14302	-35.9	-7.5	-0.2	-8.00
09:01:07	+4746.69070	+01933.85225	14242	164.1	3.8	-0.3	-8.57
09:01:12	+4746.70712	+01933.93758	14199	-35.6	-2.7	-0.3	-8.60
09:01:17	+4746.72233	+01934.01675	14156	-36.7	-11.5	-0.3	-8.60
09:01:24	+4746.74706	+01934.11907	14099	-6.9	-10.7	-0.1	-8.14
09:01:29	+4746.76820	+01934.18422	14057	-36.4	-15.5	-0.1	-8.40
09:01:34	+4746.78955	+01934.25178	14016	-36.7	-10	-0.1	-8.20
09:01:41	+4746.81710	+01934.34236	13958	-8.2	-6.5	0	-8.29
09:01:46	+4746.83661	+01934.40872	13918	-37.8	-11.3	0	-8.00
09:01:51	+4746.85588	+01934.47826	13878	-37.2	-11	0	-8.00
09:01:58	+4746.88115	+01934.57545	13820	-8.1	-10.9	-0.3	-8.29
09:02:03	+4746.89983	+01934.64843	13778	-37.4	-2.6	-0.3	-8.40
09:02:08	+4746.91863	+01934.72373	13738	117.7	-9.1	-0.3	-8.00
09:02:15	+4746.94112	+01934.83018	13681	-7.9	-9.7	-0.1	-8.14
09:02:20	+4746.95591	+01934.90595	13640	-37.5	-7.5	-0.1	-8.20
09:02:25	+4746.97222	+01934.97774	13600	-37.3	-6.8	-0.1	-8.00
09:02:32	+4746.99466	+01935.07383	13550	-7.1	-3.2	-0.2	-7.14
09:02:37	+4747.01205	+01935.14025	13513	-36.9	-5	-0.2	-7.40
09:02:42	+4747.02855	+01935.20518	13477	-35.3	-9.2	-0.2	-7.20
09:02:49	+4747.04983	+01935.29162	13426	-5.9	-11.2	-0.2	-7.29
09:02:54	+4747.06823	+01935.35144	13392	-35.7	-15.1	-0.2	-6.80
09:02:59	+4747.08323	+01935.41218	13357	-36.7	-6	-0.2	-7.00
09:03:06	+4747.10845	+01935.50419	13309	149.6	7.8	0	-6.86
09:03:11	+4747.12383	+01935.57210	13274	-35.5	-10.4	0	-7.00
09:03:16	+4747.13948	+01935.64289	13238	-34.6	-7.7	0	-7.20
09:03:23	+4747.15590	+01935.73965	13189	-5.4	-11.8	-0.5	-7.00
09:03:28	+4747.16885	+01935.81295	13156	-34.6	-3.6	-0.5	-6.60
09:03:33	+4747.17826	+01935.88351	13122	-34.7	-6.3	-0.5	-6.80
09:03:40	+4747.18899	+01935.97863	13073	-4.6	-15.4	-0.2	-7.00
09:03:45	+4747.19821	+01936.05082	13039	-33.6	-6.8	-0.2	-6.80
09:03:50	+4747.20727	+01936.12955	13006	-33.1	-6.8	-0.2	-6.60
09:03:57	+4747.21737	+01936.23582	12960	-4	-13.1	-0.4	-6.57
09:04:02	+4747.22421	+01936.31611	12928	-34	-8.9	-0.4	-6.40
09:04:07	+4747.23036	+01936.39487	12893	142	-1.4	-0.4	-7.00

09:04:14	+4747.24115	+01936.50687	12845	-3.5	-7.5	-0.3	-6.86
09:04:19	+4747.25077	+01936.59199	12806	-33.2	-12.8	-0.3	-7.80
09:04:24	+4747.26276	+01936.67378	12769	-33.9	-8.9	-0.3	-7.40
09:04:31	+4747.28477	+01936.78814	12719	-3.1	-9.1	-0.3	-7.14
09:04:36	+4747.31007	+01936.87532	12681	-32.9	-7.2	-0.3	-7.60
09:04:41	+4747.33852	+01936.96509	12644	-33.3	-11.5	-0.3	-7.40
09:04:48	+4747.37847	+01937.09685	12590	-3	-9.8	-0.2	-7.71
09:04:53	+4747.41765	+01937.20121	12554	-32.2	-9.4	-0.2	-7.20
09:04:58	+4747.46027	+01937.30324	12517	-32	-9.4	-0.2	-7.40
09:05:05	+4747.52576	+01937.43456	12465	-3.1	9.4	-0.3	-7.43
09:05:10	+4747.58071	+01937.52267	12429	-32.3	-13.3	-0.3	-7.20
09:05:15	+4747.63390	+01937.60890	12393	-32.5	-11.6	-0.3	-7.20
09:05:22	+4747.71264	+01937.72715	12345	-3.5	-10	-0.3	-6.86
09:05:27	+4747.77209	+01937.80314	12311	-33.1	-9.2	-0.3	-6.80
09:05:32	+4747.83184	+01937.86948	12277	-33	-9.5	-0.3	-6.80
09:05:39	+4747.90948	+01937.97139	12231	-4.1	-7.8	-0.3	-6.57
09:05:44	+4747.96030	+01938.05290	12198	-34.3	-8.6	-0.3	-6.60
09:05:49	+4748.01778	+01938.14487	12165	-34.4	-9.4	-0.3	-6.60
09:05:56	+4748.09660	+01938.28007	12118	-5.6	-9.7	-0.2	-6.71
09:06:01	+4748.15625	+01938.39174	12087	-35.3	-4.8	-0.2	-6.20
09:06:06	+4748.21960	+01938.50105	12056	120.5	8.8	-0.2	-6.20
09:06:13	+4748.31892	+01938.66749	12012	-6.4	-10.3	-0.2	-6.29
09:06:18	+4748.39393	+01938.77816	11981	-36.4	-7.2	-0.2	-6.20
09:06:23	+4748.45977	+01938.89483	11949	-36.8	-7.5	-0.2	-6.40
09:06:30	+4748.55268	+01939.04550	11905	-7	-13.4	-0.1	-6.29
09:06:35	+4748.62080	+01939.14709	11873	-37.6	-8.8	-0.1	-6.40
09:06:40	+4748.69015	+01939.25699	11841	-38.6	-10.4	-0.1	-6.40
09:06:47	+4748.79367	+01939.41091	11796	-8.7	-8	-0.2	-6.43
09:06:52	+4748.87534	+01939.51448	11765	-39.3	-9.4	-0.2	-6.20
09:06:57	+4748.95480	+01939.61063	11732	-39.6	-8.1	-0.2	-6.60
09:07:04	+4749.07193	+01939.74339	11685	-8.9	-6	-0.1	-6.71
09:07:09	+4749.15714	+01939.82345	11652	-39.8	-12.7	-0.1	-6.60
09:07:14	+4749.23921	+01939.91301	11619	-40	-6.3	-0.1	-6.60
09:07:21	+4749.34995	+01940.02509	11571	-11.6	-13	-0.4	-6.86
09:07:26	+4749.42659	+01940.09281	11538	-40.5	-11.9	-0.4	-6.60
09:07:31	+4749.50608	+01940.16809	11505	-41.6	-10.9	-0.4	-6.60
09:07:38	+4749.61975	+01940.26293	11458	-11.6	-11.9	-0.4	-6.71
09:07:43	+4749.70134	+01940.32204	11424	-42.8	-12.4	-0.4	-6.80
09:07:48	+4749.77615	+01940.38767	11392	-42.8	-8.5	-0.4	-6.40
09:07:55	+4749.88190	+01940.48389	11346	-13.7	-9.4	-0.5	-6.57
09:08:00	+4749.95707	+01940.55349	11314	-43.7	-12.7	-0.5	-6.40
09:08:05	+4750.02677	+01940.62471	11284	-45.2	8.2	-0.5	-6.00
09:08:12	+4750.13040	+01940.73849	11242	-13.6	-9.8	0.2	-6.00
09:08:17	+4750.19675	+01940.81971	11212	-44.5	-10	0.2	-6.00

