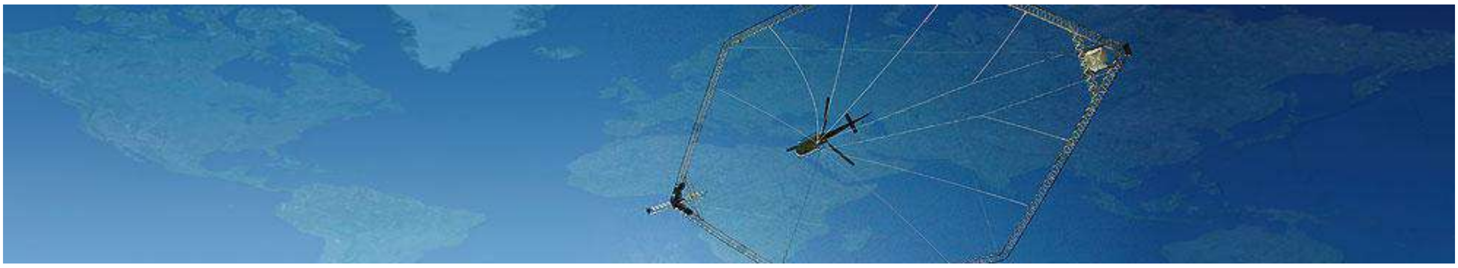
`



SkyTEM Survey:
Sicily, italy
Data report

Client: IRSA-CNR

Date: February 2012

Contents

This data report covers data acquisition of a time domain electromagnetic and magnetic survey carried out in the area of Sicily, italy 2011, by SkyTEM Surveys ApS.

Contact person at SkyTEM: Rasmus Teilmann
Tel. +45 8620 2050
Email: rt@skytem.com

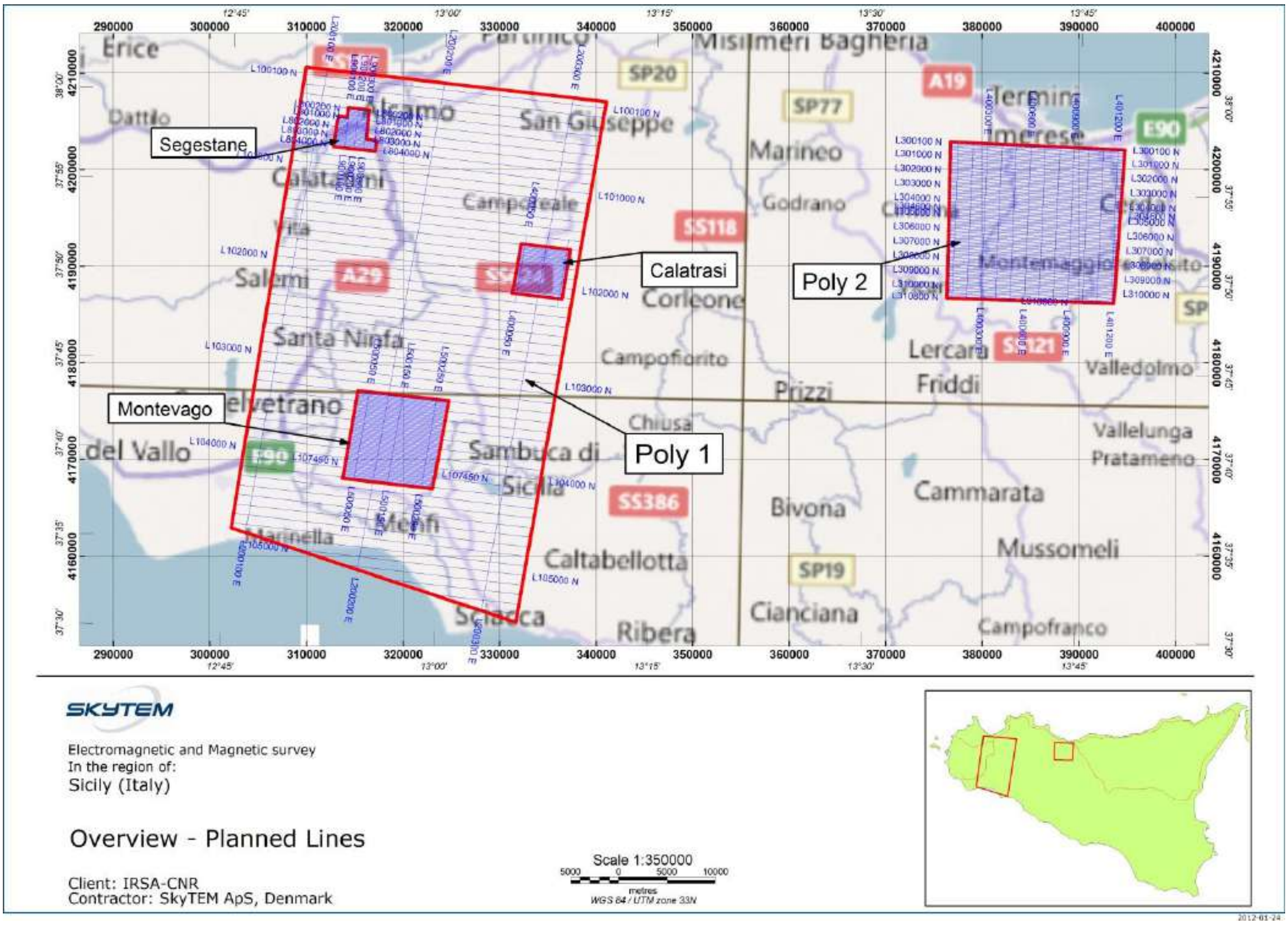


Figure 1 Project overview. The red polygons represent the outline of the survey areas and the blue lines are planned flight lines.

Introduction

On November 4th to December 14th, 2011, a time domain electromagnetic and magnetic survey was performed by SkyTEM Surveys ApS in the area of Sicily, italy, see Figure 1.

The survey requested by IRSA-CNR was planned to consist of 4944 km flight lines in two blocks ("Poly 1" and "Poly 2"). During the survey 3 additional blocks were outlined within the Poly 1 block ("Calatrasi", "Segastane" and "Montevago")

SkyTEM will provide the electromagnetic and magnetic raw data measured during the flights together with the standard SkyTEM processing.

"Aarhus geophysics" has been cooperating with SkyTEM in the project and will conduct the inversion and "Aarhus Workbench" related training. All magnetic processing has been handled by SkyTEM.
This report does not include any geological interpretations of the geophysical dataset.

Client		IRSA-CNR Viale F.sco De Blasio n. 5 c.a.p. 70132, Italy
Field crew		Anne Have Rasmussen Poul Mousten
Field work		November 4th to December 14th, 2011
Flown line km		4884 km
Flight operation	Helicopter type Planned flight speed Nominal terrain clearance (above any obstacles or hazards)	Eurocopter - Lama, operated by Air Walser 80-100 km/h (on lines) 30 m
Pilots		Andrea
Report	Data processing and presentation QC by	Rasmus Teilmann Sara Thofte
Contact Person at SkyTEM 	 Email:	Rasmus Teilmann rt@skytem.com

Definition of the area

The survey areas are defined below by vertex points given in Coordinate system: UTM Zone 33N (WGS84).

The flight line orientation in the Sicily areas are E/W (see Figure 2).

Vertex Poly 1	Easting [m]	Northing [m]
1	302180	4162918
2	309998	4210603
3	341076	4207029
4	331689	4153196

Vertex Poly 2	Easting [m]	Northing [m]
1	376334	4186690
2	376700	4202919
3	394779	4202031
4	393628	4186172

Vertex Calatrasi	Easting [m]	Northing [m]
1	331327	4187247
2	332230	4192321
3	337353	4191714
4	336483	4186623

Vertex Montevago	Easting [m]	Northing [m]
1	313739	4168069
2	315347	4177145
3	324750	4176082
4	323060	4166979

Vertex Segestane	Easting [m]	Northing [m]
1	312794	4202369
2	313217	4205041
3	313373	4205531
4	314219	4205419
5	314330	4206444
6	316512	4206199
7	316201	4203170
8	317292	4202992
9	317158	4201901

Instruments and parameter setup

The instrumentation involves a time domain electromagnetic system including a data acquisition system, a magnetometer, three DGPS', two inclinometers and two altimeters.

The equipment setup has been chosen as a dual moment configuration with a Low moment (LM) with a peak moment of ~3,140 NIA and a High Moment (HM) with a peak moment of ~150,000 NIA.

The main benefit of the dual moment system is the possibility to measure the early time gates when transmitting in LM mode while still having the deep penetration obtained with the HM mode.

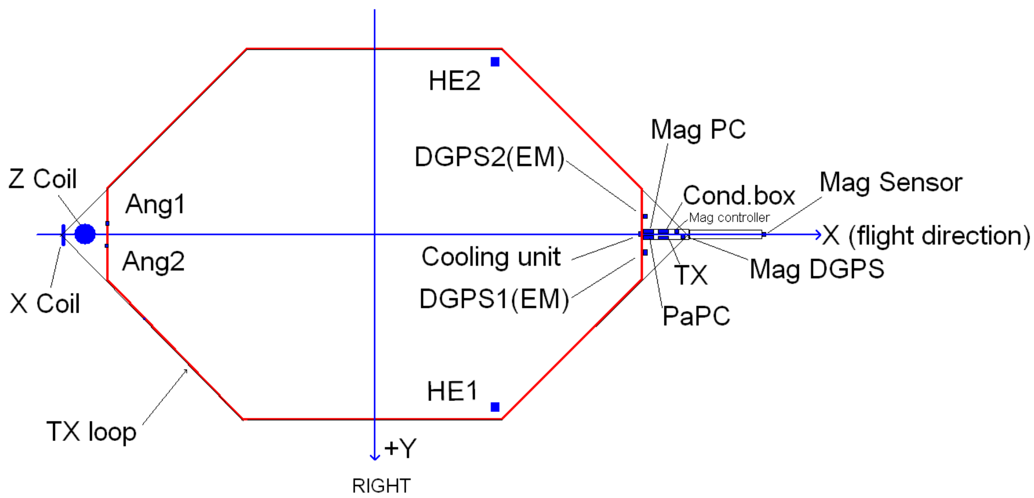


Figure 2 Sketch showing the frame and the position of the instruments. The red line defines the transmitter loop. The horizontal plane is defined by (x,y).

The location of the instruments with respect to the frame is shown in Figure 2.

X and y define the horizontal plane. Z is perpendicular to (x, y). X is positive in the flight direction, y is positive to the right of the flight direction, and z is positive downwards.

The DGPS systems are mounted in the front of the frame.

The generator used for powering of the transmitter is positioned 15 m below the helicopter.

A more thorough description of the system and individual instruments can be found in ref /1/ and Appendix 1.

Synchronizing the data

All recorded data are marked with a time stamp used to link the different data types. The time stamp is in UTC/GMT.

The time stamp formats are either

1. yyyy/mm/dd hh:mm:ss.sss

or

2. Datetime values defined as the number of days since 1900-01-01 and seconds of the day (Ddddd.sssssssss).

Calibration of the TEM system

The complete SkyTEM equipment has been tested and calibrated at the Danish National Reference Site in August 2011.
The calibration includes measurements of the transmitter wave form and data level in different altitudes. By these measurements it has been documented that the instrumentation can reproduce the reference site using constant calibration parameters independent of the flight altitude.

The calibration results and parameters are shown below:

Low moment
Shift factor: 1.00 (on the raw dB/dt data)
Time shift: 0 s

High Moment
Shift factor: 1.05 (on the raw dB/dt data)
Time shift: 0 s

All data has been processed using the above stated calibration parameters.

The waveform as well as the reproduced soundings in different altitudes is shown in Appendix 3.

High altitude tests

A High altitude test was performed during the survey at 800 m - 1000 mm above ground. The test was performed with exactly the same equipment and configuration as used during the survey. The high altitude test can be seen in Figure 3.

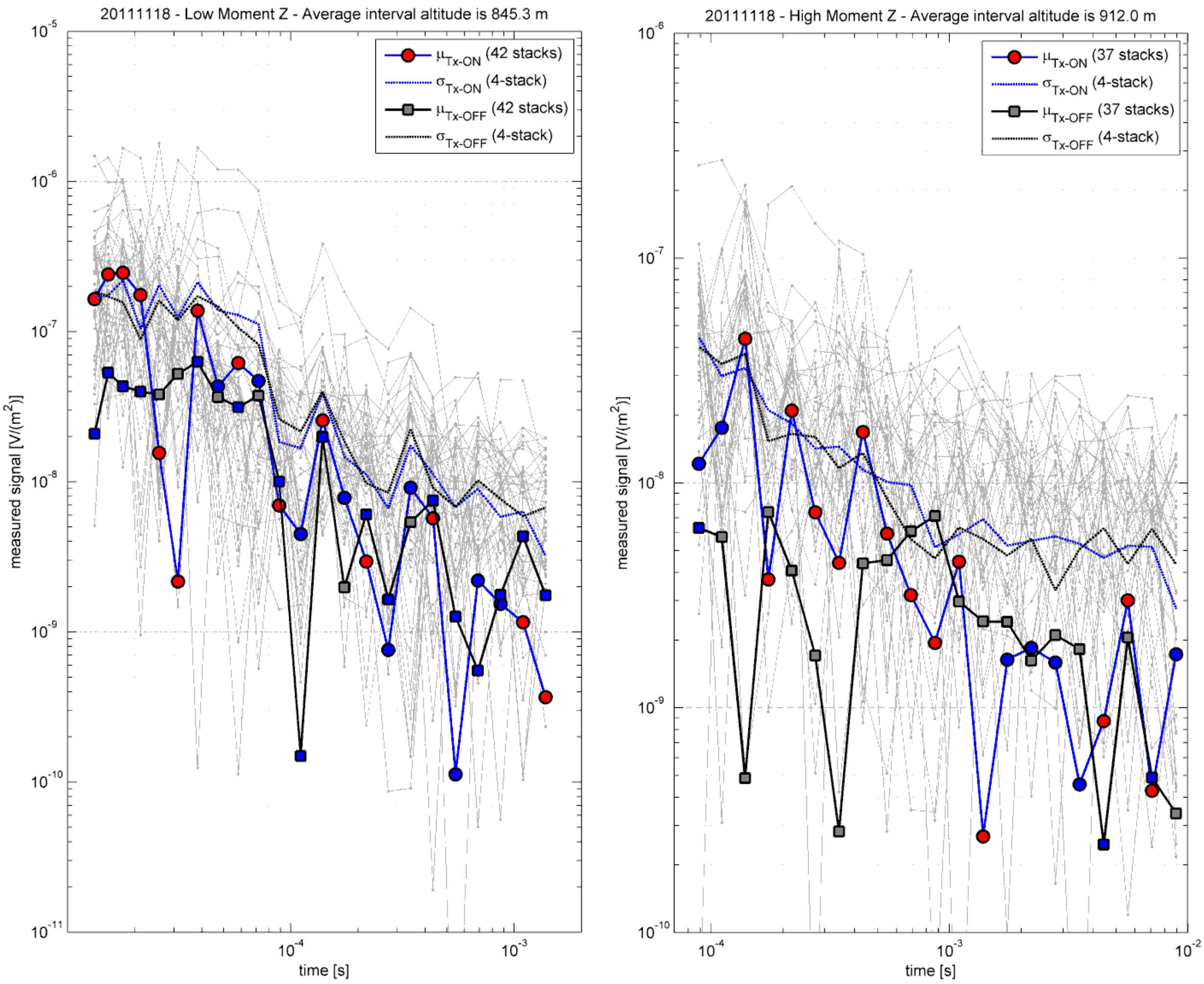


Figure 3 High altitude test (20111118). Right plot is high moment and left plot is low moment. Grey curves are un-stacked responses with the transmitter turned on. The circles are the stacked response of all the grey curves. Squares represent the background noise (i.e. the Transmitter turned off). Dotted lines represent the Standard deviation of the noise and Tx-on measurements.

In high altitude the signal with the transmitter on is at the noise level after the front gate opens (see Figure 3). Because of the high altitude no signal from the ground is present. Therefore it can be concluded that there are no noise of significance in the system.

Data acquisition

The planned flight lines covering the Sicily areas are shown in Figure 2. The lines are parallel-spaced 100 m / 1500 m extending E/W.

The flight lines are numbered as 100101-900301.

The nominal terrain clearance is 30 m above any obstacles or hazards, with an increase over forests, power lines, etc. It is always the pilot who decides the safety height for the operation.

The helicopter airspeed was planned to be 80-100 km/h (on lines) above a flat topography and in no wind. This may vary in areas of rugged terrain and/or windy conditions.

Actually flown lines can be seen in Figure 4. Discrepancies from the planned lines occur when possible noise sources are present, or the nature of the ground has called for a diversion.