09:08:22	+4750.26741	+01940.90296	11182	-44.8	-8.3	0.2	-6.00
09:08:29	+4750.35702	+01941.01636	11137	-14	-13.6	-0.3	-6.43
09:08:34	+4750.42373	+01941.10753	11105	-44.7	-7.2	-0.3	-6.40
09:08:39	+4750.48705	+01941.19415	11075	-43.6	-7.7	-0.3	-6.00
09:08:46	+4750.57556	+01941.32877	11032	-14.1	-10.7	-0.2	-6.14
09:08:51	+4750.63976	+01941.42780	11004	-44.3	-13.7	-0.2	-5.60
09:08:56	+4750.70556	+01941.51933	10973	-44.3	-9.7	-0.2	-6.20
09:09:03	+4750.78851	+01941.65132	10934	-13.4	-10.9	-0.3	-5.57
09:09:08	+4750.85482	+01941.75226	10905	133.4	-8	-0.3	-5.80
09:09:13	+4750.91667	+01941.84999	10876	-43.8	-13.7	-0.3	-5.80
09:09:20	+4751.00343	+01941.99912	10832	-13.4	-9.4	-0.2	-6.29
09:09:25	+4751.06610	+01942.11407	10802	-43.1	-6	-0.2	-6.00
09:09:30	+4751.12958	+01942.24521	10770	-43.8	-9.1	-0.2	-6.40
09:09:37	+4751.20994	+01942.41647	10724	-13	-7.8	-0.3	-6.57
09:09:42	+4751.26243	+01942.54442	10692	-43.3	-18.3	-0.3	-6.40
09:09:47	+4751.32025	+01942.66819	10660	-42.8	-14.5	-0.3	-6.40
09:09:54	+4751.39753	+01942.85260	10617	-12.9	-9.8	-0.4	-6.14
09:09:59	+4751.45986	+01942.98601	10585	-43.3	-8.5	-0.4	-6.40
09:10:04	+4751.51150	+01943.12604	10554	-43	-6.3	-0.4	-6.20
09:10:11	+4751.58845	+01943.32006	10512	-12.7	-8.8	0.2	-6.00
09:10:16	+4751.64613	+01943.45143	10482	-43	-11.9	0.2	-6.00
09:10:21	+4751.69868	+01943.59238	10452	-43	-11.5	0.2	-6.00
09:10:28	+4751.77616	+01943.78002	10411	-12.5	-11.9	-0.4	-5.86
09:10:33	+4751.82768	+01943.92040	10382	-41.6	-10.1	-0.4	-5.80
09:10:38	+4751.88630	+01944.05757	10352	-41.6	-7.8	-0.4	-6.00
09:10:45	+4751.96388	+01944.24140	10311	-12.1	-13	-0.3	-5.86
09:10:50	+4752.01636	+01944.37456	10282	-41.5	-12.1	-0.3	-5.80
09:10:55	+4752.07459	+01944.50268	10253	-41	-11.2	-0.3	-5.80
09:11:02	+4752.14500	+01944.68134	10213	-11.6	-9.7	-0.4	-5.71
09:11:07	+4752.20024	+01944.81277	10183	155	-1.8	-0.4	-6.00
09:11:12	+4752.25089	+01944.93397	10154	-40.4	-11.8	-0.4	-5.80
09:11:19	+4752.32434	+01945.11284	10113	-10.8	-13.7	-0.2	-5.86
09:11:24	+4752.37996	+01945.23335	10083	-39.6	-12.5	-0.2	-6.00
09:11:29	+4752.43027	+01945.36273	10054	-40	-14.8	-0.2	-5.80
09:11:36	+4752.50953	+01945.54041	10014	-9.8	-11	-0.4	-5.71
09:11:41	+4752.55815	+01945.66389	9987	-39.9	-12.5	-0.4	-5.40
09:11:46	+4752.61809	+01945.78785	9960	-39.2	-13.1	-0.4	-5.40
09:11:53	+4752.69356	+01945.95657	9922	-9.6	-9.5	-0.3	-5.43
09:11:58	+4752.75130	+01946.08407	9896	-39.5	-10.6	-0.3	-5.20
09:12:03	+4752.80989	+01946.20002	9869	-39.5	-14.6	-0.3	-5.40
09:12:10	+4752.88645	+01946.37323	9833	-9	-10.6	0.1	-5.14
09:12:15	+4752.94757	+01946.48807	9807	-38.8	-10.9	0.1	-5.20
09:12:20	+4753.00206	+01946.60667	9781	-38.5	-14	0.1	-5.20
09:12:27	+4753.09000	+01946.76728	9744	-8.3	-13.6	-0.3	-5.29

09:12:32	+4753.15456	+01946.88267	9718	-38.7	-10.4	-0.3	-5.20
09:12:37	+4753.21006	+01947.00251	9693	-38.3	-14.3	-0.3	-5.00
09:12:44	+4753.29181	+01947.15938	9656	-8	-11.5	-0.2	-5.29
09:12:49	+4753.34537	+01947.26821	9630	-38.1	-12.7	-0.2	-5.20
09:12:54	+4753.40709	+01947.38136	9603	-38.5	-11	-0.2	-5.40
09:13:01	+4753.48802	+01947.52980	9566	-8	-11.9	-0.4	-5.29
09:13:06	+4753.54506	+01947.64824	9539	155	6.2	-0.4	-5.40
09:13:11	+4753.60303	+01947.75289	9513	-37	-16.8	-0.4	-5.20
09:13:18	+4753.68415	+01947.91767	9476	-7.7	-10.9	-0.3	-5.29
09:13:23	+4753.74857	+01948.03161	9450	-37.3	-13.3	-0.3	-5.20
09:13:28	+4753.80492	+01948.14605	9423	-36.9	-17.1	-0.3	-5.40
09:13:35	+4753.89339	+01948.30721	9388	-6.6	-11.3	-0.4	-5.00
09:13:40	+4753.95590	+01948.41258	9362	-37.5	-10.1	-0.4	-5.20
09:13:45	+4754.02125	+01948.53007	9337	-36.4	-14.8	-0.4	-5.00
09:13:52	+4754.11129	+01948.68171	9301	-6.2	-12.1	-0.4	-5.14
09:13:57	+4754.17240	+01948.79056	9276	-35.9	-10.9	-0.4	-5.00
09:14:02	+4754.24159	+01948.89931	9251	-36	-9.4	-0.4	-5.00
09:14:09	+4754.33985	+01949.06070	9216	-6	-13.6	-0.3	-5.00
09:14:14	+4754.40946	+01949.17399	9189	-35.9	-9.5	-0.3	-5.40
09:14:19	+4754.46953	+01949.28612	9164	-36.1	-13.4	-0.3	-5.00
09:14:26	+4754.56545	+01949.42981	9129	-5.5	-14.8	-0.4	-5.00
09:14:31	+4754.62962	+01949.54213	9104	-35.5	-14.8	-0.4	-5.00
09:14:36	+4754.69688	+01949.64244	9079	-34.3	-12.1	-0.4	-5.00
09:14:43	+4754.79119	+01949.79827	9043	-5.1	-12.7	-0.4	-5.14
09:14:48	+4754.85928	+01949.89878	9018	-34.3	-13.4	-0.4	-5.00
09:14:53	+4754.92663	+01950.01070	8993	-35	-15.7	-0.4	-5.00
09:15:00	+4755.01990	+01950.15224	8959	-4.4	-12.8	-0.4	-4.86
09:15:05	+4755.08775	+01950.26501	8935	-34.3	3.7	-0.4	-4.80
09:15:10	+4755.15421	+01950.36394	8911	-33.7	-9.5	-0.4	-4.80
09:15:17	+4755.25596	+01950.51380	8875	-3.8	-15.2	-0.4	-5.14
09:15:22	+4755.32279	+01950.61733	8849	-33.2	-10.3	-0.4	-5.20
09:15:27	+4755.39433	+01950.71123	8823	-33.1	-12.4	-0.4	-5.20
09:15:34	+4755.49670	+01950.85382	8787	-3.4	-11.6	-0.3	-5.14
09:15:39	+4755.56148	+01950.95445	8762	-33	-11.6	-0.3	-5.00
09:15:44	+4755.63536	+01951.05095	8737	-32.2	-12.7	-0.3	-5.00
09:15:51	+4755.74182	+01951.19672	8701	-3.3	-14.8	-0.4	-5.14
09:15:56	+4755.81488	+01951.30127	8675	-32.4	-8.3	-0.4	-5.20
09:16:01	+4755.88919	+01951.39624	8650	-32.3	-13.7	-0.4	-5.00
09:16:08	+4755.99278	+01951.54498	8615	179.5	-13.6	-0.3	-5.00
09:16:13	+4756.06008	+01951.64102	8591	-31.5	-11.8	-0.3	-4.80
09:16:18	+4756.13586	+01951.74189	8566	-31.5	-8.9	-0.3	-5.00
09:16:25	+4756.23173	+01951.88350	8533	-2.4	-12.4	-0.4	-4.71
09:16:30	+4756.30793	+01951.98442	8508	-31.4	-13.3	-0.4	-5.00
09:16:35	+4756.37498	+01952.08860	8484	-31.4	-13.4	-0.4	-4.80

09:16:42	+4756.47741	+01952.22220	8450	-1.7	-14.3	-0.4	-4.86
09:16:47	+4756.55022	+01952.33119	8425	-30.5	-11.6	-0.4	-5.00
09:16:52	+4756.62160	+01952.43091	8400	-30.2	-14	-0.4	-5.00
09:16:59	+4756.72800	+01952.57570	8366	-1.1	-13.3	-0.5	-4.86
09:17:04	+4756.80031	+01952.66806	8342	-30.2	-10.1	-0.5	-4.80
09:17:09	+4756.87948	+01952.76713	8317	-29.1	-12.5	-0.5	-5.00
09:17:16	+4756.98236	+01952.89841	8284	-0.2	-13.4	-0.4	-4.71
09:17:21	+4757.06290	+01952.99659	8259	-29.8	-10.9	-0.4	-5.00
09:17:26	+4757.13767	+01953.10030	8235	-29.1	-13.1	-0.4	-4.80
09:17:33	+4757.24838	+01953.22852	8202	0.4	-13.1	-0.5	-4.71
09:17:38	+4757.32663	+01953.33205	8179	-28.8	-13.6	-0.5	-4.60
09:17:43	+4757.39877	+01953.42997	8155	-28.3	-12.1	-0.5	-4.80
09:17:50	+4757.50397	+01953.57427	8121	0.5	-13.4	-0.3	-4.86
09:17:55	+4757.57910	+01953.67321	8097	-28.2	-11.3	-0.3	-4.80
09:18:00	+4757.66088	+01953.76732	8072	-28.1	-14.3	-0.3	-5.00
09:18:07	+4757.76667	+01953.90432	8039	166.5	-2.6	-0.4	-4.71
09:18:12	+4757.84898	+01954.00112	8016	-27.6	-11.2	-0.4	-4.60
09:18:17	+4757.92482	+01954.10405	7991	-27.8	-13.4	-0.4	-5.00
09:18:24	+4758.03323	+01954.23044	7958	1.7	-12.7	-0.4	-4.71
09:18:29	+4758.11610	+01954.32464	7934	-26.9	-12.1	-0.4	-4.80
09:18:34	+4758.19726	+01954.41619	7909	-26.9	-12.1	-0.4	-5.00
09:18:41	+4758.30430	+01954.55687	7876	2.7	-13	-0.4	-4.71
09:18:46	+4758.38380	+01954.64609	7852	-26.4	-10.1	-0.4	-4.80
09:18:51	+4758.46586	+01954.74634	7828	-26.1	-13	-0.4	-4.80
09:18:58	+4758.57098	+01954.88210	7795	3.4	-15.7	-0.4	-4.71
09:19:03	+4758.65394	+01954.97366	7771	-25.6	-13.4	-0.4	-4.80
09:19:08	+4758.73439	+01955.07872	7747	116.4	-12.7	-0.4	-4.80
09:19:15	+4758.84864	+01955.22108	7711	3.9	-16.3	-0.3	-5.14
09:19:20	+4758.92606	+01955.32197	7686	-25.4	-14.5	-0.3	-5.00
09:19:25	+4759.00052	+01955.41272	7661	-25.3	-12.2	-0.3	-5.00
09:19:32	+4759.11228	+01955.55081	7625	4.1	-14.2	-0.4	-5.14
09:19:37	+4759.18497	+01955.64806	7601	-24.4	-14.2	-0.4	-4.80
09:19:42	+4759.26488	+01955.74004	7577	-24.3	-13.1	-0.4	-4.80
09:19:49	+4759.38081	+01955.88213	7543	5.2	-14.2	-0.5	-4.86
09:19:54	+4759.45457	+01955.98006	7519	-24.2	-13.9	-0.5	-4.80
09:19:59	+4759.53555	+01956.07076	7494	-23.9	-13.9	-0.5	-5.00
09:20:06	+4759.64250	+01956.21109	7460	161.3	1.4	-0.4	-4.86
09:20:11	+4759.72226	+01956.30009	7436	-23.3	-13.9	-0.4	-4.80
09:20:16	+4759.80472	+01956.40061	7410	-22.9	-14.2	-0.4	-5.20
09:20:23	+4759.91075	+01956.54058	7376	6.8	-13.1	-0.5	-4.86
09:20:28	+4759.98458	+01956.63720	7351	-22.6	-13.4	-0.5	-5.00
09:20:33	+4800.06206	+01956.72423	7325	-22.3	-13.9	-0.5	-5.20
09:20:40	+4800.17719	+01956.86257	7288	7.2	-14.9	-0.4	-5.29
09:20:45	+4800.25908	+01956.95798	7262	-22.2	-14	-0.4	-5.20

09:20:50	+4800.34262	+01957.04948	7236	-21.9	-13.7	-0.4	-5.20
09:20:57	+4800.45731	+01957.17821	7200	7.4	-14.5	-0.4	-5.14
09:21:02	+4800.53310	+01957.26581	7175	-21.3	-14.5	-0.4	-5.00
09:21:07	+4800.61735	+01957.35644	7149	153.6	-5	-0.4	-5.20
09:21:14	+4800.72574	+01957.48919	7112	8.7	-14.3	-0.4	-5.29
09:21:19	+4800.80747	+01957.57541	7087	-20.7	-12.7	-0.4	-5.00
09:21:24	+4800.88780	+01957.67297	7061	-20.6	-13.1	-0.4	-5.20
09:21:31	+4800.99962	+01957.79272	7025	10.3	-14.9	-0.4	-5.14
09:21:36	+4801.07998	+01957.89111	7000	-20.2	-13.1	-0.4	-5.00
09:21:41	+4801.15819	+01957.98253	6973	-19.8	-13.3	-0.4	-5.40
09:21:48	+4801.27267	+01958.10830	6938	11	-14	-0.4	-5.00
09:21:53	+4801.34569	+01958.20393	6913	-19.2	-13.7	-0.4	-5.00
09:21:58	+4801.42283	+01958.29436	6887	-19.3	-13.4	-0.4	-5.20
09:22:05	+4801.52471	+01958.42980	6853	11.1	1	-0.4	-4.86
09:22:10	+4801.60108	+01958.52623	6828	-18.5	-14.2	-0.4	-5.00
09:22:15	+4801.67224	+01958.61802	6801	-18.3	-13.9	-0.4	-5.40
09:22:22	+4801.77644	+01958.75443	6765	11.8	-14.2	-0.4	-5.14
09:22:27	+4801.84820	+01958.85160	6738	-18	-14.3	-0.4	-5.40
09:22:32	+4801.92612	+01958.95106	6714	-17.9	-14.3	-0.4	-4.80
09:22:39	+4802.02426	+01959.09994	6679	12	-13	-0.4	-5.00
09:22:44	+4802.09401	+01959.19960	6653	-18	-14.3	-0.4	-5.20
09:22:49	+4802.16941	+01959.29665	6628	-17.6	-14.2	-0.4	-5.00
09:22:56	+4802.26469	+01959.43685	6592	12.3	-14.6	-0.4	-5.14
09:23:01	+4802.32826	+01959.53487	6568	-17.1	-13.9	-0.4	-4.80
09:23:06	+4802.40018	+01959.62688	6545	117.9	-0.1	-0.4	-4.60
09:23:13	+4802.48453	+01959.75060	6510	12.1	-13	-0.6	-5.00
09:23:18	+4802.54350	+01959.84162	6486	-16.4	-14.3	-0.6	-4.80
09:23:23	+4802.60487	+01959.92929	6461	-16.8	-12.7	-0.6	-5.00
09:23:30	+4802.70142	+02000.04810	6428	12.9	-13.3	-0.5	-4.71
09:23:35	+4802.76524	+02000.13283	6402	-16.5	-13.7	-0.5	-5.20
09:23:40	+4802.82524	+02000.20573	6377	-16.1	-12.5	-0.5	-5.00
09:23:47	+4802.91031	+02000.31638	6343	12.9	-14	-0.4	-4.86
09:23:52	+4802.96430	+02000.38921	6319	-15.9	-13.7	-0.4	-4.80
09:23:57	+4803.02481	+02000.45891	6295	-15.6	-14.5	-0.4	-4.80
09:24:04	+4803.10909	+02000.56738	6262	14	-14.9	-0.4	-4.71
09:24:09	+4803.16466	+02000.63898	6240	-15.4	-14.3	-0.4	-4.40
09:24:14	+4803.22576	+02000.71351	6216	-15.2	-13.9	-0.4	-4.80
09:24:21	+4803.31383	+02000.82034	6185	13.9	-15.5	-0.4	-4.43
09:24:26	+4803.36979	+02000.90282	6161	-14.9	-14.6	-0.4	-4.80
09:24:31	+4803.42417	+02000.97727	6138	-14.5	-14.8	-0.4	-4.60
09:24:38	+4803.50611	+02001.09082	6106	14.6	-16.5	-0.4	-4.57
09:24:43	+4803.56004	+02001.16662	6082	-14	-14.2	-0.4	-4.80
09:24:48	+4803.61823	+02001.25191	6059	-14	-13.3	-0.4	-4.60
09:24:55	+4803.69112	+02001.36202	6027	15	-18.7	-0.5	-4.57