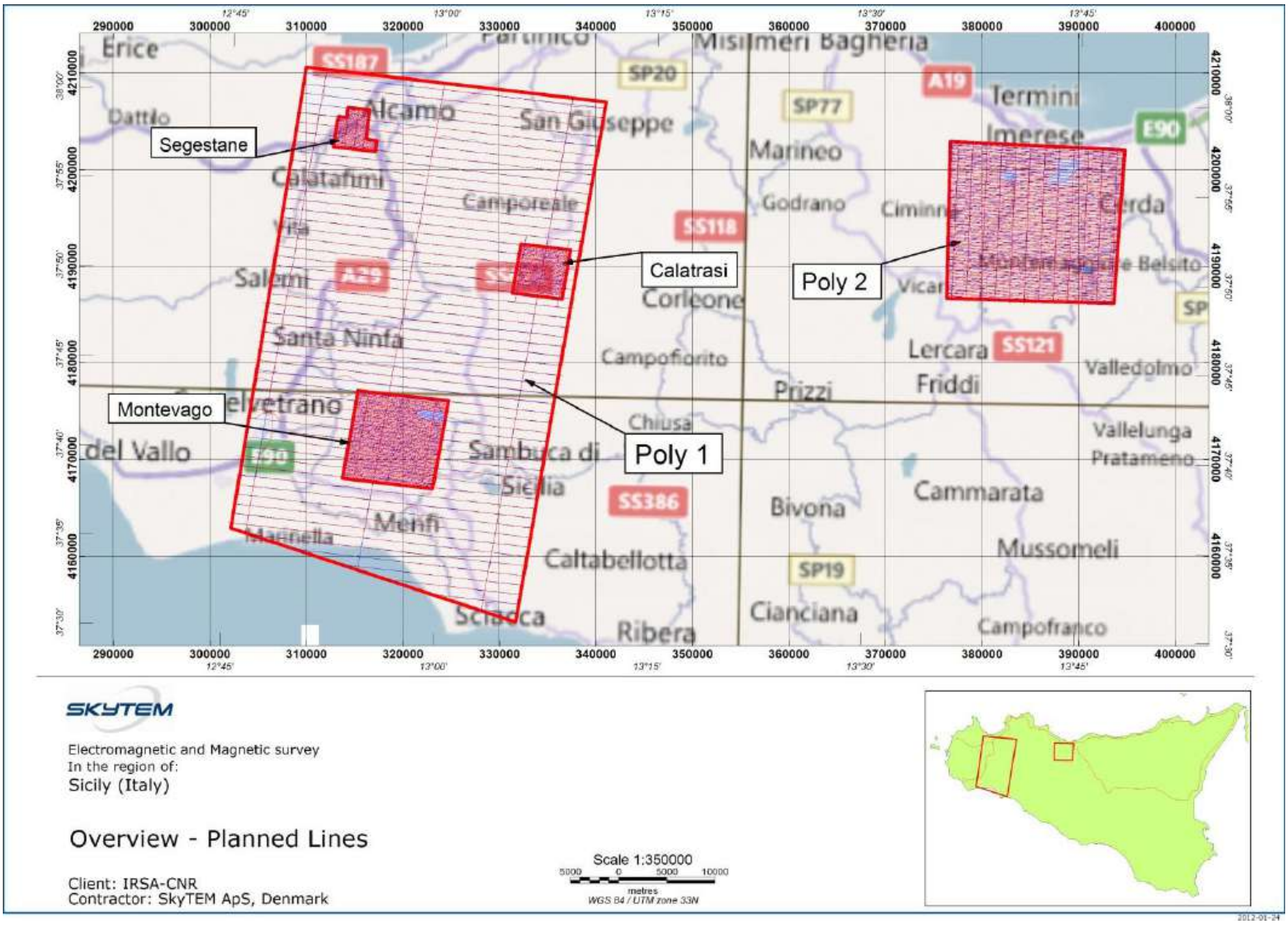


Figure 4 Actually flown lines in red in respect to planned flight lines in blue. Coordinate system: UTM Zone 33N (WGS84).

Ground Base Stations

DGPS base station

The DGPS base station was in proximity to the landing site.

Utmost effort was made to ensure that the base station was placed at a location of maximum possible view to satellites and out of any metallic objects that could influence the GPS antenna.

Table showing the DGPS base station location (lat/Lon (WGS84)).

Area	Lat	Lon	Ell. Height
Poly 1	37 58 20.84	13 46 12.94	46 m
Poly 2	37 47 29.48	12 50 35.75	235 m

Magnetometer base station

The magnetometer base station was in proximity to the landing site.
Great effort was made to ensure that the base station magnetometer was placed in a location of low magnetic gradient and away from electrical transmission lines and moving metallic objects, such as e.g. motor vehicles.

Table showing the magnetic base station location (lat/Lon (WGS84)).

Area	Date	Lat	Lon
Poly 1	20111112-20111127	37.8778691	13.5874363
Poly 2	20111128-20111214	37.8327941	12.8189860

Flight reports

For each flight, a flight diary with key information regarding the data gathering was made. Listed in the reports are details on special data parameters and other events which may influence the data. Selected information from the flight diary and a weather diary are shown in the tables below:

Weather

Flight/date	Description	Temperature (C)	Wind (m/s)	Visibility
20111102	Sunny - overcast in the afternoon	20-25	2-4	Medium
20111103	Sunny - overcast in the afternoon	20-25	4-6	Medium
20111104	Sunny	22-27	12-15	Good
20111105	Sunny - overcast in the afternoon	20-25	15-20 (gust at 25)	Good
20111106.01	Sunny	20 - 25	4 -6	Good
20111106.02	Sunny	25	4 - 6	Good
20111106.03	sunny	25	6 - 8	Good
20111106.04	Sunny	20 - 25	8 - 10	Good
20111107.01	Sunny	20 - 25	10 - 12	Good
20111107.02	Sunny	22 - 27	11 - 13	Good
20111108.01	sunny	20 - 25	4 - 6	Good
20111108.02	sunny	20 - 25	4 - 6	Good
20111108.03	Sunny	22 - 27	4 - 6	Good
20111108.04	Overcast	20 - 25	6 - 8	Good
20111109.01	Sunny	25 - 27	2 - 5	Good
20111109.02	Overcast	20 - 22	4 - 6	Medium
20111110.01	Sunny	25 - 27	2 - 5	Good
20111110.02	Sunny	20 - 25	6 - 8	Good
20111111	Sunny - overcast in the afternoon	20 - 25	4 - 6	Good
20111112.01	Sunny	20 - 25	4 - 6	Good
20111112.02	Sunny	22 - 27	4 - 6	Good
20111112.03	Partly overcast	20 - 25	4 - 6	Good
20111112.04	Partly overcast	20 - 25	4 - 6	Good
20111112.05	Overcast	20 - 25	4 - 6	Good
20111113.01	Partly overcast - wind picked up during flight	15 - 20	4 - 8	Medium
20111113.02	Partly overcast	15 - 20	6 - 8	Good
20111113.03	Partly overcast - wind picked up during flight	15 - 20	6 -10	Good
20111114.01	Overcast	10 - 15	6 - 8	medium - good
20111114.02	Overcast	10 - 15	4 - 6	Good

20111114.03	Partly overcast	15 - 20	4 - 6	Good
20111115.01	Partly overcast	15 - 20	4 - 6	Good
20111115.02	Partly overcast	10 - 15	6 - 8	medium - good
20111116	Overcast and low clouds, strong wind	10 - 15	10 - 12	Medium
20111117.01	Partly overcast	15 - 20	4 - 6	Good
20111118.01	Sunny	10 - 15	4 - 6	Good
20111118.02	Sunny	10 - 15	4 - 6	Good
20111118.03	Sunny	15 - 20	4 - 6	Good
20111118.04	Sunny	15 - 20	4 - 6	Good
20111119.03	Sunny, windy in the mountains with lots of turbulence	15 - 20	5 - 7	Good
20111119.04	Partly overcast, windy in the mountains	15 - 20	6 - 8	Good
20111120.01	Sunny	15 - 20	6 - 8	Good
20111120.02	Sunny	15 - 20	6 - 8	Good
20111121	Sunny, windy in the mountains with lots of turbulence	15 - 20	10 - 12	Good
20111122	Partly overcast, Werry windy	15 - 20	15 - 20 (gudsts at 25)	Medium
20111123	Partly overcast, windy, rain in the afternoon	15 - 20	10 - 12	Medium
20111124.01	Partly overcast, strong wind in the mountains	15 - 20	4 - 6	Good - Medium
20111124.02	Partly overcast, strong wind in the mountains	15 - 20	6 - 8	Good - Medium
20111125.01	Sunny - fog in vallys	10 - 15	4 - 6	Good
20111125.02	Sunny	15 - 20	4 - 6	Good
20111125.03	Sunny	15 - 20	4 - 6	Good
20111126.01	Sunny	5 - 10	6 - 8	Good
20111126.02	Sunny	15 - 20	4 - 6	Good
20111126.03	Partly overcast - high clouds	15 - 20	4 - 6	Good
20111127.01	Sunny	15 - 20	4 - 6	Good
20111127.02	Sunny	15 - 20	4 - 6	Good
20111127.03	Sunny	15 - 20	4 - 6	Good
20111128.01	overcast	10 - 15	6 - 8	Medium
20111128.02	Partly overcast	15 - 20	4 - 6	Good
20111130.01	Sunny	10 - 15	4 -6	Good
20111130.02	Sunny	15 - 20	4 - 6	Good
20111201.01	Sunny	10 - 15	4 -6	Good
20111201.02	Sunny	15 - 20	4 -6	Good
20111201.03	Sunny	15 - 20	4 -6	Good
20111202.01	partly overcast	5 - 10	4 - 6	Good -

				Medium
20111202.02	partly overcast	10 - 15	6 - 8	Good
20111202.03	partly overcast	10 - 15	7 - 9	Good
20111203.01	Partly Overcast	5 - 10	4 -6	Good
20111203.02	partly overcast	10 - 15	7 - 9	Good
20111203.03	partly overcast	10 - 15	7 - 9	Good
20111204	Overcast, high wind, low clouds and rain showers	12 - 15	7 > 9	Poor
20111205	Cloudy, very strong wind rain showers.	14 - 18	8 > 12	Poor
20111206	Strong wind, low clouds, raining	14 > 18	8 > 12	Poor
20111206	Strong wind in the morning, some clouds.	15 > 18	5 > 8	Ok
20111207	Strong wind in the morning, some clouds.	15 > 18	5 > 8	Ok
20111208	Strong wind in the morning, some clouds.	15 > 18	5 > 8	Ok
20111209	Little wind, some clouds.	14 - 18	5 - 8	Ok
20111210	Strong wind, few clouds	15 > 18	7 - 10	Ok
20111211.01	Light wind and overcast, haze	12 > 14	2 > 4	Ok
20111211.02	Light wind and overcast, haze	14 > 18	3 > 5	Ok
20111211.03	Strong wind, and overcast, haze	14 > 16	6 > 9	Ok
20111212.01	Medium wind, gusting, few clouds	14 > 16	5 > 8	Good
20111212.02	Light wind with few clouds	15 > 18	3 > 5	Good
20111213.01	Light wind, blue sky	13 > 16	2 > 3	Good
20111213.02	Light wind, light shower, some clouds	13 > 15	3 > 5	Good
20111213.03	Light wind, few clouds	14 > 16	4 > 6	Good
20111214.01	Light wind some low clouds	8 > 10	3 > 5	Ok
20111214.02	Some wind and overcast	10 > 12	4 > 6	Ok
20111214.03	Some wind and overcast little rain	10 > 12	4 > 7	Ok

Flight Diary

Flight	Description
20111112.05	Production – lots of power lines
20111113.01	Production
20111113.02	Production in blok 2
20111113.03	Production in blok 2
20111114.01	Production in block 2
20111114.02	Production in block 2
20111114.03	Production in block 2

20111115.01	Production in block 2
20111115.02	Production in block 2
20111117.01	Frame damaged - no Production
20111118.01	Calibration Flight
20111118.02	Calibration Flight
20111118.03	Calibration Flight
20111118.04	Calibration Flight
20111119.01	Mag base flight
20111119.02	Mag base flight
20111119.03	Production in block 2. Flight aborted due to strong turbulence in the survey block
20111119.04	Production in block 2
20111120.01	Production in block 2
20111120.02	Production in block 2
20111124.01	Production in block 2, strong wind in the mountains
20111124.02	Production in block 2
20111125.01	Production in block 2 - came back early due to fog in the valleys
20111125.02	Production in block 2
20111125.03	Production in block 2
20111126.01	Production in block 2
20111126.02	Production in block 2
20111126.03	Production in block 2
20111127.01	Production in block 2
20111127.02	Up to mag base
20111127.03	Down from mag base (base taken down)
20111128.01	Move from landing in poly 2 to landing in poly 1
20111128.02	Safety flight in Block 1 - mapping af major powerlines / windmills etc
20111130.01	Production in Block 1
20111130.02	Production in Block 1
20111201.01	Production in Block 1
20111201.02	Production in Block 1
20111201.03	Production in Block 1
20111202.01	Production in Block 1
20111202.02	Production in Block 1
20111202.03	Production in Block 1
20111203.01	Production in Block 1 - flight aborted due to wind
20111203.02	Production in Block 1
20111203.03	Production in Block 1
20111209.01	Production in mid-northern part of block 1
20111209.02	Production in northern part of block 1
20111209.03	A lot of towns and buildings in the northern end of the survey block and a mountain in the north western corner, area might not be flown fully up there due to to the many buildings/towns along the coast and the mountain.
20111211.01	Production in Montevago block south
20111211.02	Tielines in Block 1

20111211.03	Production in Montevago block north, strong wind and left out lines in the north-east at Montevago town.
20111212.01	Production in Montevago block.
20111212.02	Production in Montevago block
20111213.01	Production in Montevago block center.
20111213.02	Production in Montevago block and Calatrasi
20111213.03	Production in Calatrasi block
20111214.01	Production in Calatrasi
20111214.02	Production in Segestane
20111214.03	Production in Segestane

Processed data

Selected control parameters are plotted in Appendix 4. The plots contain information about the flight altitude, speed, angle of the frame, transmitted current, transmitter voltage and transmitter temperature.

Mean values and standard deviations of control parameters are found in the table below.

Control parameter		Mean Value	Standard Deviation
Ground speed*)		87.5km/h	11.9 km/h
Processed height		44.0 m	18.2 m
Tilt angle	X	-3.5 degrees	8.8 degrees
	Y	2.5 degrees	2.5 degrees
Tx Voltage**)	Tx_off	71 V	-
	Tx_on	66-71 V	-
Low moment Current**)		10.7 A	0.02 A
High Moment Current**)		112 A	0.7 A
Tx temperature**)		40-60 °C	-

**) Actual speed varies as a function of day and flight direction due to different wind directions and magnitude.*

***) Few spikes are seen in the temperature, current and voltage data. These are not caused by errors in the instruments but are a matter of digital drop outs.*

EM processing

All data are resampled to 10 Hz in the SkyTEM in-house software.

The data are normalized in respect to effective Rx coil area, Tx coil area, number of turns and current giving the unit: $V/(m^4 \cdot A)$.

The raw EM data are filtered based on the signal level, i.e. high level means a low number of transients in a stack and vice versa.

LM and HM EM values are rescaled from V to pV.

All Auxiliary devices (DGPS, Laser altimeters, inclinometers) are moved to the centre of the frame as based on the values stated in Appendix 1.

Tilt processing

The X and Y angle processing involves manual and automated routines using a combination of the SkyTEM in-house software SkyLAB and Oasis Montaj Geosoft.
The processing involves the following steps:

1. Automated spike removal
2. 3 sec box filter (SkyLAB)
3. Low pass filtering of 2 sec. (Geosoft)

Height processing

The height processing involves manual and automated routines using a combination of the SkyTEM in-house software SkyPRO and Oasis Montaj Geosoft.
The processing involves the following steps:

1. Keeping the 2 highest values pr. second and discarding the rest to correct for the canopy effect (treetop filter)
2. 2 sec running box filter (smoothing filter)
3. Tilt correction
4. Averaging of the two laser values.
5. Additional filters in Geosoft involving:
    a. Editing of spurious data (i.e. missing data over lakes etc.)
    b. Small data gaps interpolated
    c. Low pass filter (8 sec)

DGPS processing

The DGPS has been processed using the Waypoint GrafNav Lite Differential GPS processing tool. The standard airborne settings has been used.

1. Import of basestation (Master)
2. Import of Airborne files (Rover)
3. Calculation of forward and reverse DGPS solution
4. Export as .txt file.

The DGPS.txt files are used as input to the SkyPRO software assuring DGPS corrected data in the processed files.

The ground speed, altitude, latitude and longitude from the processed DGPS are merged into the final GDB. Afterwards the coordinates are transformed into "UTM Zone 33N (WGS84)"
A low pass filter of 2 sec has been applied to the above mentioned parameters.

Digital elevation model

A digital elevation model (DEM) channel has been calculated by subtracting the filtered laser altimeter data from the DGPS elevation.

The Processing to the final DEM involves the following steps:

1. Filtering and processing of the laser altimeter height as described above
2. DEM data received by subtraction of final filtered laser data from final processed DGPS altitude data
3. Grids produced using the minimum curvature method
4. Resampling of the grid into DEM channel

The DEM channel was produced and gridded (see Figure 5 Digital Elevation Model) as described above in Oasis Montaj Geosoft format and included in the data delivery catalogue.

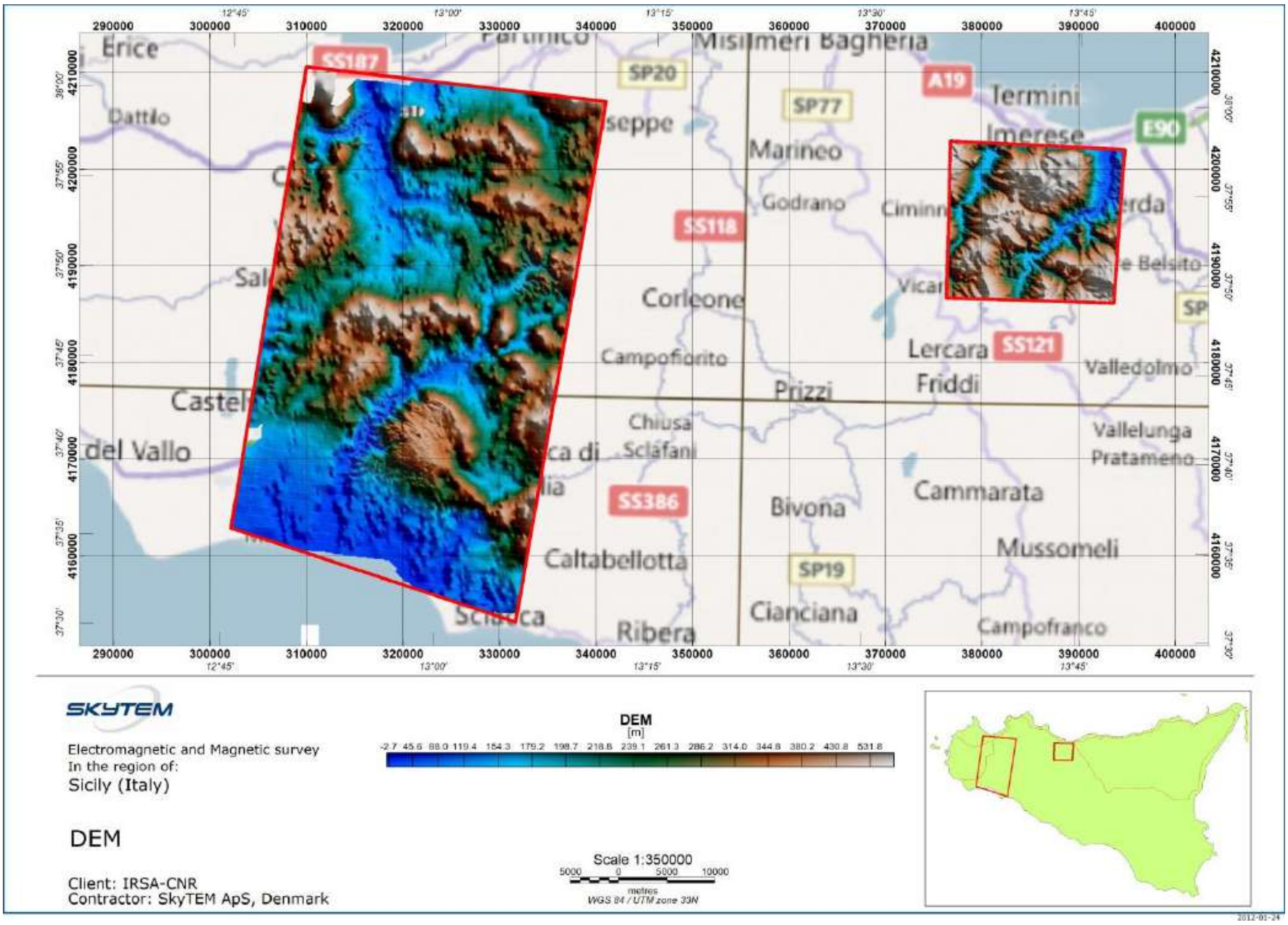


Figure 5 DEM of the Sicily areas in meters above sea level. UTM Zone 33N (WGS84).