09:25:00	+4803.75094	+02001.44027	6005	-13.5	-13.6	-0.5	-4.40
09:25:05	+4803.80832	+02001.52842	5982	-13.6	0.2	-0.5	-4.60
09:25:12	+4803.88329	+02001.64704	5951	15	-15.1	0	-4.43
09:25:17	+4803.93349	+02001.72870	5929	-13	-14.3	0	-4.40
09:25:22	+4803.99134	+02001.80842	5906	-12.5	-13.7	0	-4.60
09:25:29	+4804.06641	+02001.92204	5869	14.9	-17.5	-0.6	-5.29
09:25:34	+4804.12288	+02002.00003	5847	-12.5	-13.9	-0.6	-4.40
09:25:39	+4804.17237	+02002.07772	5822	-12.5	-14.2	-0.6	-5.00
09:25:46	+4804.24119	+02002.18828	5790	15.7	-16.3	-0.4	-4.57
09:25:51	+4804.28696	+02002.25586	5766	-12	-13.4	-0.4	-4.80
09:25:56	+4804.33166	+02002.33364	5743	-11.8	-13.7	-0.4	-4.60
09:26:03	+4804.39395	+02002.43221	5711	16	-13.1	-0.4	-4.57
09:26:08	+4804.43593	+02002.51073	5689	157.9	-14.9	-0.4	-4.40
09:26:13	+4804.47580	+02002.57640	5667	-11.1	-13.7	-0.4	-4.40
09:26:20	+4804.53632	+02002.68121	5637	16.3	-13	-0.5	-4.29
09:26:25	+4804.57304	+02002.75045	5615	-11	-14.5	-0.5	-4.40
09:26:30	+4804.61383	+02002.82316	5593	-11	-13.6	-0.5	-4.40
09:26:37	+4804.66466	+02002.92134	5562	16.6	-15.1	-0.5	-4.43
09:26:42	+4804.70794	+02002.99168	5541	-11	-14	-0.5	-4.20
09:26:47	+4804.74341	+02003.06527	5521	-10.5	-14.5	-0.5	-4.00
09:26:54	+4804.78986	+02003.15858	5492	17.3	-15.1	-0.5	-4.14
09:26:59	+4804.82675	+02003.21970	5471	-10.2	-13.9	-0.5	-4.20
09:27:04	+4804.86496	+02003.29147	5450	-10.4	-10.6	-0.5	-4.20
09:27:11	+4804.91410	+02003.38293	5422	17.6	-15.9	0	-4.00
09:27:16	+4804.94848	+02003.45591	5401	-10.5	-14.6	0	-4.20
09:27:21	+4804.98262	+02003.51779	5380	-10.3	-13.9	0	-4.20
09:27:28	+4805.03333	+02003.61379	5351	18	-13.7	-0.5	-4.14
09:27:33	+4805.06879	+02003.67417	5330	-9.9	-13.4	-0.5	-4.20
09:27:38	+4805.10784	+02003.74090	5310	-9.9	-14	-0.5	-4.00
09:27:45	+4805.15790	+02003.82695	5282	17.8	-13.7	-0.5	-4.00
09:27:50	+4805.19807	+02003.89509	5261	-9.2	-13.7	-0.5	-4.20
09:27:55	+4805.23231	+02003.96393	5241	-9.2	-14.2	-0.5	-4.00
09:28:02	+4805.27792	+02004.04272	5211	18.8	-15.9	-0.4	-4.29
09:28:07	+4805.31833	+02004.10142	5191	180.7	-5.7	-0.4	-4.00
09:28:12	+4805.35603	+02004.16573	5171	-8.8	-13	-0.4	-4.00
09:28:19	+4805.40074	+02004.24675	5143	19.1	-16.3	-0.4	-4.00
09:28:24	+4805.43865	+02004.30768	5123	-8.5	-12.8	-0.4	-4.00
09:28:29	+4805.47390	+02004.37220	5103	-8.6	-14.3	-0.4	-4.00
09:28:36	+4805.52009	+02004.44584	5074	19	-14.3	-0.5	-4.14
09:28:41	+4805.55588	+02004.50849	5054	-8.3	-13.9	-0.5	-4.00
09:28:46	+4805.58453	+02004.56321	5034	-8	-14.3	-0.5	-4.00
09:28:53	+4805.62817	+02004.63874	5001	19.6	-14.9	-0.4	-4.71
09:28:58	+4805.65409	+02004.69272	4980	-7.6	-13.7	-0.4	-4.20
09:29:03	+4805.68350	+02004.74137	4960	-7.6	-13.9	-0.4	-4.00

09:29:10	+4805.72742	+02004.82019	4935	19.9	-18.3	0	-3.57
09:29:15	+4805.75512	+02004.87428	4915	-7.4	-14.2	0	-4.00
09:29:20	+4805.78348	+02004.93273	4898	-7.3	-13.7	0	-3.40
09:29:27	+4805.82102	+02005.00611	4872	20	-16.6	-0.5	-3.71
09:29:32	+4805.84488	+02005.05951	4854	-7	-12.7	-0.5	-3.60
09:29:37	+4805.87430	+02005.10799	4835	-6.7	-12.8	-0.5	-3.80
09:29:44	+4805.91021	+02005.17820	4810	20.6	-17.1	-0.4	-3.57
09:29:49	+4805.94274	+02005.23056	4792	-6.6	-13.1	-0.4	-3.60
09:29:54	+4805.96935	+02005.28820	4774	-6.6	-13.6	-0.4	-3.60
09:30:01	+4806.01045	+02005.35679	4748	20.7	-14	-0.3	-3.71
09:30:06	+4806.03767	+02005.41189	4731	145.9	0.4	-0.3	-3.40
09:30:11	+4806.06892	+02005.45852	4713	-6.1	-13.9	-0.3	-3.60
09:30:18	+4806.10664	+02005.53207	4688	21.8	-15.5	-0.5	-3.57
09:30:23	+4806.13845	+02005.58340	4670	-5.9	-13.1	-0.5	-3.60
09:30:28	+4806.16473	+02005.64040	4652	-5.2	-13.6	-0.5	-3.60
09:30:35	+4806.19895	+02005.71237	4627	21.9	-14.9	-0.4	-3.57
09:30:40	+4806.23010	+02005.76071	4608	-5.2	-13.7	-0.4	-3.80
09:30:45	+4806.25698	+02005.80801	4590	-5.1	-14.3	-0.4	-3.60
09:30:52	+4806.29790	+02005.88121	4565	22.2	-14.2	-0.5	-3.57
09:30:57	+4806.32980	+02005.92824	4547	-4.6	-14.2	-0.5	-3.60
09:31:02	+4806.35827	+02005.97592	4528	-4.5	-12.2	-0.5	-3.80
09:31:09	+4806.40654	+02006.04641	4504	22.4	-14	-0.4	-3.43
09:31:14	+4806.43411	+02006.09665	4486	-4.4	-13.6	-0.4	-3.60
09:31:19	+4806.46968	+02006.14219	4468	-4	-13.9	-0.4	-3.60
09:31:26	+4806.51202	+02006.21150	4444	23	-16.3	-0.4	-3.43
09:31:31	+4806.54751	+02006.25923	4426	-3.9	-13.4	-0.4	-3.60
09:31:36	+4806.57656	+02006.31305	4407	-3.7	-14.9	-0.4	-3.80
09:31:43	+4806.62107	+02006.37840	4381	23.2	-15.5	-0.5	-3.71
09:31:48	+4806.64745	+02006.43139	4363	-3.7	-13.7	-0.5	-3.60
09:31:53	+4806.68000	+02006.47897	4345	-3.7	-13.7	-0.5	-3.60
09:32:00	+4806.71962	+02006.55076	4319	23.9	-14	-0.3	-3.71
09:32:05	+4806.75390	+02006.60187	4301	-3.2	0.8	-0.3	-3.60
09:32:10	+4806.78190	+02006.65539	4282	-2.7	-13.4	-0.3	-3.80
09:32:17	+4806.82980	+02006.72522	4257	23.9	-15.7	-0.4	-3.57
09:32:22	+4806.85763	+02006.78062	4239	-2.8	-12.5	-0.4	-3.60
09:32:27	+4806.89084	+02006.82798	4220	-2.5	-13.7	-0.4	-3.80
09:32:34	+4806.93322	+02006.90546	4195	24.3	-14.6	-0.4	-3.57
09:32:39	+4806.96640	+02006.94935	4177	-2.1	-14.3	-0.4	-3.60
09:32:44	+4806.99877	+02007.00450	4158	-2	-12.7	-0.4	-3.80
09:32:51	+4807.04459	+02007.07173	4132	25	-12.5	-0.5	-3.71
09:32:56	+4807.07334	+02007.12602	4113	-2.1	-13.9	-0.5	-3.80
09:33:01	+4807.10127	+02007.17104	4094	-1.8	-13.1	-0.5	-3.80
09:33:08	+4807.14803	+02007.24118	4068	199.4	-14.3	-0.3	-3.71
09:33:13	+4807.17886	+02007.28835	4048	-1.4	-12.4	-0.3	-4.00

09:33:18	+4807.20903	+02007.34289	4029	-1.3	-14.3	-0.3	-3.80
09:33:25	+4807.24886	+02007.40381	4003	26	-13.9	-0.5	-3.71
09:33:30	+4807.28273	+02007.45185	3984	-0.8	-13.7	-0.5	-3.80
09:33:35	+4807.30914	+02007.50145	3964	-0.6	-11.6	-0.5	-4.00
09:33:42	+4807.35330	+02007.56329	3936	26.8	-13.1	-0.4	-4.00
09:33:47	+4807.38138	+02007.61729	3917	-0.4	-11.8	-0.4	-3.80
09:33:52	+4807.41175	+02007.66186	3897	-0.1	-13.4	-0.4	-4.00
09:33:59	+4807.45417	+02007.73079	3869	26.9	-12.5	-0.4	-4.00
09:34:04	+4807.48992	+02007.78252	3848	0	-10.3	-0.4	-4.20
09:34:09	+4807.51721	+02007.83557	3828	0	-20.2	-0.4	-4.00
09:34:16	+4807.56118	+02007.90591	3798	27.6	-13.9	-0.3	-4.29
09:34:21	+4807.58787	+02007.95762	3777	0.5	-13.6	-0.3	-4.20
09:34:26	+4807.62116	+02008.00429	3756	0.6	-12.8	-0.3	-4.20
09:34:33	+4807.66814	+02008.08695	3728	28.1	-15.4	-0.3	-4.00
09:34:38	+4807.69665	+02008.13659	3708	0.9	-11.3	-0.3	-4.00
09:34:43	+4807.73278	+02008.19175	3687	1	-13	-0.3	-4.20
09:34:50	+4807.77301	+02008.26295	3657	28.3	-14	-0.4	-4.29
09:34:55	+4807.80634	+02008.31491	3636	1.8	-9.8	-0.4	-4.20
09:35:00	+4807.83292	+02008.36804	3615	1.9	-11.2	-0.4	-4.20
09:35:07	+4807.87998	+02008.43668	3585	174.4	-2	-0.4	-4.29
09:35:12	+4807.90989	+02008.49660	3563	2.4	-14	-0.4	-4.40
09:35:17	+4807.93737	+02008.54668	3541	2	-11.6	-0.4	-4.40
09:35:24	+4807.98580	+02008.62538	3509	29.7	-11	-0.5	-4.57
09:35:29	+4808.01345	+02008.68120	3487	2.4	-13.1	-0.5	-4.40
09:35:34	+4808.04748	+02008.73035	3464	2.4	-13.1	-0.5	-4.60
09:35:41	+4808.09126	+02008.80391	3432	29.2	-13.7	-0.3	-4.57
09:35:46	+4808.12668	+02008.85298	3411	2.7	-12.2	-0.3	-4.20
09:35:51	+4808.15639	+02008.90634	3388	2.5	-13.3	-0.3	-4.60
09:35:58	+4808.19602	+02008.96748	3359	29.2	-13.7	-0.4	-4.14
09:36:03	+4808.22729	+02009.01733	3337	2.3	-15.2	-0.4	-4.40
09:36:08	+4808.25342	+02009.06243	3317	160.5	-13.3	-0.4	-4.00
09:36:15	+4808.29660	+02009.12863	3288	30	-11.3	-0.3	-4.14
09:36:20	+4808.32622	+02009.16822	3268	2.9	-11.8	-0.3	-4.00
09:36:25	+4808.35326	+02009.21790	3247	2.9	-14.9	-0.3	-4.20
09:36:32	+4808.39405	+02009.27711	3220	30.4	-10.9	-0.4	-3.86
09:36:37	+4808.41824	+02009.32345	3201	3.2	-10.3	-0.4	-3.80
09:36:42	+4808.44769	+02009.36832	3183	3.2	-12.1	-0.4	-3.60
09:36:49	+4808.48165	+02009.43292	3159	31.5	-15.5	-0.4	-3.43
09:36:54	+4808.51174	+02009.48603	3141	4.2	-13.9	-0.4	-3.60
09:36:59	+4808.53623	+02009.54068	3125	4.4	-16	-0.4	-3.20
09:37:06	+4808.57512	+02009.60500	3103	146.3	-1.5	-0.4	-3.14
09:37:11	+4808.59838	+02009.65464	3086	4.5	-14	-0.4	-3.40
09:37:16	+4808.62550	+02009.70164	3069	4.9	-12.8	-0.4	-3.40
09:37:23	+4808.65885	+02009.77083	3044	32	-16	-0.3	-3.57

09:37:28	+4808.68643	+02009.82189	3027	4.9	-11	-0.3	-3.40
09:37:33	+4808.70880	+02009.86929	3009	5	-14.9	-0.3	-3.60
09:37:40	+4808.74325	+02009.93581	2984	32.1	-11.9	-0.3	-3.57
09:37:45	+4808.77049	+02009.97607	2966	5.5	-13.9	-0.3	-3.60
09:37:50	+4808.79850	+02010.02745	2949	5.5	-14.9	-0.3	-3.40
09:37:57	+4808.82883	+02010.09569	2925	32.6	-12.2	-0.3	-3.43
09:38:02	+4808.85131	+02010.14217	2907	5.7	-13	-0.3	-3.60
09:38:07	+4808.87739	+02010.19462	2890	186.8	-6.2	-0.3	-3.40
09:38:14	+4808.91743	+02010.25739	2866	32.5	-11.9	-0.4	-3.43
09:38:19	+4808.94310	+02010.31131	2849	6.8	-12.5	-0.4	-3.40
09:38:24	+4808.97331	+02010.35752	2832	6.5	-13.6	-0.4	-3.40
09:38:31	+4809.00843	+02010.42854	2807	33.7	-13	-0.3	-3.57
09:38:36	+4809.04036	+02010.47932	2789	7.1	-17.8	-0.3	-3.60
09:38:41	+4809.06447	+02010.53654	2773	7.4	-14.2	-0.3	-3.20
09:38:48	+4809.10436	+02010.60176	2750	34	-13	-0.3	-3.29
09:38:53	+4809.13365	+02010.65914	2734	7.6	-12.1	-0.3	-3.20
09:38:58	+4809.15564	+02010.71020	2719	7.7	-15.7	-0.3	-3.00
09:39:05	+4809.19691	+02010.77473	2698	34.9	-1.1	-0.3	-3.00
09:39:10	+4809.22639	+02010.83218	2682	8.2	-9.7	-0.3	-3.20
09:39:15	+4809.24866	+02010.88879	2667	8.3	-13.7	-0.3	-3.00
09:39:22	+4809.28029	+02010.95184	2645	34.9	-16.3	-0.3	-3.14
09:39:27	+4809.31139	+02010.99686	2630	8.7	-12.2	-0.3	-3.00
09:39:32	+4809.34251	+02011.05344	2614	8.9	-13.3	-0.3	-3.20
09:39:39	+4809.37570	+02011.13168	2593	35.5	-13	-0.4	-3.00
09:39:44	+4809.40351	+02011.17665	2578	9.2	-14.9	-0.4	-3.00
09:39:49	+4809.43728	+02011.22859	2562	9.4	-14.6	-0.4	-3.20
09:39:56	+4809.47600	+02011.31405	2541	36	-13	-0.3	-3.00
09:40:01	+4809.49899	+02011.36603	2527	9.9	-13.3	-0.3	-2.80
09:40:06	+4809.52852	+02011.41579	2513	184.1	-0.4	-0.3	-2.80
09:40:13	+4809.57132	+02011.50646	2494	36.2	-11	-0.3	-2.71
09:40:18	+4809.59372	+02011.57204	2480	9.8	-17.8	-0.3	-2.80
09:40:23	+4809.61739	+02011.62748	2466	9.5	-9.8	-0.3	-2.80
09:40:30	+4809.66102	+02011.71289	2447	36	-10.1	-0.3	-2.71
09:40:35	+4809.68663	+02011.78413	2433	10	-10.9	-0.3	-2.80
09:40:40	+4809.70747	+02011.84399	2419	10	-15.4	-0.3	-2.80
09:40:47	+4809.74802	+02011.92504	2400	36.2	-13.4	-0.3	-2.71
09:40:52	+4809.77187	+02011.99226	2385	10.3	-8.8	-0.3	-3.00
09:40:57	+4809.79392	+02012.04776	2371	10.4	-11.6	-0.3	-2.80
09:41:04	+4809.83431	+02012.13633	2350	37.2	-12.7	-0.3	-3.00
09:41:09	+4809.85467	+02012.20173	2336	10.1	-14	-0.3	-2.80
09:41:14	+4809.88093	+02012.25665	2321	10.3	-11.8	-0.3	-3.00
09:41:21	+4809.91389	+02012.35105	2300	36.5	-8.9	-0.2	-3.00
09:41:26	+4809.93631	+02012.40863	2284	10.2	-14.2	-0.2	-3.20
09:41:31	+4809.96210	+02012.47732	2268	10.8	-14.6	-0.2	-3.20