Mag processing

Final processing of the magnetic data involved the application of traditional corrections to compensate for diurnal variation and heading effects prior to gridding. Advanced full processing of magnetic data was implemented in Geosoft's Oasis Montaj software as follows:

- Processing of static magnetic data acquired on magnetic base station
- Pre-processing of airborne magnetic data
    - Stacking of data from 50 Hz to 10 Hz in SkyPro.
    - Moving positions to the center of the carrier frame in SkyPro.
- Processing and filtering of airborne magnetic data
- Standard corrections to compensate the diurnal variation and heading effect
- IGRF correction
- Leveling
- Gridding

Processing of base station magnetic data

The base station magnetometer data was transferred into a base station Geosoft database on a daily basis for further processing. A non-linear filter was applied to remove spikes and a low-pass filter used to smooth the magnetic data.

IGRF was calculated and subtracted from TMI data to obtain residual magnetic field and remove secular variation.

Diurnal variation was calculated from residual magnetic field by subtracting the mean value averaged from all observations received on magnetic base station in course of the survey.

Two base station locations were used during the survey. The first location covering Poly 2 and the second location covering Poly 1 and subareas (see Page 11)

The cultural noise on the basestation covering (Poly 2) was a bit higher than on the second location, therefore different filtering parameters ware used based on the noise analysis:

- Poly 2 location:
    1. Naudy Non-linear filter : parameters : filter width = 5, filter tolerance 0.0
    2. B-spline Low pass filter : parameters: smoothness=0.9, tension = 0.9
- Poly 1 and sub blocks location:
    1. Naudy Non-linear filter : parameters : filter width = 5, filter tolerance 0.0
    2. B-spline Low pass filter : parameters: smoothness=0.75, tension = 0.75

A typical noise on the base mag can be seen on Figure 6

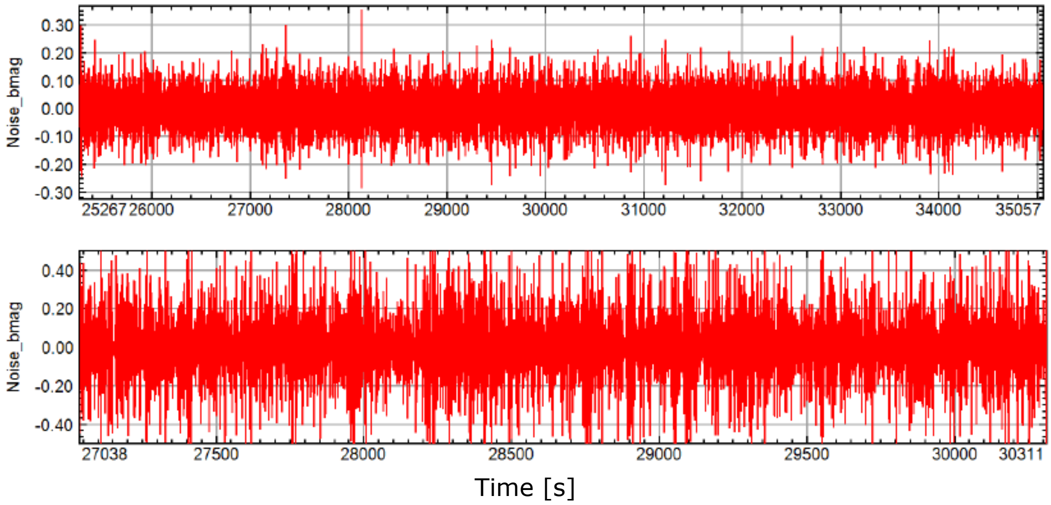


Figure 6. Typical Base mag noise in nT (calculated as 4th difference). Top (Poly 1 and sub blocks), bottom (poly 2)

Processing and Filtering of airborne magnetic data

TMI data was filtered and interpolated as follows:

- Adjacent record at the beginning and end of each 0.3 sec gap in magnetic data not measured during low moment TEM data acquisition was deleted. These records may still be influenced by B-field generated during low moment TEM data acquisition.
- Bi-cubic spline (tension of 0.0 and smoothness of 0.55) was applied as low-pass filter – this filter also interpolates the gaps in magnetic data not acquired during low moment TEM data acquisition (0.3 sec gaps)

Corrections to the magnetic data

The processing of the data involved the application of the following corrections:

- Airborne magnetometer data was corrected for diurnal variations. Calculated diurnal variation was subtracted from the filtered airborne magnetic data.

- No time lag correction is necessary since the positions are shifted to center of the carrier frame (See Figure 7).

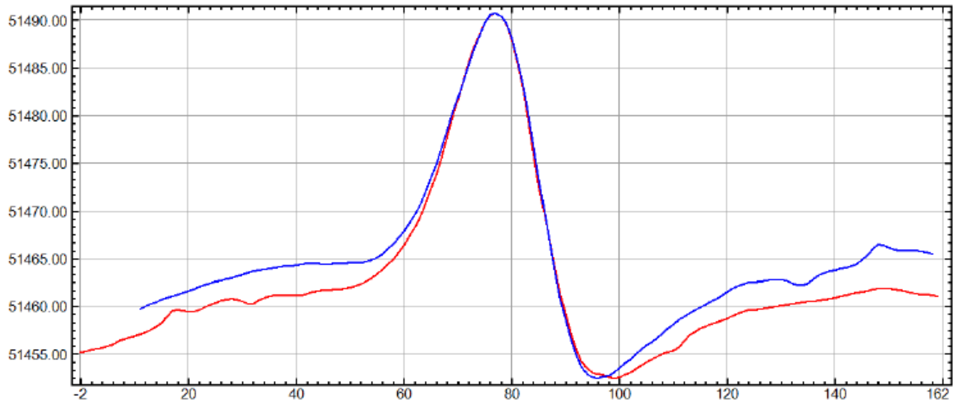


Figure 7. Figure shows TMI acquired over parallax test line flown prior the survey - no lag recognized

The heading correction test flown during the survey shows the heading errors as indicated in the following table.

Direction	Heading Correction
7 deg	0.335
104 deg	0.218
187 deg	-0.437
277 deg	-0.007

The coefficients listed above were so low that no heading correction was applied to the data.

IGRF correction

The International Geomagnetic Reference Field (IGRF) is a long-wavelength regional magnetic field calculated from permanent observatory data collected around the world. The IGRF is updated and determined by an international committee of geophysicists every 5 years. Secular variations in the Earth's magnetic field are incorporated into the determination of the IGRF. The IGRF model for all blocks was calculated before leveling using the following parameters for the survey area:

IGRF model year: IGRF 11th generation
Date: variable according to date channel in database
Position: variable according to GPS WGS84 longitude and latitude
Elevation: variable according to magnetic sensor altitude derived from DGPS data

Tie-line leveling and micro-leveling of magnetic data

After applying the above corrections to the profile data, statistical leveling of control lines followed by full leveling of traverse lines and micro-leveling is applied as a standard procedure. The following steps were adapted on the data on each separate sub block:

- Statistical leveling on control lines applied
  - spurious magnetic data at intersections removed - high gradient/intensive anomalous segments removed
  - amplitudes up to 10 nT corrected
- Full leveling on traverse lines applied
  - amplitudes up to 30 nT corrected
- Micro leveling applied on each sub block.
  - Decorrugation cutoff wavelength – Variable from area to area.
  - Azimuth for directional filter – 92.5-97 degrees
  - Limit amplitude 3-5 nT
  - Naudy filter length – Variable from area to area.

The corrected data were then used to generate the final grids free of line directional noise.

TMI recalculation

Residual magnetic field (RMF) was the outcome of processed magnetic data after all corrections and leveling was applied. Total magnetic intensity was recalculated to add back the IGRF using the following parameters.

IGRF model year: IGRF 11th generation

Date: variable as flown

Position: variable according to GPS WGS84 longitude and latitude

Elevation: variable according to magnetic sensor altitude derived from DGPS data.

Geosoft GDB-files

The GDB files are the foremost result of the SkyTEM survey, containing all the collected and processed data and information used for the interpretation and inversion.

Data in the files are split at the beginning and end of each planned flight line.
The raw EM data and auxiliary data are filtered and processed as described above. All parameters in the GDB-file hence refer to the origo of the frame.

The GDB can be used as input for further processing and gridding and as input to inversion and interpretation software.

The projection of the GDB is given as Latitude/longitude, WGS84 and UTM Zone 33N (WGS84).
The header of the EM GDB-file gives the following information:

Parameter	Explanation	Unit
Fid	Unique Fiducial number	seconds
Line	Line number	LLLLLL
Flight	Name of flight	yyyymmdd.ff
DateTime	DateTime format	Decimal days
Date	Date	yyyymmdd
Time	Time	hhmmss.zzz
AngleX	Angle in flight direction	Degrees
AngleY	Angle perpendicular to flight direction	Degrees
Height	Filtered height measurement	Meters
DEM	Digital Elevation Model	Meters above mean sea level
Lon	Latitude/longitude, WGS84	Decimal degrees
Lat	Latitude/longitude, WGS84	Decimal degrees
E	UTM Zone 33N (WGS84)	Meter
N	UTM Zone 33N (WGS84)	Meter
Alt	DGPS Altitude	Meters above mean sea level
GdSpeed	Ground Speed	[km/h]
Curr_1	Current, high moment	Amps
Curr_2	Current, low moment	Amps
LM_Z_G6[xx]*	Normalized LM Z-coil value: gate 6-27. [xx] refer to geosoft array channel number*	pV/(m4*A)
HM_Z_G15 [xx]*	Normalized HM Z-coil value: gate 15-35. [xx] refer to geosoft array channel number*	pV/(m4*A)
LM_X_G6[xx]*	Normalized LM X-coil value: gate 5-27. [xx] refer to geosoft array channel number*	pV/(m4*A)

HM_X_G15[xx]*	Normalized HM Z-coil value: gate 15-35. [xx] refer to geosoft array channel number*	pV/(m4*A)
IGRF_TMI	Calculated IGRF-11 - Total magnetic intensity	nT
IGRF_Inc	Calculated IGRF-11 - Magnetic Inclination	Degrees
IGRF_Dec	Calculated IGRF-11 - Magnetic Declination	Degrees
Bmag_TMI	Raw TMI for ground magnetic base	nT
Bmag_diurnal	Diurnal variation – magnetic base station data	nT
Mag_raw	Raw edited magnetic data – total magnetic intensity - despiked	nT
Mag_fil	Filtered raw magnetic data - TMI	nT
Mag_Cor	Residual magnetic field – corrected for diurnal, lag, heading and IGRF-11	nT
RMF	Residual magnetic field – IGRF removed - final corrected and levelled magnetic data	nT
TMI	Total magnetic intensity – final corrected and levelled magnetic data; IGRF recalculated	nT

Magnetic data grids

Corrected magnetic data was used to generate grids of the Residual Magnetic Field (RMF) and Total Magnetic Intensity (TMI). Corrected magnetic line data was interpolated between survey lines using a minimum curvature gridding algorithm to yield x-y grid values for a standard grid cell size of 30/50/300 (100 m Line spacing / 150 m linespacing / 1000m linespacing).

The grids for each block and sub block can be found in the data delivery folder. See Figure 8 for a TMI map

The blocks covered during the survey have all been highly affected by multiple power lines, manmade conductors and cultural features. This is clearly seen in the grids.

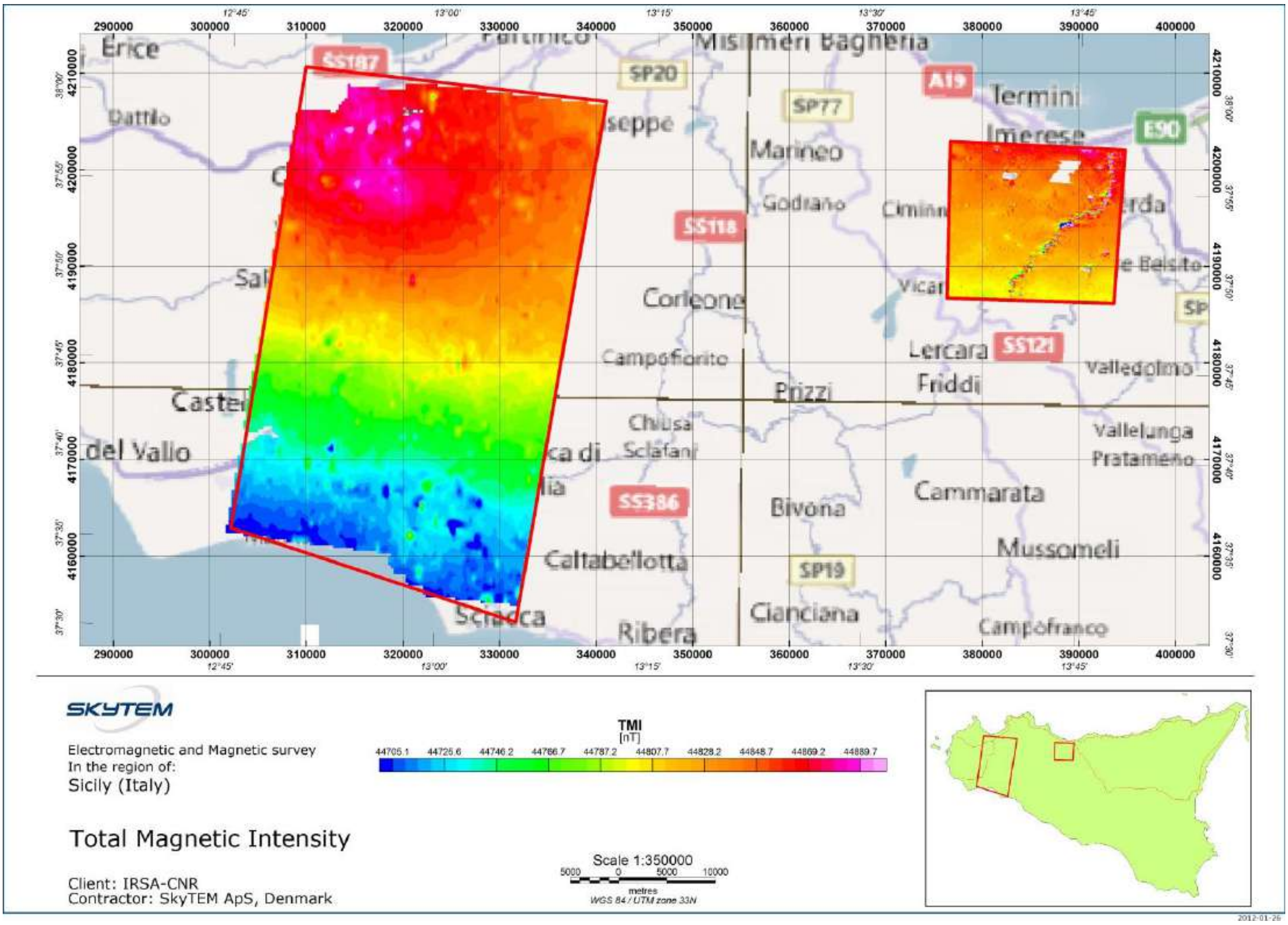


Figure 8. Total Magnetic Intensity map

References

/1/ Sorensen, K. I. and Auken, E. (2004). SkyTEM - A new high-resolution helicopter transient electromagnetic system, Exploration Geophysics, 35, 191-199.

/2/ Christensen, N. B. (2002). A generic 1-D imaging method for transient electromagnetic data. Geophysics, 67, 438-447.

/3/ Christensen, N.B., Reid, J.E. and Halkjær, M. (2009). Fast, laterally smooth inversion of airborne time-domain electromagnetic data, Near Surface Geophysics, 7, 599-612

Appendix list

Appendix 1: Instruments

Instrument positions

The instrumentation involves a time domain electromagnetic system, two inclinometers, two altimeters and two DGPS'.

The measurements were carried out, using a setup as described below.

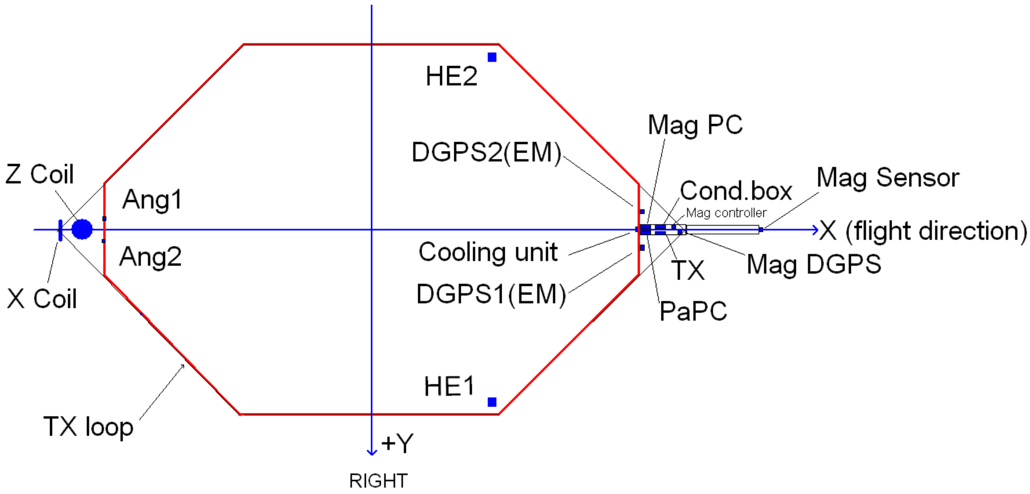


Figure 1 Sketch showing the frame and the position of the basic instruments. The red line defines the transmitter loop. The horizontal plane is defined by (x, y).