09:41:38	+4809.98972	+02012.56428	2245	37.3	-10.1	-0.4	-3.29
09:41:43	+4810.01727	+02012.63026	2229	11.4	-16.9	-0.4	-3.20
09:41:48	+4810.03653	+02012.69940	2212	10.7	-12.8	-0.4	-3.40
09:41:55	+4810.07052	+02012.78098	2188	37	-13.1	-0.3	-3.43
09:42:00	+4810.09523	+02012.85270	2170	11.8	-11.2	-0.3	-3.60
09:42:05	+4810.11329	+02012.91765	2151	10.5	-0.6	-0.3	-3.80
09:42:12	+4810.14685	+02012.99925	2126	37.7	-9.8	0	-3.57
09:42:17	+4810.17132	+02013.07069	2107	11.7	-13.6	0	-3.80
09:42:22	+4810.18954	+02013.13531	2088	11.8	-9.5	0	-3.80
09:42:29	+4810.22672	+02013.22248	2062	38	-7.1	-0.4	-3.71
09:42:34	+4810.24846	+02013.29435	2042	12.2	-10	-0.4	-4.00
09:42:39	+4810.26632	+02013.35750	2022	12.4	-16	-0.4	-4.00
09:42:46	+4810.29862	+02013.43916	1994	37.7	-10.9	-0.5	-4.00
09:42:51	+4810.32556	+02013.50555	1974	12.5	-11.2	-0.5	-4.00
09:42:56	+4810.34984	+02013.57859	1953	12.6	-11.6	-0.5	-4.20
09:43:03	+4810.37584	+02013.68063	1924	38.2	-10.3	-0.3	-4.14
09:43:08	+4810.39214	+02013.74762	1903	163.1	-13.1	-0.3	-4.20
09:43:13	+4810.41358	+02013.80707	1882	12	-11.9	-0.3	-4.20
09:43:20	+4810.45107	+02013.90475	1854	38.6	-11.6	-0.3	-4.00
09:43:25	+4810.47171	+02013.97871	1833	12.2	-10.1	-0.3	-4.20
09:43:30	+4810.48964	+02014.04251	1813	12.6	-7.1	-0.3	-4.00
09:43:37	+4810.52346	+02014.12380	1784	38.7	-9.2	-0.1	-4.14
09:43:42	+4810.55140	+02014.18794	1764	13	-12.8	-0.1	-4.00
09:43:47	+4810.57436	+02014.25971	1744	13.1	-12.1	-0.1	-4.00
09:43:54	+4810.59915	+02014.35182	1716	39.3	-11.6	-0.4	-4.00
09:43:59	+4810.62151	+02014.40776	1697	12.9	-15.9	-0.4	-3.80
09:43:59	+4810.62151	+02014.40776	1697	12.7	-8.3	-0.4	-3.80
09:44:11	+4810.68123	+02014.56779	1651	39.1	-11.3	0	-3.83
09:44:16	+4810.70206	+02014.63286	1633	13.3	-8.1	0	-3.60
09:44:21	+4810.72387	+02014.69062	1614	12.9	-11.9	0	-3.80
09:44:28	+4810.75798	+02014.78134	1587	40	-11.8	-0.3	-3.86
09:44:33	+4810.78417	+02014.83725	1567	13	-14.3	-0.3	-4.00
09:44:38	+4810.81256	+02014.88916	1548	12.8	-9.4	-0.3	-3.80
09:44:45	+4810.85601	+02014.96225	1520	40.1	-13.7	-0.4	-4.00
09:44:50	+4810.88933	+02015.01740	1500	13.1	-12.1	-0.4	-4.00
09:44:55	+4810.92170	+02015.07346	1480	13.5	-14.3	-0.4	-4.00
09:45:02	+4810.96884	+02015.15969	1450	39.9	-13.7	-0.2	-4.29
09:45:07	+4810.99547	+02015.22780	1429	134.3	-4.2	-0.2	-4.20
09:45:12	+4811.01900	+02015.29303	1408	13.6	-14.3	-0.2	-4.20
09:45:19	+4811.05204	+02015.38444	1377	40.2	-2.9	-0.4	-4.43
09:45:24	+4811.07628	+02015.45035	1356	14	-4.1	-0.4	-4.20
09:45:29	+4811.10214	+02015.51511	1335	14	-8	-0.4	-4.20
09:45:36	+4811.14268	+02015.59577	1307	40.3	-10.9	-0.2	-4.00
09:45:41	+4811.17585	+02015.64327	1288	15	-15.7	-0.2	-3.80

09:45:46	+4811.20420	+02015.68069	1270	14.9	-10	-0.2	-3.60
09:45:53	+4811.24478	+02015.73192	1246	40.8	-11.9	-0.3	-3.43
09:45:58	+4811.27145	+02015.76241	1230	15.5	-11	-0.3	-3.20
09:46:03	+4811.29670	+02015.79360	1208	15.3	-11.6	-0.3	-4.40
09:46:10	+4811.32923	+02015.85517	1177	41.8	-14.3	0	-4.43
09:46:15	+4811.35907	+02015.89982	1159	15.2	-13.4	0	-3.60
09:46:20	+4811.38661	+02015.92530	1147	15.1	-13.3	0	-2.40
09:46:27	+4811.41586	+02015.95865	1130	41.4	-8.1	-0.2	-2.43
09:46:32	+4811.44607	+02015.97909	1117	15	-6.9	-0.2	-2.60
09:46:37	+4811.46940	+02015.99536	1104	15.7	-12.5	-0.2	-2.60
09:46:44	+4811.50489	+02016.01313	1088	42.1	-12.7	0	-2.29
09:46:49	+4811.53028	+02016.03731	1073	15.6	-8.5	0	-3.00
09:46:54	+4811.56015	+02016.05387	1059	15.4	-6.2	0	-2.80
09:47:01	+4811.59288	+02016.07493	1038	41.3	-5.9	-0.3	-3.00
09:47:06	+4811.61388	+02016.08924	1021	133.4	1.1	-0.3	-3.40
09:47:11	+4811.63025	+02016.10282	1007	14.5	-15.4	-0.3	-2.80
09:47:18	+4811.66109	+02016.13490	985	41	-7.2	-0.4	-3.14
09:47:23	+4811.67919	+02016.14949	962	14.6	-13.9	-0.4	-4.60
09:47:28	+4811.70066	+02016.17412	941	13.7	-10.1	-0.4	-4.20
09:47:35	+4811.73135	+02016.20176	912	39.6	-12.7	-0.4	-4.14
09:47:40	+4811.75588	+02016.22866	895	13	-11.8	-0.4	-3.40
09:47:45	+4811.78070	+02016.24523	877	13.3	-9.5	-0.4	-3.60
09:47:52	+4811.81126	+02016.26833	847	38.7	-7.2	-0.3	-4.29
09:47:57	+4811.82812	+02016.28597	831	12.9	-14	-0.3	-3.20
09:48:02	+4811.84528	+02016.30868	819	12.6	-5	-0.3	-2.40
09:48:09	+4811.86671	+02016.33475	809	38.4	-11.9	-0.2	-1.43
09:48:14	+4811.88023	+02016.34211	799	12.5	-7.1	-0.2	-2.00
09:48:19	+4811.89277	+02016.34846	791	12	-6.3	-0.2	-1.60
09:48:26	+4811.91276	+02016.34611	780	38.3	-8.9	-0.3	-1.57
09:48:31	+4811.93042	+02016.34128	772	12.3	-13	-0.3	-1.60
09:48:36	+4811.95334	+02016.33422	766	12.4	-11	-0.3	-1.20
09:48:43	+4811.99010	+02016.32709	753	38.2	-16	-0.2	-1.86
09:48:48	+4812.01720	+02016.32854	742	11.4	-5.1	-0.2	-2.20
09:48:53	+4812.04083	+02016.33293	731	11.2	-5	-0.2	-2.20
09:49:00	+4812.06180	+02016.33200	714	38.1	-12.4	-0.3	-2.43
09:49:05	+4812.08179	+02016.32399	704	12.3	1.1	-0.3	-2.00
09:49:10	+4812.10806	+02016.32025	685	12.5	-13.1	-0.3	-3.80
09:49:17	+4812.14628	+02016.32471	660	38.1	-6.8	-0.2	-3.57
09:49:22	+4812.16437	+02016.33325	641	12	-10.4	-0.2	-3.80
09:49:27	+4812.17856	+02016.33263	628	12	-6.8	-0.2	-2.60
09:49:34	+4812.20198	+02016.32428	611	38.2	-8.6	0	-2.43
09:49:39	+4812.22788	+02016.32253	601	11.7	-11.5	0	-2.00
09:49:44	+4812.25029	+02016.32655	587	12.1	-10.7	0	-2.80
09:49:51	+4812.26724	+02016.32788	570	37.9	-8.6	-0.1	-2.43