The location of instruments in respect to the frame is shown in Figure 1 and is given in (x, y, z) coordinates in the table below.

X and y define the horizontal plane. Z is perpendicular to (x, y). X is positive in the flight direction, y is positive to the right of the flight direction, and z is positive downwards.

The generator used for powering of the transmitter is 15 m below the helicopter.

Device	X	Y	Z
DGPS1 (EM)	11.85	0.80	-0.25
DGPS2 (EM)	11.85	-0.80	-0.25
HE1 (altim.)	5.15	7.61	0.00
HE2 (altim.)	5.15	-7.61	0.00
Inclinometer 1	-11.85	-0.50	-0.35
Inclinometer 2	-11.85	0.50	-0.35
RX (Z Coil)	-12.60 m	0.00	-2.14 m
RX (X Coil)	-13.76 m	0.00	0.00
Mag sensor	17.15	0.00	-0.30

For the location of instruments see Figure 1.

Transmitter

The time domain transmitter loop can be described as an octagon with the corners listed below:

X	Y
-11.87	-2.03
-5.68	-8.22
5.68	-8.22
11.87	-2.03
11.87	2.03
5.68	8.22
-5.68	8.22
-11.87	2.03

The total area of the transmitter coil defined by the corner points is 314 m² and 65.9 m in circumference.

The key parameters defining the transmitter set up are:

Low moment

Parameter	Value
Number of transmitter turns	1
Transmitter area	314 m²
Peak current	10.7 Amp
Peak moment	~3,140 NIA
Repetition frequency	200 Hz
On-time	800 µs
Off-time	1700 µs
Duty cycle	32 %

High Moment

Parameter	Value
Number of transmitter turns	4
Transmitter area	314 m²
Peak current	112 Amp
Peak moment	~150,000 NIA
Repetition frequency	25 Hz
On-time	10000 µs
Off-time	10000 µs
Duty cycle	50 %

Figure 2 The 314 m² frame in production mode.

Receiver system

The decay of the secondary magnetic field is measured using two independent active induction coils. The Z coil is the vertical component, and the X coil is the horizontal in-line component. Each coil has an effective receiver area of 105 m² respectively.

The receiver coils are placed in a null-position:

Z coil (x, y, z) = (-12.60 m, 0.0 m, -2.14 m)
X coil (x, y, z) = (-13.76 m, 0.0 m, 0.0 m)

In the null-position, the primary field is damped with a factor of 0.01.

Figure 3 Rudder containing the Z coil located approximately in the top part of the tower.

The key parameters defining the receiver set up are:

Receiver parameters		
Sample rate		All decays are measured
Number of output gates		35 (HM) and 27 (LM)
Receiver coil low pass filter		450 kHz
Receiver instrument low pass filter		300 kHz
Repetition frequency	LM HM	200 Hz 25 Hz
Front gate	LM HM	0.0 μs 60.0 μs

Receiver gate times are measured from the start of the transmitter current turn-off. A complete list describing gate open, close and centre times are listed in Appendix 2.

Inclination

Instrument type: Bjerre Technology

The inclination of the frame is measured with 2 independent inclinometers. The x and y angles are measured 2 times per second in both directions. The inclinometers are placed in the rear of the frame as close to the z coil as possible, see Figure 1.

The angle data are stored as x, y readings. X is parallel to the flight direction and positive when the front of the frame is above horizontal. Y is perpendicular to the flight direction and negative when the right side of the frame is above horizontal.

The angle is checked and calibrated manually within 0.5 degree by use of a level meter.

DGPS airborne unit and base stations

Chipset: OEMV1-L1 14-channel rate.
Antenna: Trimble, Bullet III GPS Antenna

The differential GPS receiver is on top of the boom in front of the frame.

The DGPS delivers one dataset per second. The raw coordinates are given in Latitude/longitude, WGS84.

The uncertainty in the xyz-directions is ± 1 m after processing.
The processed DGPS data is combined with the EM data in the xyz-files, giving the precise position.

DGPS parameters	
Sample rate	1 Hz
Uncertainty	± 1 m
Coordinate system	Latitude/longitude, WGS84

Altimeter

Instrument type: MDL ILM300R

Two independent laser units mounted on each side of the frame measure the distance from the frame to the ground, see Figure 1.

Each laser delivers 30 measurements per second, and covers the interval from 1.5 m to approximately 130 m.

Dark surfaces including water surfaces will reduce the reflected signal. Consequently, it may occur that some measurements do not result in useful values.

The altimeter measurements are given in meters with two decimals. The uncertainty is 10 - 30 cm. The lasers are checked as a routine against well defined targets.

Laser parameters	
Sample rate	30 Hz
Uncertainty	10 - 30 cm
Min/ max range	1.5 m / 130 m

Magnetometer airborne unit

Instrument type: Geometrics G822A sensor and Kroum KMAG4 counter.

The Geometrics G822A sensor and Kroum KMAG4 counter is a high sensitivity cesium magnetometer. The basic of the sensor is a self-oscillating split-beam Cesium Vapor (non-radioactive) Principe, which operates on principles similar to other alkali vapor magnetometers.

The sensitivity of the Geometrics G822A sensor and Kroum KMAG4 counter is stated as <0.0005 nT/√Hz rms. Typically 0.002 nT P-P at a 0.1 second sample rate, combined with absolute accuracy of less than 3 nT over its full operating range.

The magnetometer is synchronized with the TEM system. When the TEM signal is on, the counter is closed. In the TEM off-time the magnetometer data is measured from 100 microseconds until the next TEM pulse is transmitted. The data are averaged and sampled as 50 Hz.

Parameter	Value
Sample frequency	50 Hz (in between each HM EM pulse)
Magnetometer on	HM Cycles
Magnetometer off	LM Cycles

Magnetometer base station

Instrument type: GEM Proton.

The GEM Proton is a portable high-sensitivity precession magnetometer.

The GEM Proton is a secondary standard for measurement of the Earth's magnetic field with 0.01 nT resolutions, and 1 nT absolute accuracy over its full temperature range.

The base station data are sampled with 1 Hz frequency.

Appendix 2: Time gates

Gate	GateOpen (µs)	Gatewidth (µs)	GateClose (µs)	GateCenter (µs)	Comment
1	0.430	5.570	6.000	3.215	Not used
2	6.430	1.570	8.000	7.215	Not used
3	8.430	1.570	10.000	9.215	Not used
4	10.430	1.570	12.000	11.215	Not used
5	12.430	1.570	14.000	13.215	Not used
6	14.430	1.570	16.000	15.215	LM only
7	16.430	2.570	19.000	17.715	LM only
8	19.430	3.570	23.000	21.215	LM only
9	23.430	4.570	28.000	25.715	LM only
10	28.430	5.570	34.000	31.215	LM only
11	34.430	7.570	42.000	38.215	LM only
12	42.430	9.570	52.000	47.215	LM only
13	52.430	11.570	64.000	58.215	LM only
14	64.430	14.570	79.000	71.715	LM only
15	79.430	18.570	98.000	88.715	LM & HM
16	98.430	24.570	123.000	110.715	LM &HM
17	123.430	30.570	154.000	138.715	LM & HM
18	154.430	38.570	193.000	173.715	LM & HM
19	193.430	48.570	242.000	217.715	LM & HM
20	242.430	61.570	304.000	273.215	LM & HM
21	304.430	78.570	383.000	343.715	LM & HM
22	383.430	99.570	483.000	433.215	LM & HM
23	483.430	125.570	609.000	546.215	LM & HM
24	609.430	158.570	768.000	688.715	LM & HM
25	768.430	200.570	969.000	868.715	LM & HM
26	969.430	253.570	1223.000	1096.215	LM & HM
27	1223.430	320.570	1544.000	1383.715	LM & HM
28	1544.430	404.570	1949.000	1746.715	HM only
29	1949.430	510.570	2460.000	2204.715	HM only
30	2460.430	645.570	3106.000	2783.215	HM only
31	3106.430	815.570	3922.000	3514.215	HM only
32	3922.430	1030.570	4953.000	4437.715	HM only
33	4953.430	1301.570	6255.000	5604.215	HM only
34	6255.430	1643.570	7899.000	7077.215	HM only
35	7899.430	2076.570	9976.000	8937.715	HM only

Note: Gate 1 to 5 is not used in any of the moments in the present survey as it is in the transition zone.

Appendix 3: Calibration of the TEM system

The base frequencies used for the data acquisition are 200 Hz (denoted LM) and 25 Hz (denoted HM).

Transmitter waveform – Piecewise description

LM

Parameter	Value
Base frequency	200 Hz
Current range	9.0 – 11.0 A

Table 1: Waveform parameters for LM

The waveform is measured using a current probe (turn-on ramp) and a pick-up coil (outputs dI/dt) for the (turn-off ramp). The approximation to the measured waveform can be applied in modelling of the data, which was also the case for inversion of the survey data in this report.
The data (dI/dt) measured using the pick-up coil are integrated to obtain the current (I).

Time [s]	Normalized current
-8.00E-04	0.0000
-7.63E-04	0.7067
-7.01E-04	0.9624
-6.07E-04	0.9984
0.00	1.0000
3.63E-07	0.9853
6.61E-07	0.9220
9.61E-07	0.8031
1.43E-06	0.5525
1.87E-06	0.3166
2.30E-06	0.1371
2.63E-06	0.0605
3.01E-06	0.0198
3.54E-06	0.0040
4.60E-06	0.0000

Table 2: Normalized current for LM

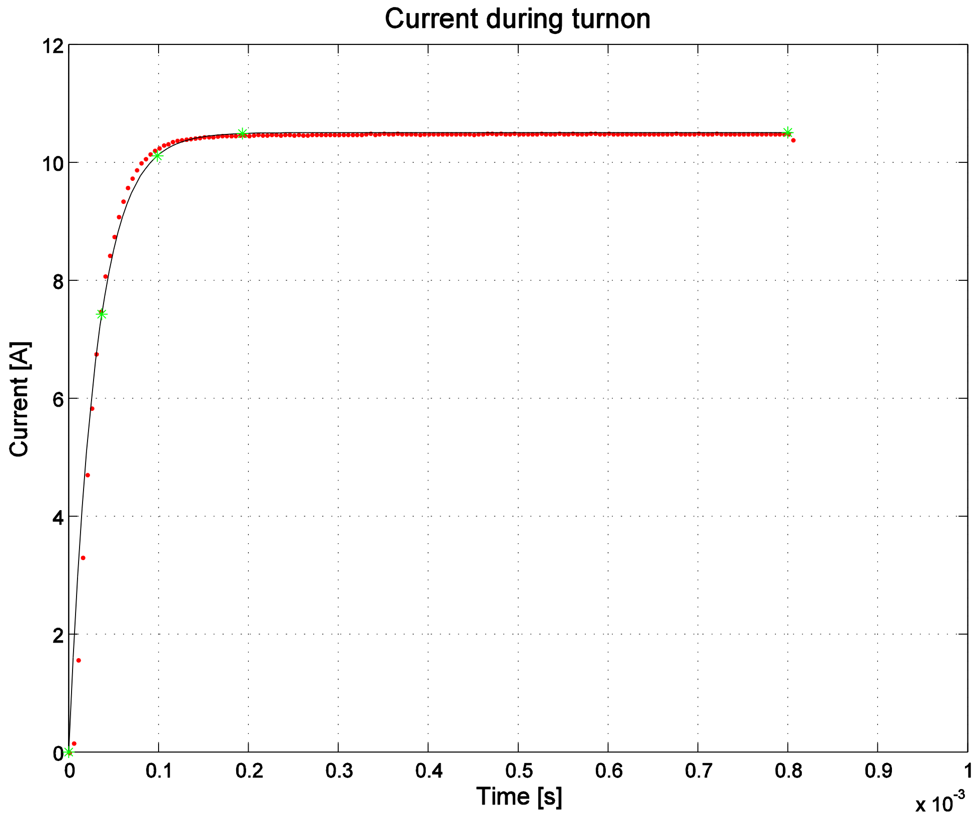


Figure 1: Turn-on ramp waveform at 200 Hz (LM). The red curved is the measured current waveform and the black is the approximated waveform.Green dots are the piecewise linear waveform

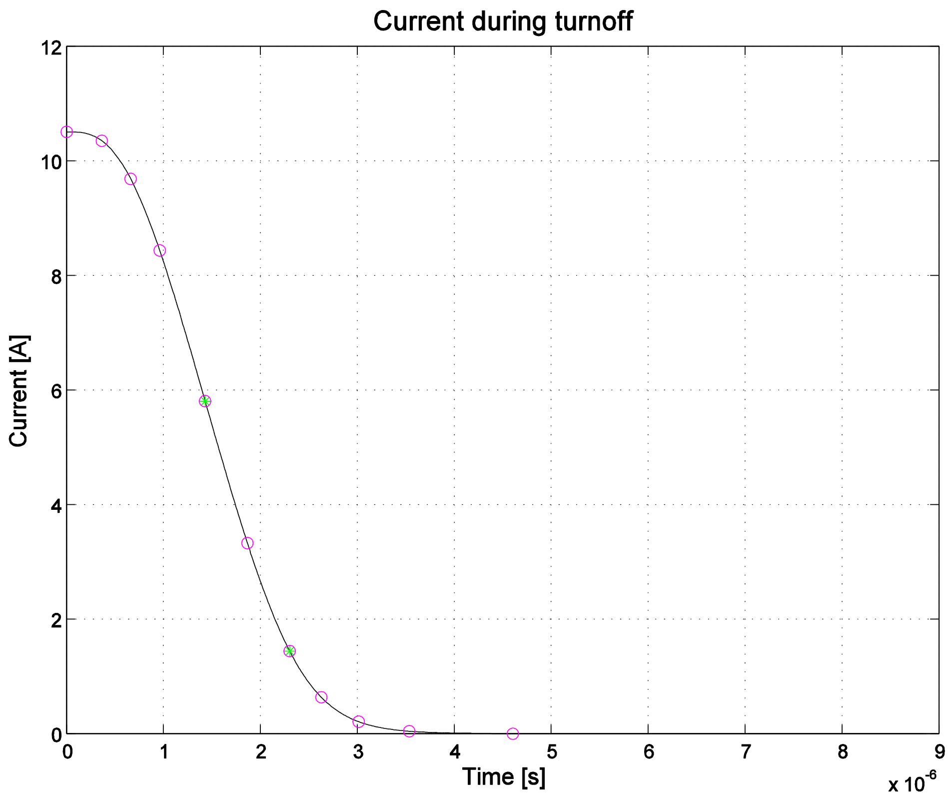


Figure 2: Ramp down at 200 Hz (LM). The curve is the integrated current waveform and the points are the values used in the linear presentation waveform.

The data (dI/dt) measured using the pick-up coil are integrated to obtain the current (I).

HM

The waveform is measured using a current probe (turn-on ramp) and a pick-up coil (outputs dI/dt) for the turn-off ramp. The approximation to the measured waveform can be applied in modelling of the data, which was also the case for inversion of the survey data in this report.

The data (dI/dt) measured using the pick-up coil are integrated to obtain the current (I).

Parameter	Value
Base frequency	25 Hz
Current range	110.0 – 125.0 A

Table 3: Normalized Waveform parameters for HM

Time [s]	Normalized current
-1.00E-02	0.00E+00
-8.39E-03	4.57E-01
-6.38E-03	7.52E-01
-3.78E-03	9.20E-01
0.00	1.00E+00
2.97E-07	9.99E-01
5.83E-07	9.94E-01
9.08E-07	9.87E-01
2.60E-06	9.46E-01
2.22E-05	4.73E-01
4.19E-05	7.31E-03
4.23E-05	3.22E-03
4.28E-05	1.06E-03
4.36E-05	2.12E-04
4.50E-05	0.00E+00

Table 4: Normalized current for HM

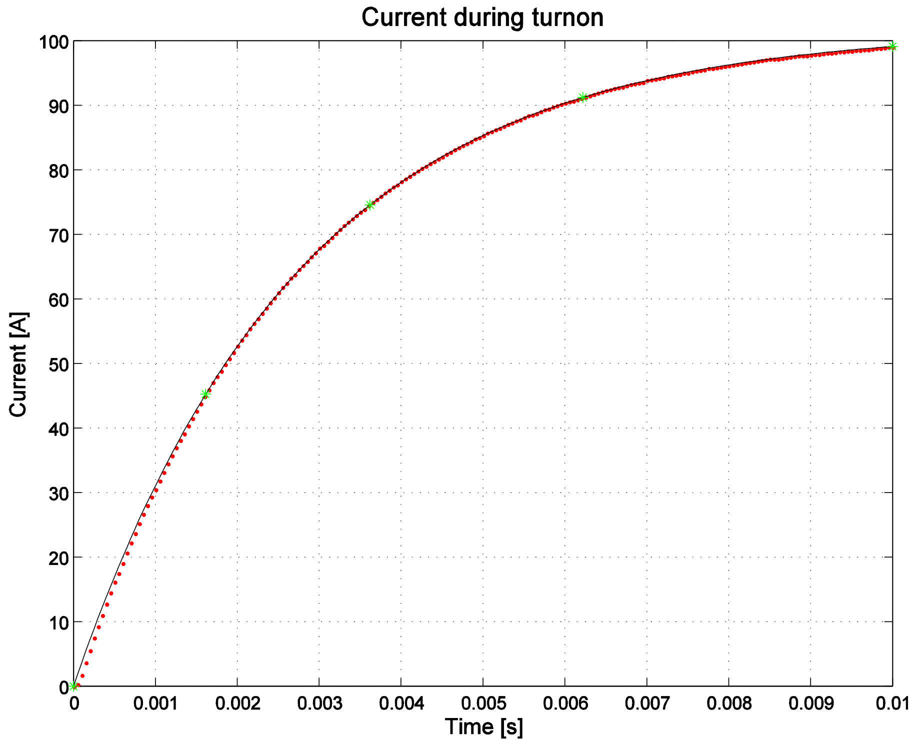


Figure 3 Turn-on ramp waveform at 25 Hz (HM). The red curve is the measured current waveform and the black is the approximated waveform.Green dots are the piecewise linear waveform

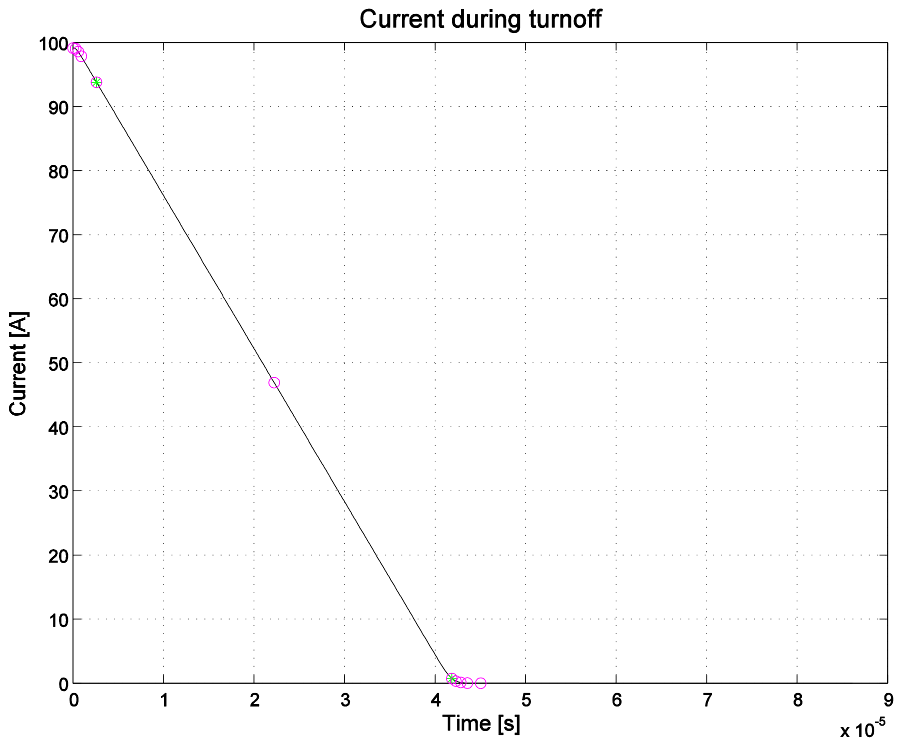


Figure 4 Ramp down at 25 Hz (HM). The curve is thebest fit for the integrated current waveform and the points are the values used in the linear presentation waveform.

Transmitter waveform – Workbench geometry file description

The geometry file used for workbench imports has the option of importing the waveform as exponential ramps and -decays.
The calibrated workbench settings are listed below and stated in the geometry file in the data delivery folder

Low moment

	Parameter	**Value**
Ramp up	Repetition frequency	200 Hz
	Decay constant, τ	410 s^{-1}
Ramp Down	Avalanche mode	2.00 µs
	Linear ramp dI/dt	4.65E+06
	End avalanche mode	1.5 A
	Decay const exp mode, τ	-2.50E+06

High moment

	Parameter	**Value**
Ramp up	Repetition frequency	25 Hz
	Decay constant, τ	410 s^{-1}
Ramp Down	Avalanche mode	43.0 µs
	Linear ramp dI/dt	2.30E+06
	End avalanche mode	1.0 A
	Decay const exp mode, τ	-1.29E+06

Calibration at the National Danish Reference Site

The complete SkyTEM equipment has been calibrated at the National Danish Reference Site. The following plots, Figure 5 to Figure 9, show the measured data as well as the forward response in altitudes 5 m, 10 m, 15 m, 20 m and 30 m.

The reference data for both LM and HM data are shown as blue curves and the measured data for LM and HM as red curves.

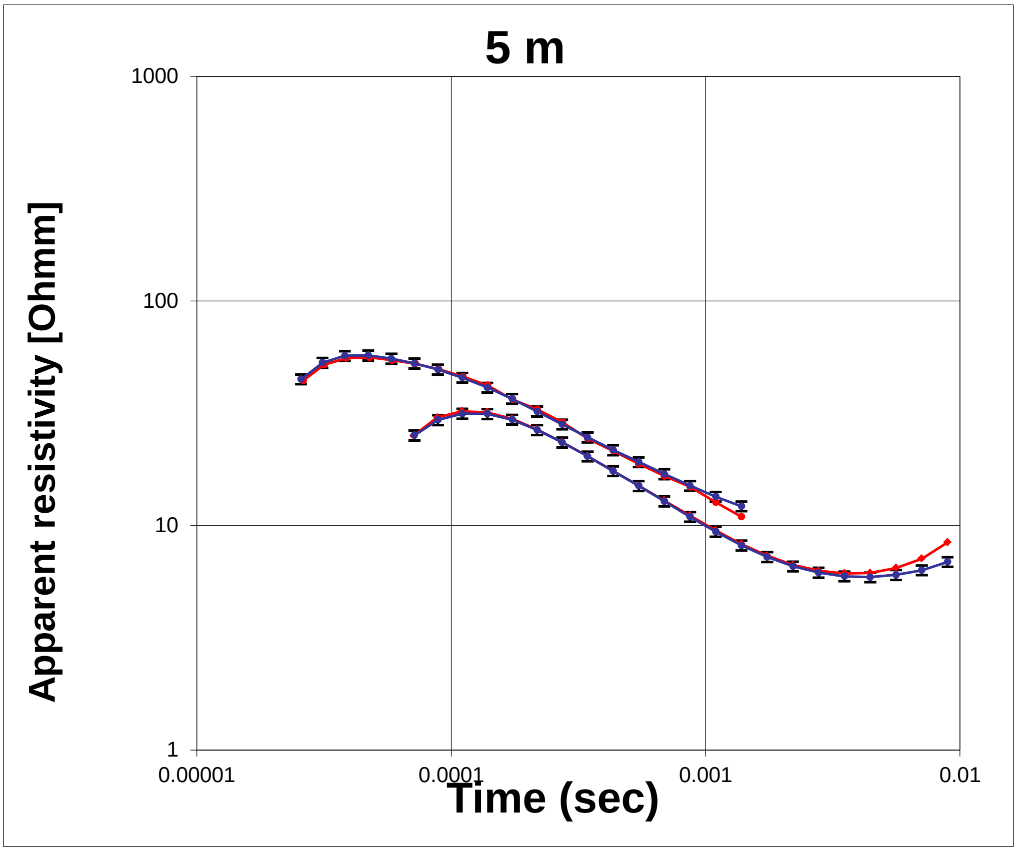


Figure 5 The frame is in 5 m altitude. Blue curves are the forward response, and the red curves are the actual measurements.

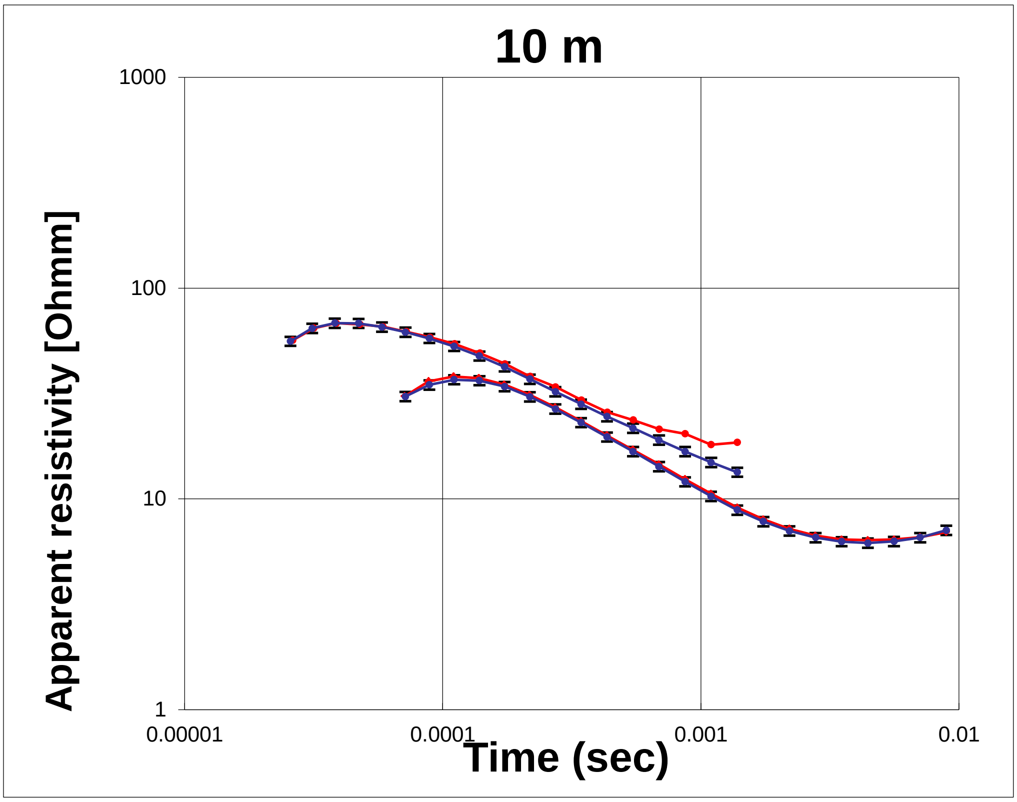


Figure 6: The frame is in 10 m altitude. Blue curves are the expected response, and red curves are the actual measurements.

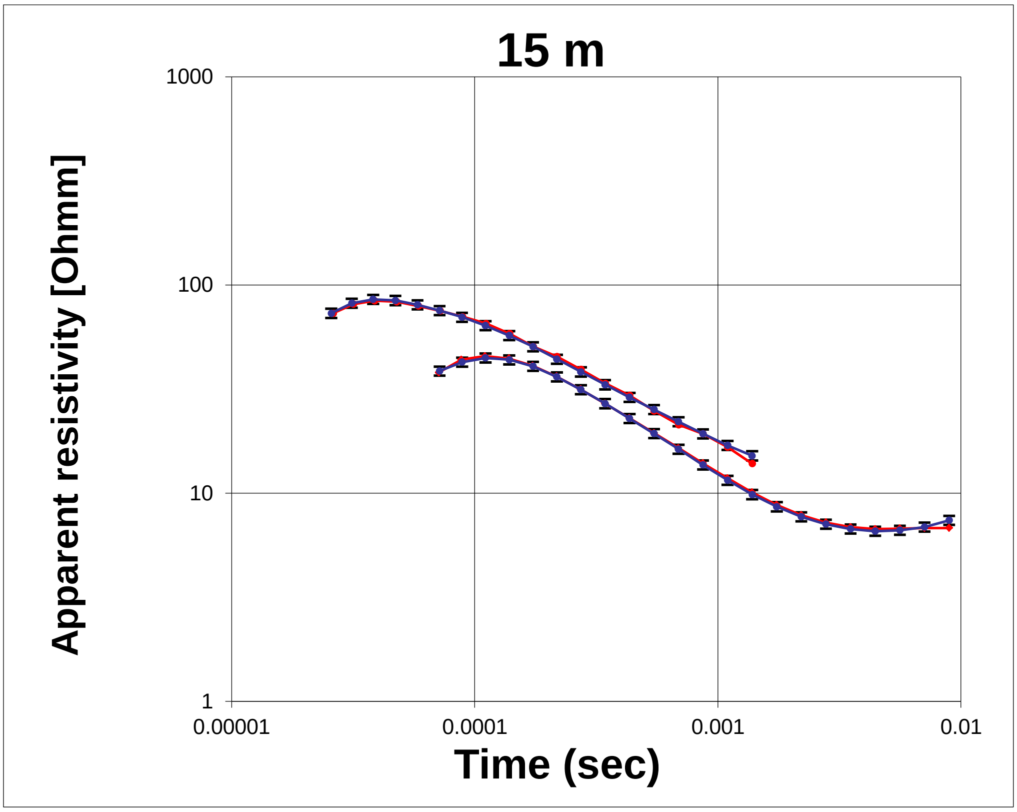


Figure 7: The frame is in 15 m altitude. Blue curves are the expected response, and red curves are the actual measurements.

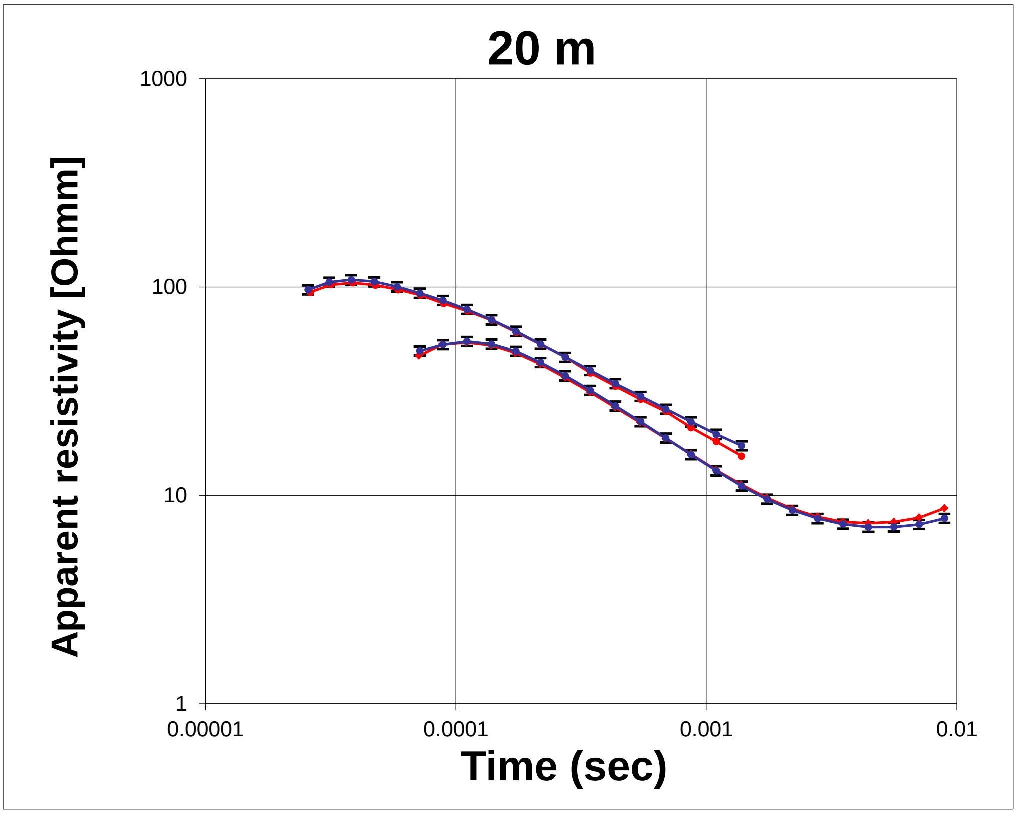


Figure 8 The frame is in 20 m altitude. Blue curves are the expected response and red curves are the actual measurements.

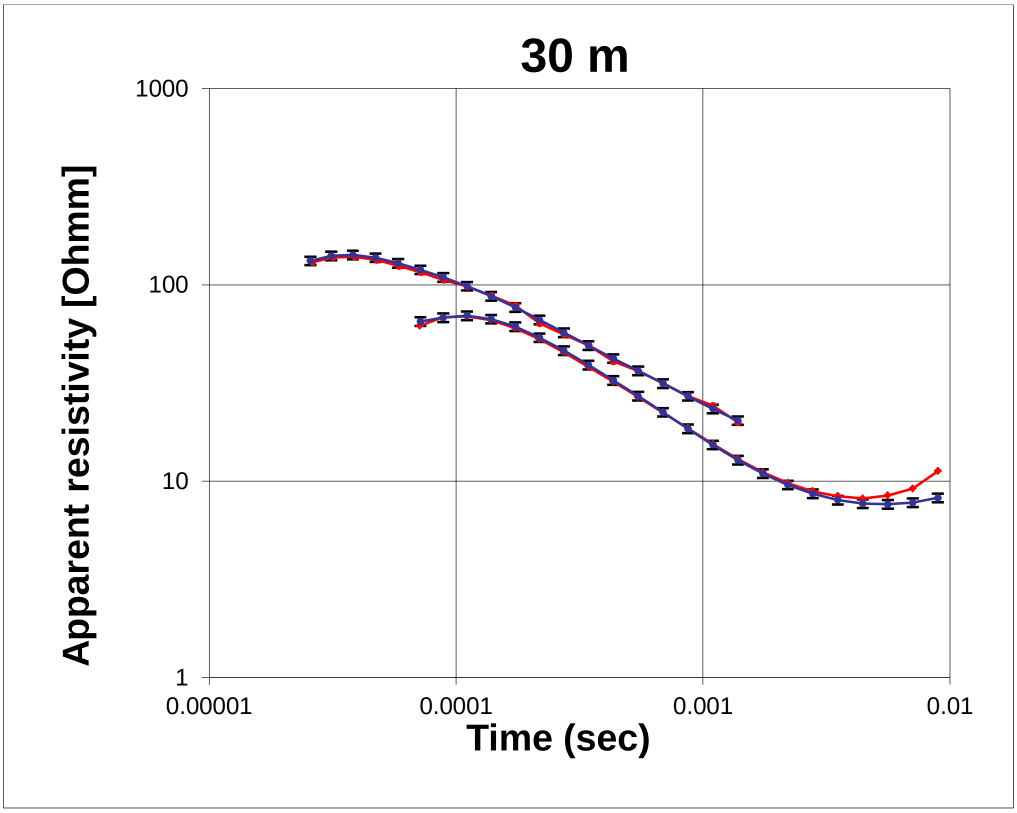


Figure 9: The frame is in 30 m altitude. Blue curves are the expected response and red curves are the actual measurements.