09:49:56	+4812.28660	+02016.32407	558	12.1	-8.1	-0.1	-2.40
09:50:01	+4812.30340	+02016.32580	544	11.6	-3.6	-0.1	-2.80
09:50:08	+4812.31729	+02016.31461	519	180	-5	-0.1	-3.57
09:50:13	+4812.34047	+02016.30178	503	12.7	-17.4	-0.1	-3.20
09:50:18	+4812.36285	+02016.29999	486	12.7	-9.4	-0.1	-3.40

Appendix 2

GND Data

Time (UTC)	Latitude (decimal)	Longitude (decimal)	Altitude (m)	Ext.Temp (°C)	OBC Temp (°C)	COM Temp (°C)	Distance (m)	RSSI (dBm)
8:23:46	N47.47355	E19.05872	15	19.7	7	3	139	-78
8:23:53	N47.47356	E19.05870	11	19.2	8	2	140	-82
8:23:53	N47.47356	E19.05870	11	19.3	4	3	140	-78
8:24:13	N47.47373	E19.05767	0	20.5	3	1	220	-84
8:24:33	N47.47370	E19.05923	53	20.7	0	0	107	-77
8:24:43	N47.47382	E19.05942	70	19.3	4	0	104	-78
8:24:53	N47.47408	E19.05948	71	19.1	0	12	113	-79
8:25:03	N47.47398	E19.05815	0	19.7	8	0	189	-80
8:25:13	N47.47387	E19.05852	19	20.4	0	1	158	-84
8:25:23	N47.47375	E19.05888	32	18.7	3	3	129	-85
8:25:33	N47.47358	E19.06067	123	19.3	9	3	103	-80
8:25:43	N47.47367	E19.06070	127	19.5	0	2	108	-79
8:25:53	N47.47363	E19.06073	132	20	2	0	113	-86
8:26:03	N47.47365	E19.06073	132	20.3	9	4	113	-76
8:26:13	N47.47365	E19.06072	134	19	9	1	115	-72
8:26:23	N47.47370	E19.06067	131	20.3	7	2	112	-74
8:26:33	N47.47355	E19.06082	131	32.7	2	1	112	-62
8:26:43	N47.47367	E19.06082	202	32.6	4	0	183	-80
8:26:53	N47.47392	E19.06075	276	24.4	-1	1	259	-74
8:27:03	N47.47425	E19.06058	330	31.3	6	0	320	-73
8:27:13	N47.47463	E19.06053	386	26.2	5	1	385	-84
8:27:23	N47.47515	E19.06050	445	29.1	1	1	461	-75
8:27:33	N47.47575	E19.06065	514	24	4	0	551	-87
8:27:53	N47.47723	E19.06080	653	24.2	0	0	755	-82
8:28:10	N47.47873	E19.06148	772	23.8	3	3	950	-83
8:28:27	N47.48042	E19.06228	886	21.5	3	2	1162	-77
8:28:44	N47.48225	E19.06355	1000	21.6	5	3	1396	-82
8:29:01	N47.48415	E19.06512	1106	15.3	24	9	1639	-83
8:29:18	N47.48606	E19.06683	1214	16	3	2	1894	-83
8:29:35	N47.48803	E19.06930	1332	17.7	2	0	2179	-86
8:29:52	N47.48986	E19.07167	1439	13.5	2	0	2451	-84
8:30:09	N47.49165	E19.07395	1554	13.4	4	2	2724	-95
8:30:26	N47.49361	E19.07658	1667	13.8	2	2	3024	-84
8:30:43	N47.49543	E19.07955	1778	11.2	11	1	3325	-85
8:31:00	N47.49737	E19.08242	1887	10.2	3	9	3634	-87
8:31:17	N47.49933	E19.08558	2001	10	4	3	3960	-87

8:31:34	N47.50132	E19.08868	2112	9.8	4	0	4287	-88
8:31:51	N47.50318	E19.09155	2225	8.6	-2	2	4599	-87
8:32:08	N47.50503	E19.09450	2344	7.5	5	-1	4916	-89
8:32:25	N47.50658	E19.09763	2465	5.4	4	1	5219	-89
8:32:42	N47.50838	E19.10088	2583	5.7	6	1	5547	-90
8:32:59	N47.51002	E19.10383	2709	7.9	1	8	5853	-93
8:33:16	N47.51185	E19.10655	2840	6.4	6	1	6168	-90
8:33:33	N47.51338	E19.10952	2976	7.5	-3	2	6473	-90
8:33:50	N47.51512	E19.11283	3111	4.7	1	3	6809	-92
8:34:07	N47.51677	E19.11653	3239	4.3	7	0	7153	-93
8:34:24	N47.51837	E19.12015	3374	3	-2	3	7494	-99
8:34:58	N47.52160	E19.12733	3637	1.6	1	1	8175	-95
8:35:15	N47.52310	E19.13067	3772	0.2	-2	2	8498	-95
8:35:32	N47.52457	E19.13397	3902	0.1	1	-1	8815	-94
8:35:49	N47.52602	E19.13722	4027	0.9	0	0	9127	-95
8:36:23	N47.52910	E19.14458	4276	-0.9	2	0	9806	-98
8:36:40	N47.53038	E19.14800	4400	-3.3	2	0	10116	-100
8:36:57	N47.53197	E19.15140	4538	-3.3	-3	4	10452	-99
8:37:14	N47.53365	E19.15437	4670	-1.5	3	3	10771	-95
8:37:31	N47.53567	E19.15800	4798	-4	-1	-1	11144	-99
8:37:48	N47.53790	E19.16137	4928	-5.7	1	1	11520	-96
8:38:05	N47.53988	E19.16498	5053	-7.9	2	2	11889	-98
8:38:22	N47.54183	E19.16880	5182	-8	0	1	12268	-95
8:38:37	N47.54398	E19.17248	5313	-9.8	-3	2	12654	-95
8:38:54	N47.54625	E19.17637	5437	-9.7	0	0	13056	-96
8:39:11	N47.54868	E19.18037	5567	-10.7	-2	1	13478	-95
8:39:28	N47.55177	E19.18478	5709	-9.2	4	2	13971	-96
8:39:45	N47.55510	E19.18920	5860	-9.9	1	0	14486	-101
8:40:02	N47.55867	E19.19388	6002	164.4	17	1	15026	-103
8:40:19	N47.56178	E19.19817	6133	-11.8	0	1	15512	-98
8:40:36	N47.56532	E19.20247	6256	-11.9	5	1	16024	-99
8:40:53	N47.56857	E19.20698	6398	-13.5	1	1	16536	-99
8:41:10	N47.57250	E19.21157	6529	-12.9	6	0	17096	-101
8:41:27	N47.57673	E19.21630	6661	-14.6	0	1	17685	-99
8:41:44	N47.58132	E19.22128	6784	-12.5	6	0	18311	-99
8:42:01	N47.58610	E19.22620	6926	-13.1	18	6	18956	-100
8:42:18	N47.59067	E19.23088	7054	-14.3	4	0	19569	-102
8:42:35	N47.59530	E19.23550	7176	-18.7	-2	1	20183	-102
8:42:52	N47.60020	E19.24045	7313	-19	5	3	20840	-103
8:43:09	N47.60498	E19.24502	7437	-19.8	-5	1	21466	-101
8:43:26	N47.60978	E19.24972	7573	-18.3	0	0	22105	-102
8:43:43	N47.61448	E19.25472	7700	-20.2	2	2	22749	-102
8:44:00	N47.61922	E19.25947	7836	-20.9	4	6	23387	-102
8:44:17	N47.62390	E19.26420	7959	-20.7	0	0	24016	-102