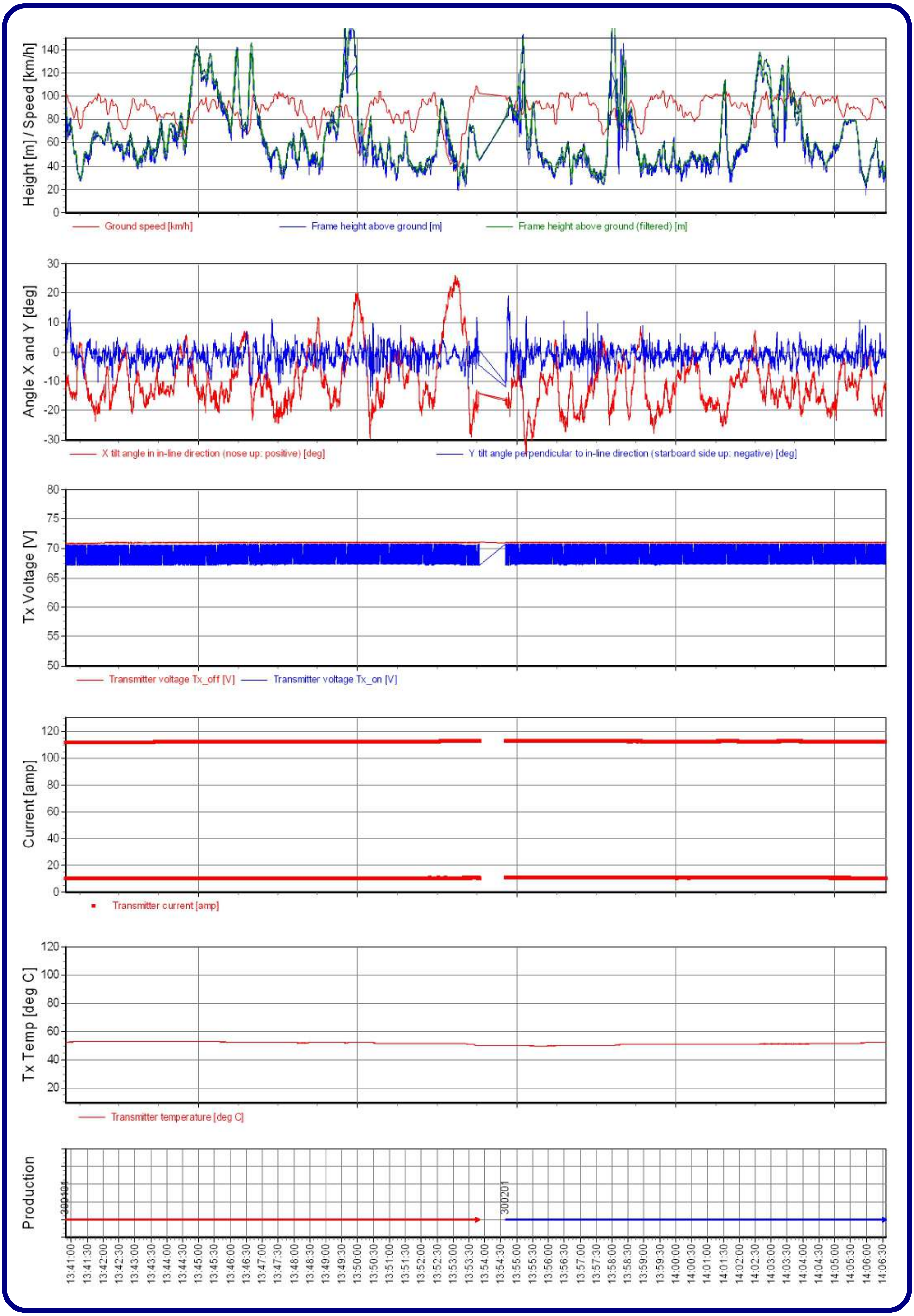
Appendix 4: Control parameters

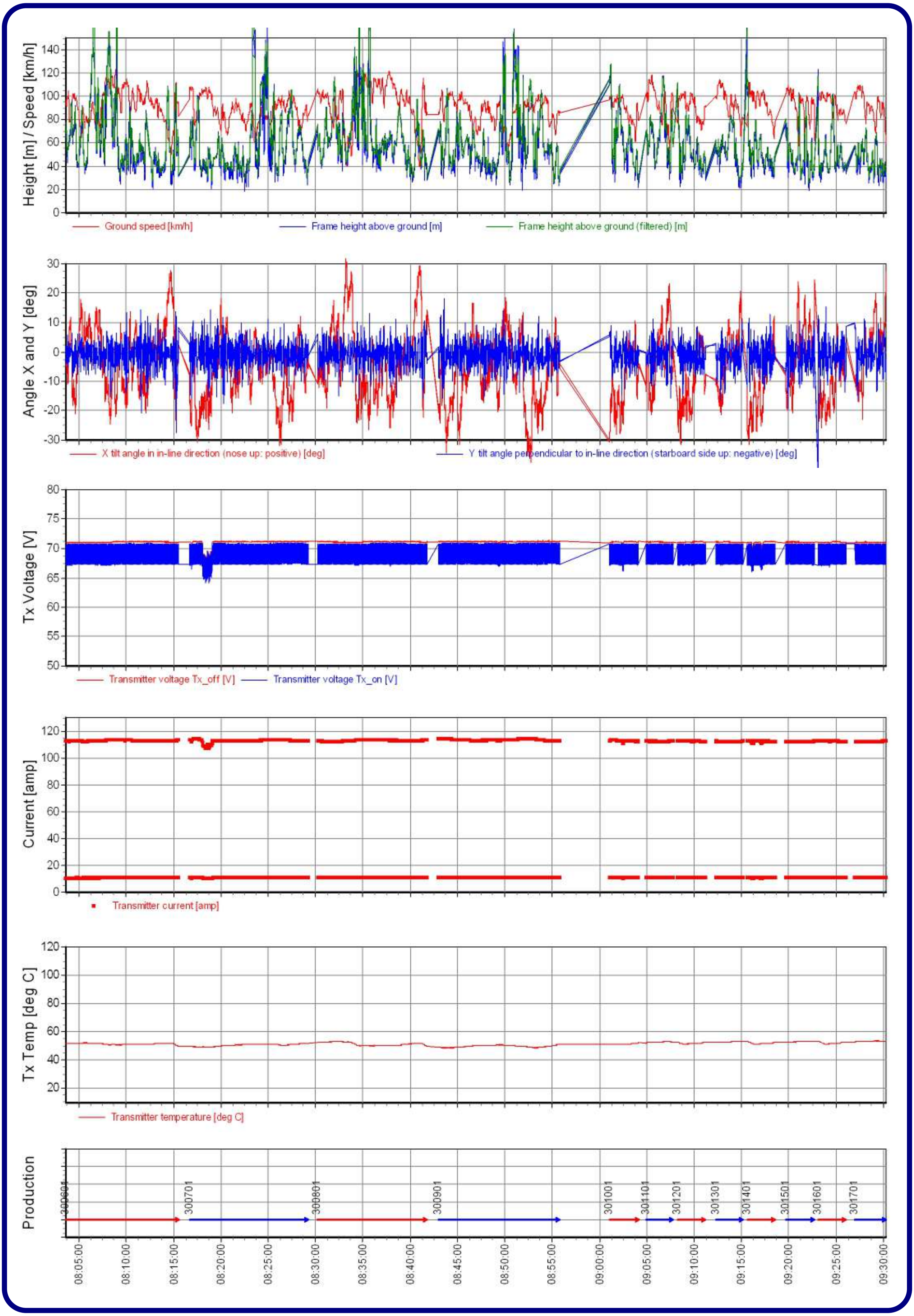
The following plots show the speed, altitude and the angle of the frame for every flight. Variations in the current, voltage on the transmitter and transmitter temperature are also shown.

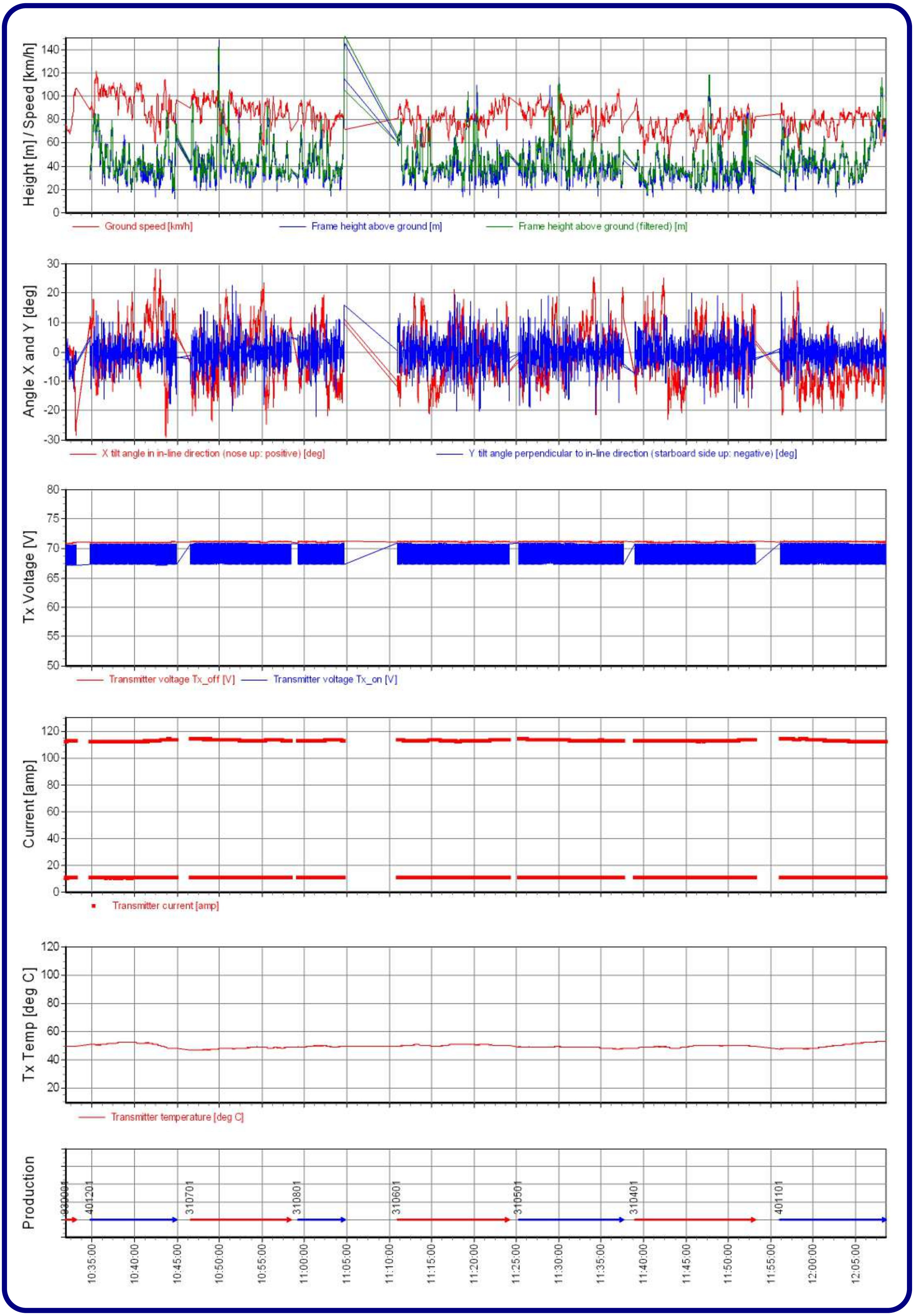
The green line, depicting processed frame height, shows the SkyPRO input from HE1 and HE2 after the frame has been corrected from deviations, away from the horizontal plane and any obstacles on the ground e.g. trees.

Turns at the end of flight lines and transport are shown as gaps in the bottom of the display.

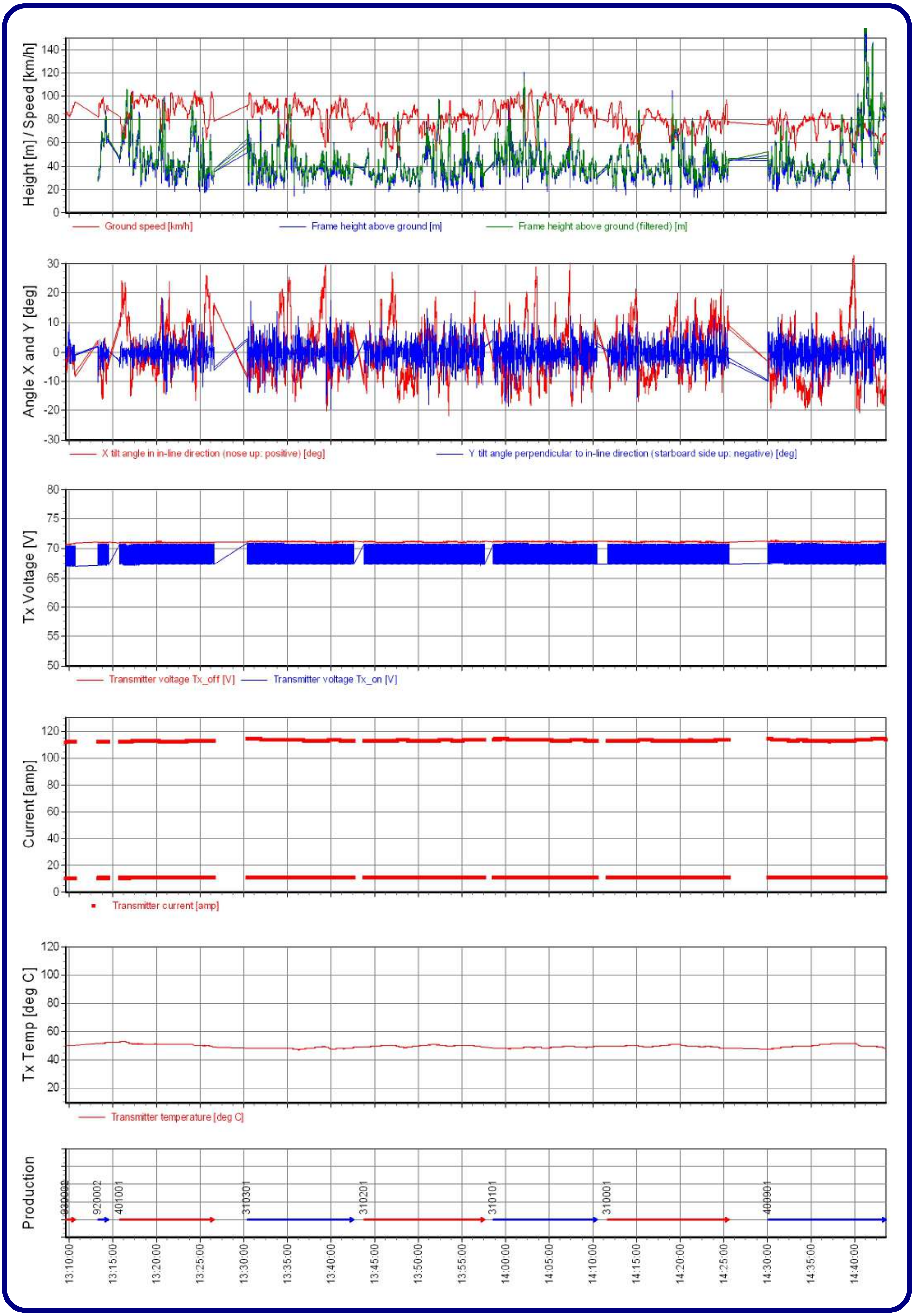
The ground speed in the uppermost window displays the signal from both gps GP1 and GP2.


Height [m] / Speed [km/h]
Ground speed [km/h]
Frame height above ground [m]
Frame height above ground (filtered) [m]
Angle X and Y [deg]
X tilt angle in in-line direction (nose up: positive) [deg]
Y tilt angle perpendicular to in-line direction (starboard side up: negative) [deg]
Tx Voltage [V]
Transmitter voltage Tx_off [V]
Transmitter voltage Tx_on [V]
Current [amp]
Transmitter current [amp]
Tx Temp [deg C]
Transmitter temperature [deg C]
Production
300101
300201
13:41:00
14:06:30

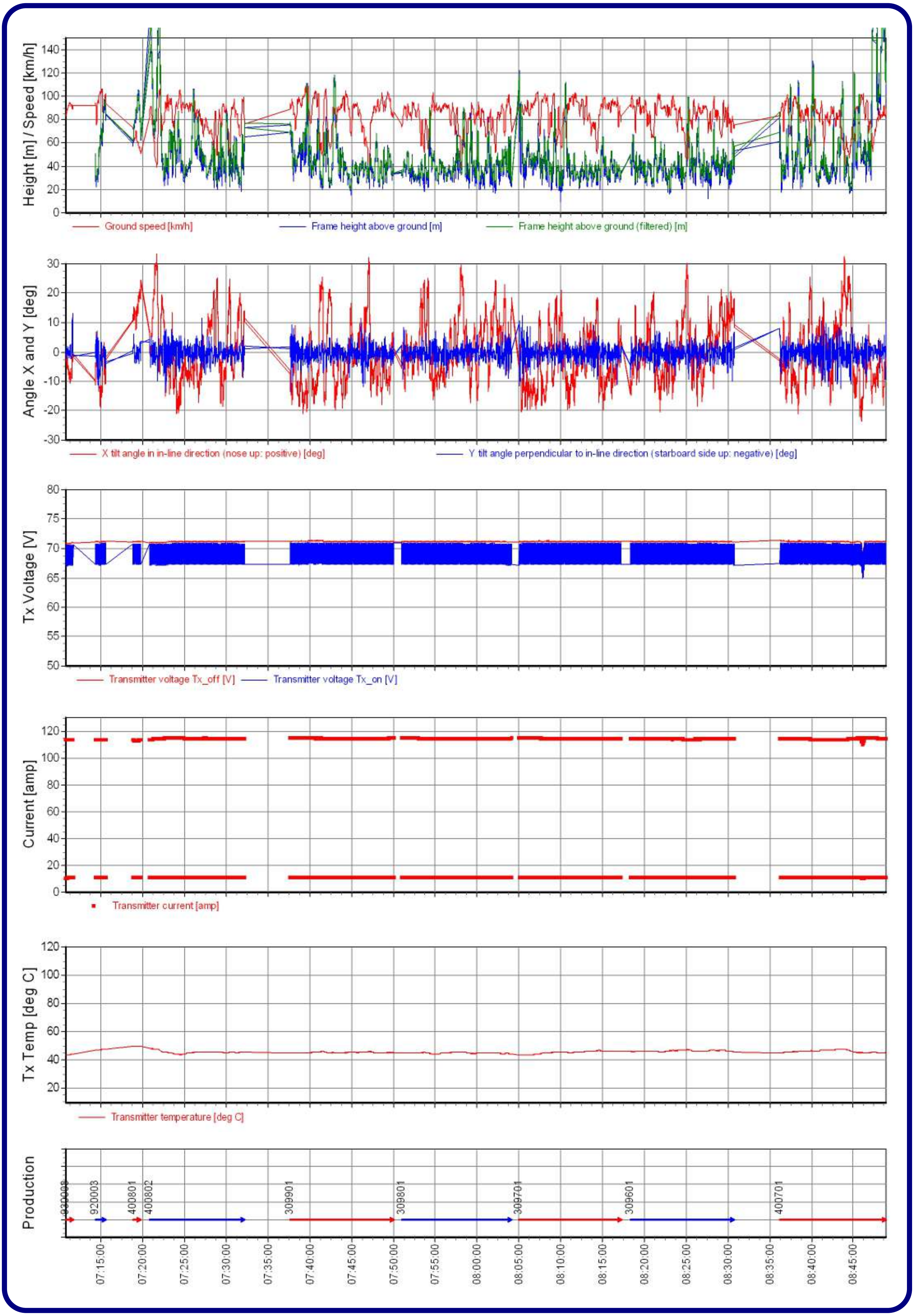

Height [m] / Speed [km/h]
Ground speed [km/h]
Frame height above ground [m]
Frame height above ground (filtered) [m]
Angle X and Y [deg]
X tilt angle in in-line direction (nose up: positive) [deg]
Y tilt angle perpendicular to in-line direction (starboard side up: negative) [deg]
Tx Voltage [V]
Transmitter voltage Tx_off [V]
Transmitter voltage Tx_on [V]
Current [amp]
Transmitter current [amp]
Tx Temp [deg C]
Transmitter temperature [deg C]
Production
300601
300701
300801
300901
301001
301101
301201
301301
301401
301501
301601
301701
08:05:00
08:10:00
08:15:00
08:20:00
08:25:00
08:30:00
08:35:00
08:40:00
08:45:00
08:50:00
08:55:00
09:00:00
09:05:00
09:10:00
09:15:00
09:20:00
09:25:00
09:30:00

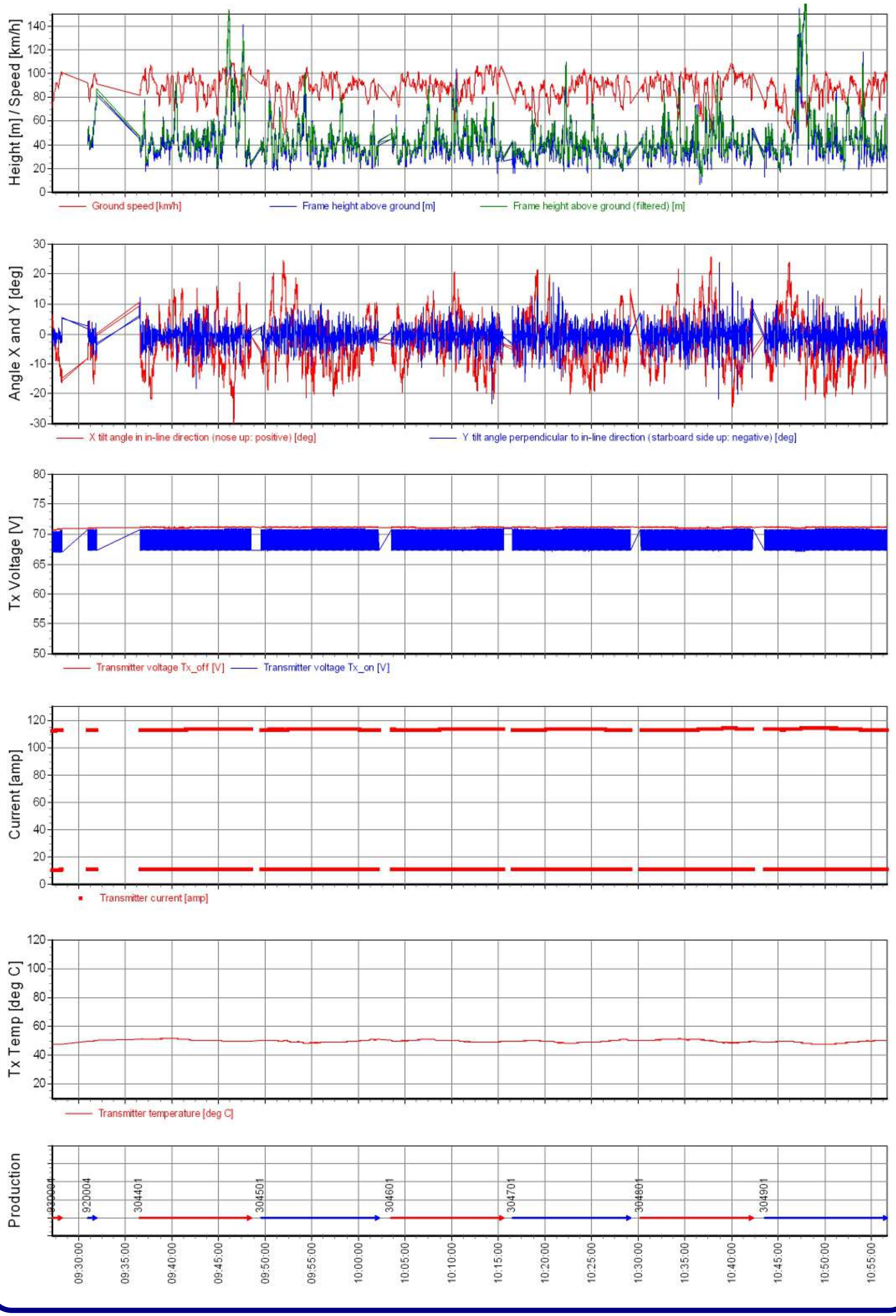


Height [m] / Speed [km/h]
Ground speed [km/h]
Frame height above ground [m]
Frame height above ground (filtered) [m]
Angle X and Y [deg]
X tilt angle in in-line direction (nose up: positive) [deg]
Y tilt angle perpendicular to in-line direction (starboard side up: negative) [deg]
Tx Voltage [V]
Transmitter voltage Tx_off [V]
Transmitter voltage Tx_on [V]
Current [amp]
Transmitter current [amp]
Tx Temp [deg C]
Transmitter temperature [deg C]
Production
401201
310701
310801
310601
310501
310401
401101
10:35:00
10:40:00
10:45:00
10:50:00
10:55:00
11:00:00
11:05:00
11:10:00
11:15:00
11:20:00
11:25:00
11:30:00
11:35:00
11:40:00
11:45:00
11:50:00
11:55:00
12:00:00
12:05:00

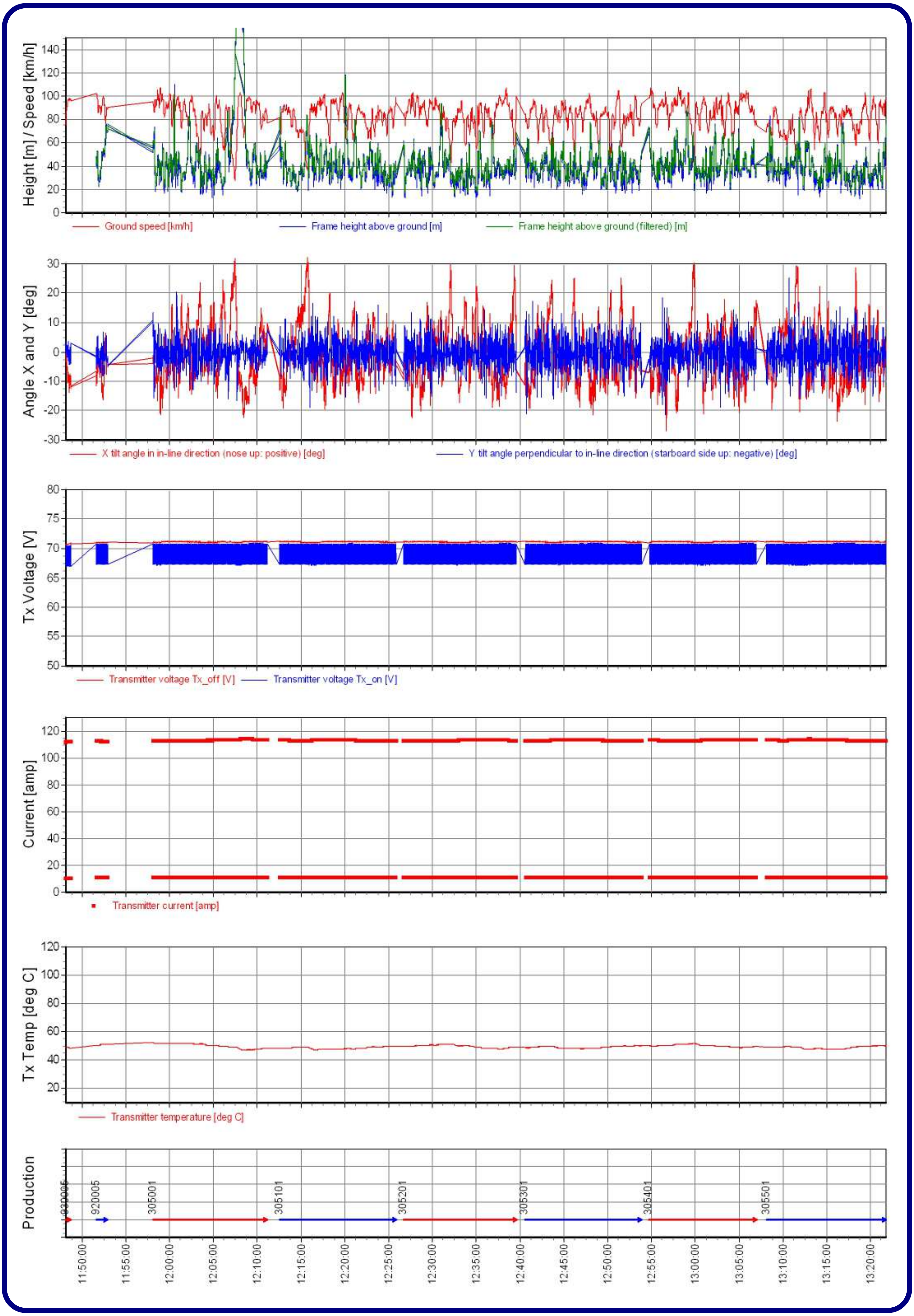


Height [m] / Speed [km/h]
Ground speed [km/h]
Frame height above ground [m]
Frame height above ground (filtered) [m]
Angle X and Y [deg]
X tilt angle in in-line direction (nose up: positive) [deg]
Y tilt angle perpendicular to in-line direction (starboard side up: negative) [deg]
Tx Voltage [V]
Transmitter voltage Tx_off [V]
Transmitter voltage Tx_on [V]
Current [amp]
Transmitter current [amp]
Tx Temp [deg C]
Transmitter temperature [deg C]
Production
920002
401001
310301
310201
310101
310001
400901
13:10:00
13:15:00
13:20:00
13:25:00
13:30:00
13:35:00
13:40:00
13:45:00
13:50:00
13:55:00
14:00:00
14:05:00
14:10:00
14:15:00
14:20:00
14:25:00
14:30:00
14:35:00
14:40:00

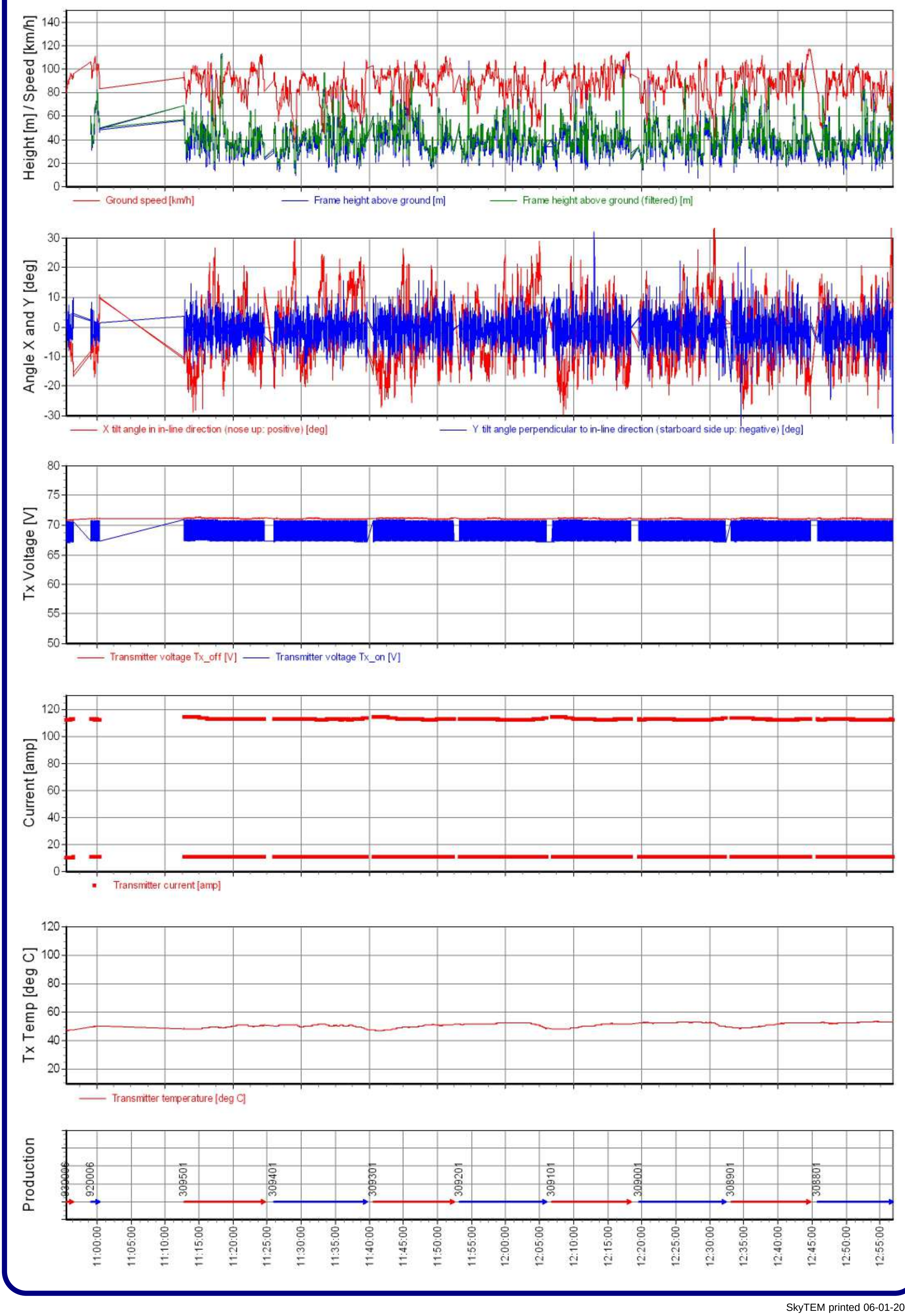

Height [m] / Speed [km/h]
Ground speed [km/h]
Frame height above ground [m]
Frame height above ground (filtered) [m]
Angle X and Y [deg]
X tilt angle in in-line direction (nose up: positive) [deg]
Y tilt angle perpendicular to in-line direction (starboard side up: negative) [deg]
Tx Voltage [V]
Transmitter voltage Tx_off [V]
Transmitter voltage Tx_on [V]
Current [amp]
Transmitter current [amp]
Tx Temp [deg C]
Transmitter temperature [deg C]
Production
920003
400801
400802
309901
309801
309701
309601
400701
07:15:00
07:20:00
07:25:00
07:30:00
07:35:00
07:40:00
07:45:00
07:50:00
07:55:00
08:00:00
08:05:00
08:10:00
08:15:00
08:20:00
08:25:00
08:30:00
08:35:00
08:40:00
08:45:00


Height [m] / Speed [km/h]
Ground speed [km/h]
Frame height above ground [m]
Frame height above ground (filtered) [m]
Angle X and Y [deg]
X tilt angle in in-line direction (nose up: positive) [deg]
Y tilt angle perpendicular to in-line direction (starboard side up: negative) [deg]
Tx Voltage [V]
Transmitter voltage Tx_off [V]
Transmitter voltage Tx_on [V]
Current [amp]
Transmitter current [amp]
Tx Temp [deg C]
Transmitter temperature [deg C]
Production
920004
304401
304501
304601
304701
304801
304901
09:30:00
09:35:00
09:40:00
09:45:00
09:50:00
09:55:00
10:00:00
10:05:00
10:10:00
10:15:00
10:20:00
10:25:00
10:30:00
10:35:00
10:40:00
10:45:00
10:50:00
10:55:00