8:44:34	N47.62853	E19.26918	8087	-23.3	8	-1	24656	-104
8:44:51	N47.63322	E19.27453	8230	-25.3	-4	2	25322	-101
8:45:08	N47.63782	E19.28003	8354	-25.5	6	1	25984	-102
8:45:25	N47.64225	E19.28523	8486	-24.6	-2	-1	26621	-102
8:45:42	N47.64663	E19.29060	8613	-25.9	-6	-1	27260	-102
8:46:33	N47.65940	E19.30768	8989	-30	6	0	29196	-103
8:47:24	N47.66950	E19.32648	9334	-32.6	-7	-1	30996	-103

Appendix 3

APRS Data

time	lasttime	lat	lng	speed	course	altitude	comment
2018-03-31 07:37:03	2018-03-31 07:37:03	47.47333	19.06117				
2018-03-31 08:26:03	2018-03-31 08:26:03	47.47350	19.06067				
2018-03-31 08:27:03	2018-03-31 08:27:03	47.47417	19.06050	5			
2018-03-31 08:28:03	2018-03-31 08:28:03	47.47783	19.06100	25			
2018-03-31 08:29:03	2018-03-31 08:29:03	47.48400	19.06500	45			
2018-03-31 08:30:03	2018-03-31 08:30:03	47.49067	19.07267	56			
2018-03-31 08:31:03	2018-03-31 08:31:03	47.49733	19.08233	62			
2018-03-31 08:32:03	2018-03-31 08:32:03	47.50417	19.09300	66			
2018-03-31 08:33:03	2018-03-31 08:33:03	47.51000	19.10400	63			
2018-03-31 08:34:03	2018-03-31 08:34:03	47.51600	19.11500	64			
2018-03-31 08:35:03	2018-03-31 08:35:03	47.52167	19.12750	68			
2018-03-31 08:36:03	2018-03-31 08:36:03	47.52683	19.13950	64			
2018-03-31 08:37:03	2018-03-31 08:37:03	47.53217	19.15183	66			
2018-03-31 08:38:03	2018-03-31 08:38:03	47.53917	19.16400	72			
2018-03-31 08:39:05	2018-03-31 08:39:05	47.54683	19.17767	77			
2018-03-31 08:40:05	2018-03-31 08:40:05	47.55817	19.19317	103			
2018-03-31 08:41:05	2018-03-31 08:41:05	47.57017	19.20883	107			
2018-03-31 08:42:05	2018-03-31 08:42:06	47.58583	19.22583				.....
2018-03-31 08:43:05	2018-03-31 08:43:05	47.60233	19.24250	135			.....
2018-03-31 08:44:05	2018-03-31 08:44:05	47.61917	19.25933	135			.....
2018-03-31 08:45:05	2018-03-31 08:45:05	47.63550	19.27717	135			.....
2018-03-31 08:46:05	2018-03-31 08:46:05	47.65150	19.29633	137			.....
2018-03-31 08:47:05	2018-03-31 08:47:05	47.66450	19.31750	129			.....

2018-03-31 08:48:05	2018-03-31 08:48:05	47.67667	19.34017	130			.....
2018-03-31 08:49:05	2018-03-31 08:49:05	47.68817	19.36517	136			.....
2018-03-31 08:50:05	2018-03-31 08:50:05	47.69983	19.39233	145			.....
2018-03-31 08:51:05	2018-03-31 08:51:05	47.71067	19.41350	119			.....
2018-03-31 08:52:05	2018-03-31 08:52:05	47.72467	19.42783	113			.....
2018-03-31 08:53:05	2018-03-31 08:53:05	47.73933	19.44783	133			.....
2018-03-31 08:54:05	2018-03-31 08:54:05	47.75033	19.46417	104			.....
2018-03-31 08:55:05	2018-03-31 08:55:05	47.75417	19.48283	87			.....
2018-03-31 08:56:05	2018-03-31 08:56:05	47.75667	19.49750	68			.....
2018-03-31 08:57:05	2018-03-31 08:57:05	47.75983	19.51267	71			.....
2018-03-31 08:58:05	2018-03-31 08:58:09	47.76367	19.52717				??????????????
2018-03-31 08:59:05	2018-03-31 08:59:05	47.76800	19.53833				.....
2018-03-31 09:01:05	2018-03-31 09:01:05	47.77767	19.56217				.....
2018-03-31 09:02:05	2018-03-31 09:02:49	47.78133	19.57667				.....
2018-03-31 09:03:05	2018-03-31 09:03:05	47.78467	19.59033	244			.....
2018-03-31 09:04:05	2018-03-31 09:04:05	47.78700	19.60467	66			.....
2018-03-31 09:05:05	2018-03-31 09:05:05	47.79133	19.62233	84			.....
2018-03-31 09:06:05	2018-03-31 09:06:05	47.80233	19.63933	106			.....
2018-03-31 09:07:05	2018-03-31 09:07:05	47.81667	19.66117	137			.....
2018-03-31 09:08:05	2018-03-31 09:08:08	47.83250	19.67583				??????????????
2018-03-31 09:09:05	2018-03-31 09:09:09	47.84583	19.69317				??????????????
2018-03-31 09:10:05	2018-03-31 09:10:05	47.85783	19.71683	142			??????????????
2018-03-31 09:11:05	2018-03-31 09:11:05	47.86867	19.74383	141			??????????????
2018-03-31 09:12:05	2018-03-31 09:12:05	47.87950	19.76867	132			??????????????
2018-03-31 09:13:05	2018-03-31 09:13:05	47.89117	19.79167	129			??????????????
2018-03-31 09:14:05	2018-03-31 09:14:05	47.90350	19.81417	130			??????????????
2018-03-31 09:15:05	2018-03-31 09:15:05	47.91683	19.83583				.....
2018-03-31	2018-03-31	47.93117	19.85617	132			.....

09:16:05	09:16:05						
2018-03-31 09:17:05	2018-03-31 09:17:05	47.94567	19.87650	133			.....
2018-03-31 09:18:05	2018-03-31 09:18:05	47.96100	19.89600	134			.....
2018-03-31 09:19:05	2018-03-31 09:19:05	47.97667	19.91517	135			.....
2018-03-31 09:20:05	2018-03-31 09:20:05	47.99250	19.93483	137			.....
2018-03-31 09:21:05	2018-03-31 09:21:05	48.00833	19.95383	135			.....
2018-03-31 09:22:05	2018-03-31 09:22:05	48.02417	19.97217	134			.....
2018-03-31 09:23:05	2018-03-31 09:23:05	48.03850	19.99183				.....
2018-03-31 09:24:05	2018-03-31 09:24:05	48.05100	20.00833				.....
2018-03-31 09:25:05	2018-03-31 09:25:05	48.06250	20.02400	104			.....
2018-03-31 09:26:05	2018-03-31 09:26:05	48.07267	20.03967	97			.....
2018-03-31 09:27:05	2018-03-31 09:27:05	48.08050	20.05383	82			.....
2018-03-31 09:28:05	2018-03-31 09:28:05	48.08767	20.06700	76			.....
2018-03-31 09:29:05	2018-03-31 09:29:05	48.09433	20.07850	68			.....
2018-03-31 09:30:05	2018-03-31 09:30:05	48.10000	20.08900	60			.....
2018-03-31 09:31:05	2018-03-31 09:31:06	48.10567	20.09917				.....
2018-03-31 09:32:05	2018-03-31 09:32:11	48.11183	20.10917				.....
2018-03-31 09:33:05	2018-03-31 09:33:05	48.11817	20.11933	69			.....
2018-03-31 09:34:05	2018-03-31 09:34:05	48.12433	20.12900	59			.....
2018-03-31 09:35:05	2018-03-31 09:35:05	48.13050	20.13933	62			.....
2018-03-31 09:36:06	2018-03-31 09:36:06	48.13667	20.14967	61			.....
2018-03-31 09:37:06	2018-03-31 09:37:06	48.14233	20.15917	57			.....
2018-03-31 09:38:05	2018-03-31 09:38:05	48.14733	20.16867	55			.....
2018-03-31 09:39:05	2018-03-31 09:39:05	48.15267	20.17867	57			.....
2018-03-31 09:40:05	2018-03-31 09:40:05	48.15817	20.18917	59			.....
2018-03-31 09:41:05	2018-03-31 09:41:05	48.16350	20.20133	65			.....
2018-03-31 09:42:05	2018-03-31 09:42:05	48.16817	20.21417	65			.....
2018-03-31 09:43:05	2018-03-31 09:43:05	48.17267	20.22717	65			.....

2018-03-31 09:45:05	2018-03-31 09:45:05	48.18250	20.25217	65			.....
2018-03-31 09:47:05	2018-03-31 09:47:05	48.19300	20.26783	49			.....
2018-03-31 09:48:05	2018-03-31 09:48:05	48.19717	20.27150	32			.....
2018-03-31 09:49:05	2018-03-31 09:49:05	48.20100	20.27217	26			.....
2018-03-31 09:51:05	2018-03-31 09:51:05	48.20750	20.27167	22			.....