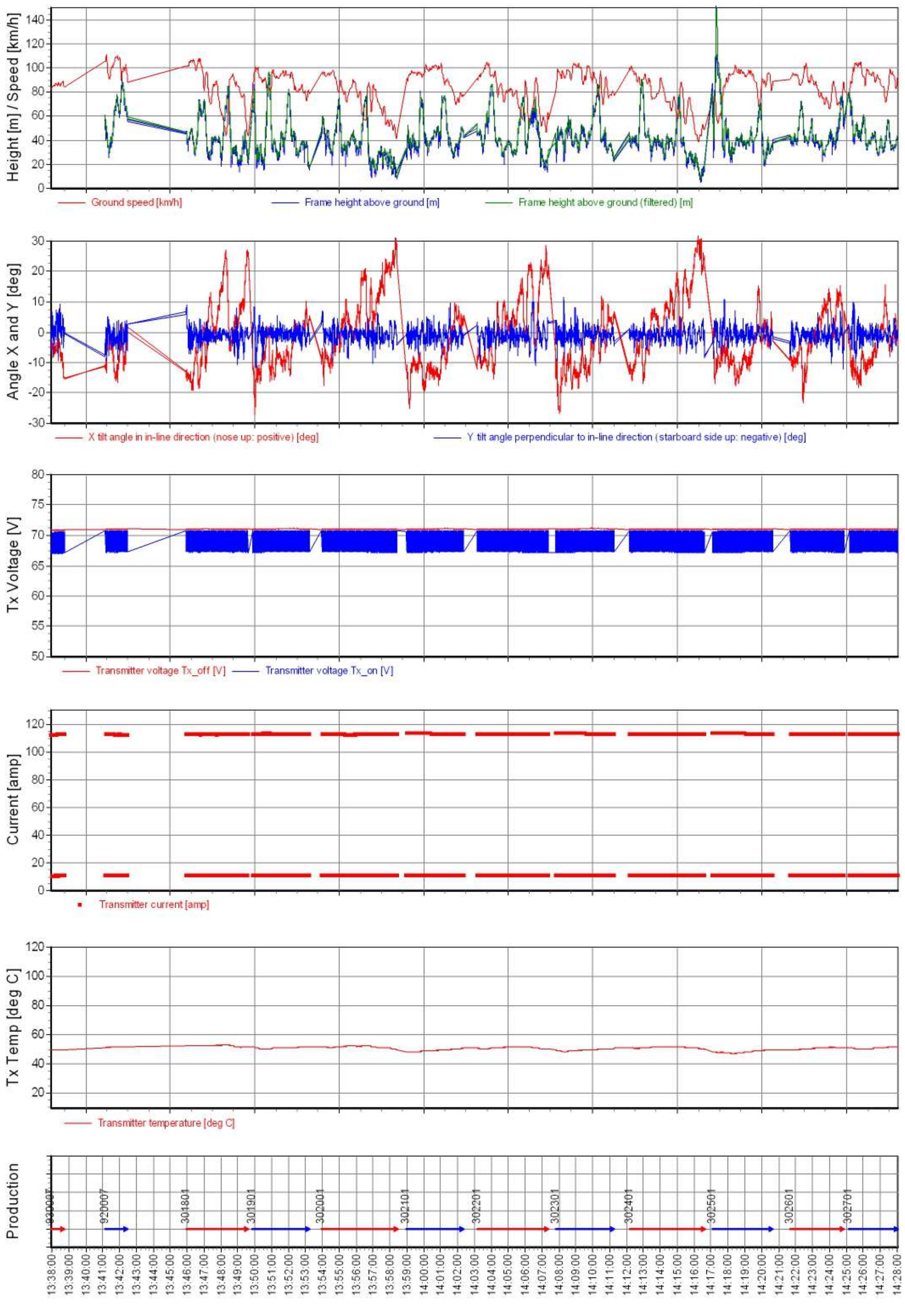
20111114.03

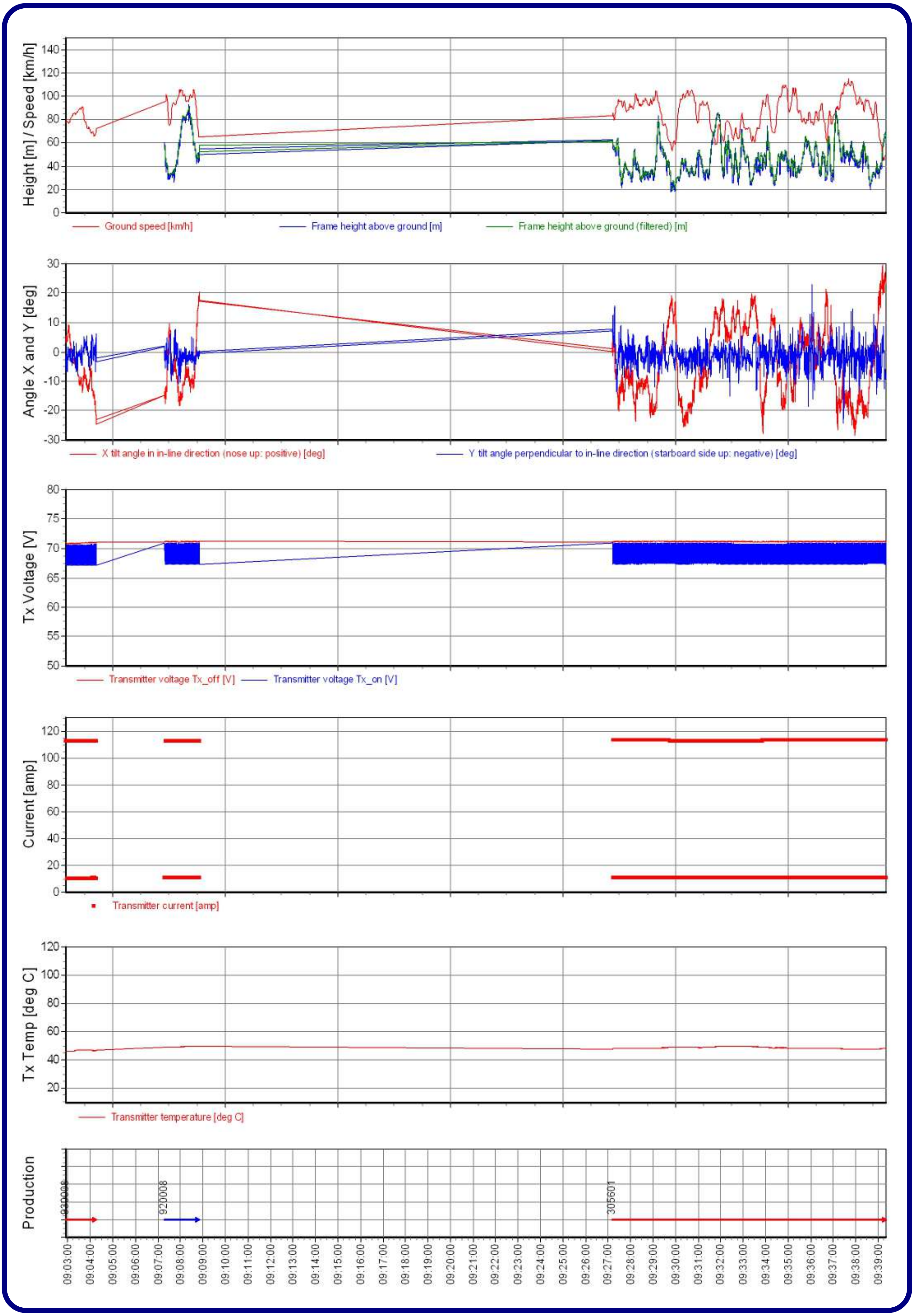


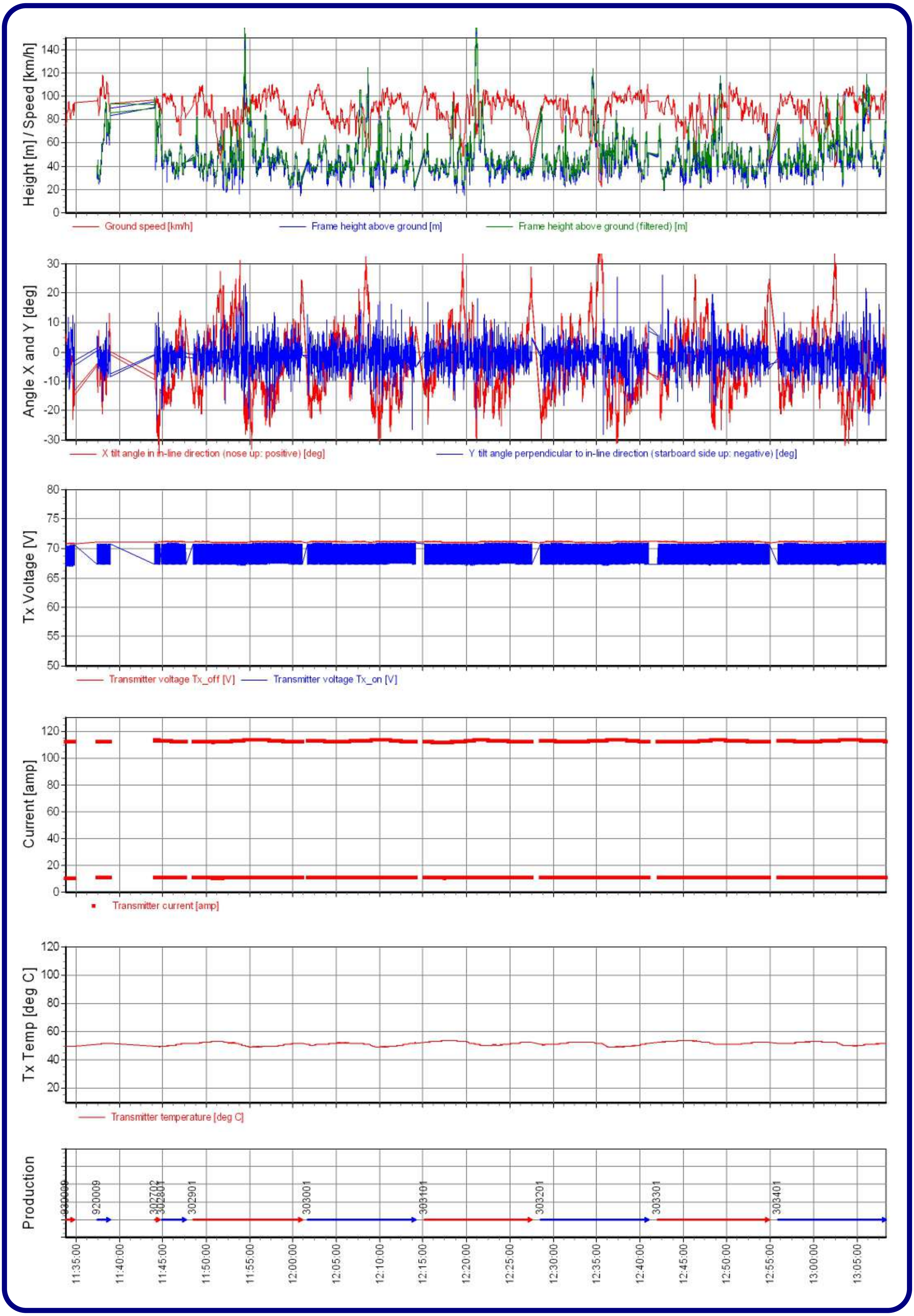
Height [m] / Speed [km/h]
Ground speed [km/h]
Frame height above ground [m]
Frame height above ground (filtered) [m]
Angle X and Y [deg]
X tilt angle in in-line direction (nose up: positive) [deg]
Y tilt angle perpendicular to in-line direction (starboard side up: negative) [deg]
Tx Voltage [V]
Transmitter voltage Tx_off [V]
Transmitter voltage Tx_on [V]
Current [amp]
Transmitter current [amp]
Tx Temp [deg C]
Transmitter temperature [deg C]
Production
920005
305001
305101
305201
305301
305401
305501
11:50:00
11:55:00
12:00:00
12:05:00
12:10:00
12:15:00
12:20:00
12:25:00
12:30:00
12:35:00
12:40:00
12:45:00
12:50:00
12:55:00
13:00:00
13:05:00
13:10:00
13:15:00
13:20:00

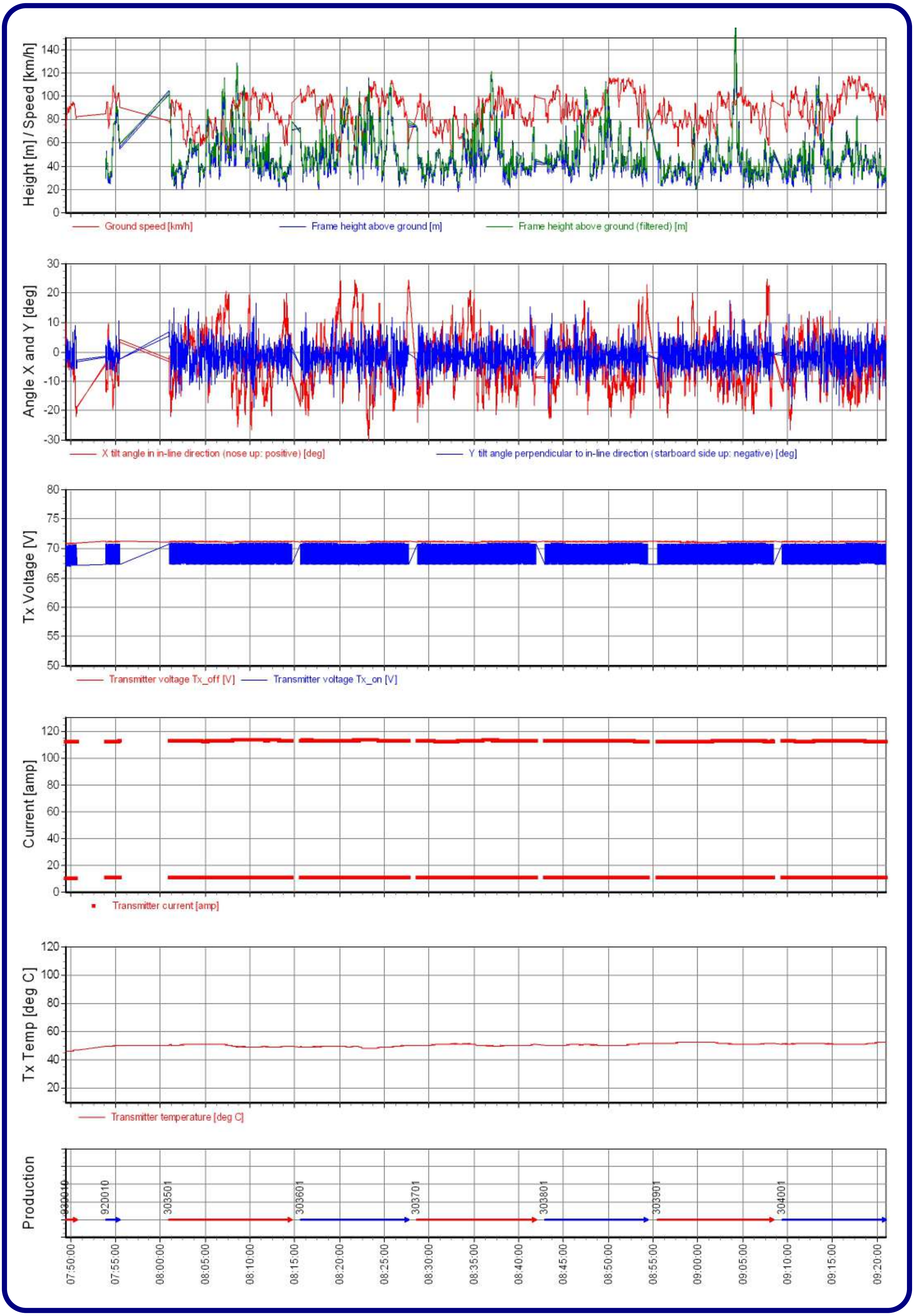


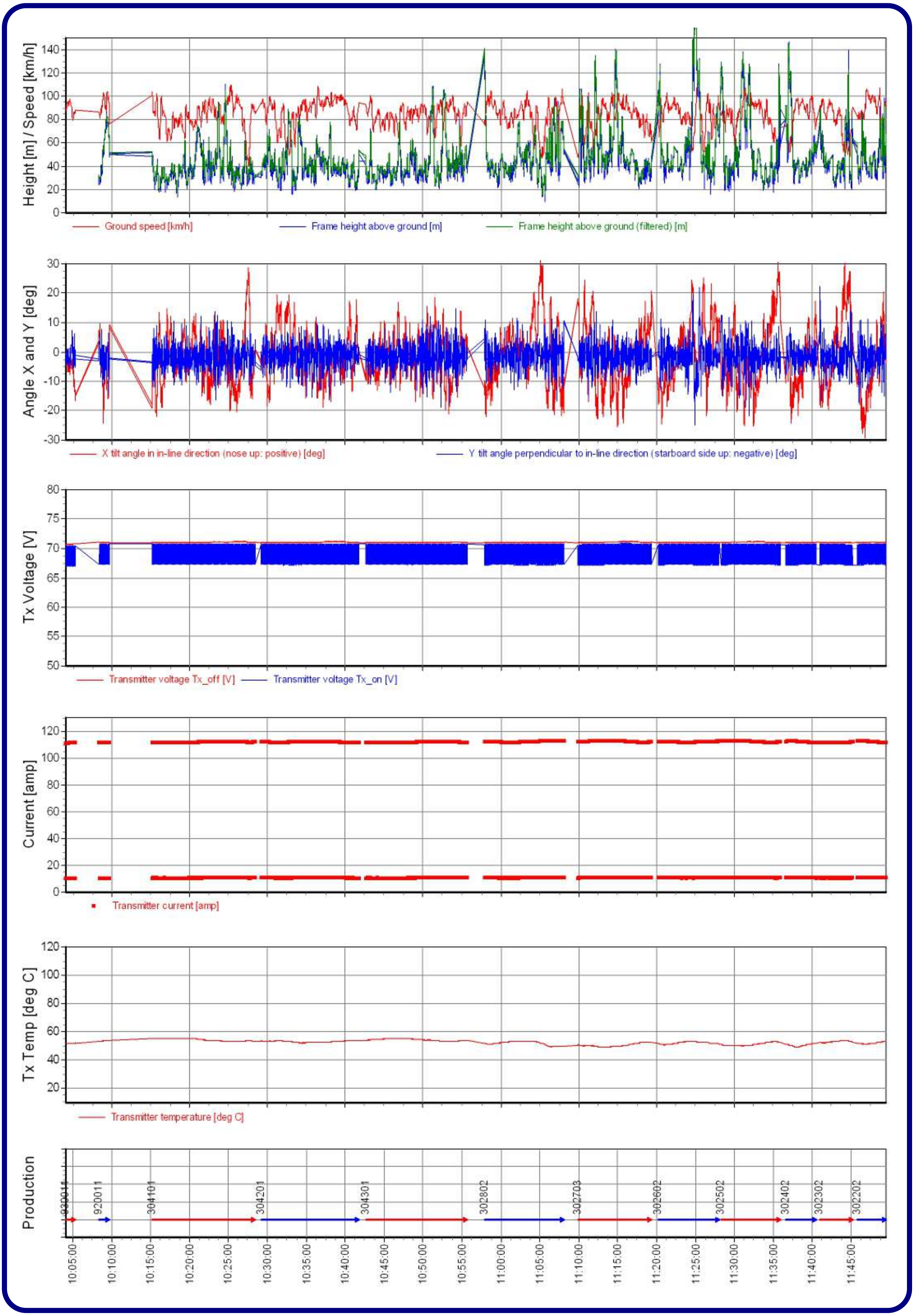
Height [m] / Speed [km/h]
Ground speed [km/h]
Frame height above ground [m]
Frame height above ground (filtered) [m]
Angle X and Y [deg]
X tilt angle in in-line direction (nose up: positive) [deg]
Y tilt angle perpendicular to in-line direction (starboard side up: negative) [deg]
Tx Voltage [V]
Transmitter voltage Tx_off [V]
Transmitter voltage Tx_on [V]
Current [amp]
Transmitter current [amp]
Tx Temp [deg C]
Transmitter temperature [deg C]
Production
920006
309501
309401
309301
309201
309101
309001
308901
308801
11:00:00
11:05:00
11:10:00
11:15:00
11:20:00
11:25:00
11:30:00
11:35:00
11:40:00
11:45:00
11:50:00
11:55:00
12:00:00
12:05:00
12:10:00
12:15:00
12:20:00
12:25:00
12:30:00
12:35:00
12:40:00
12:45:00
12:50:00
12:55:00

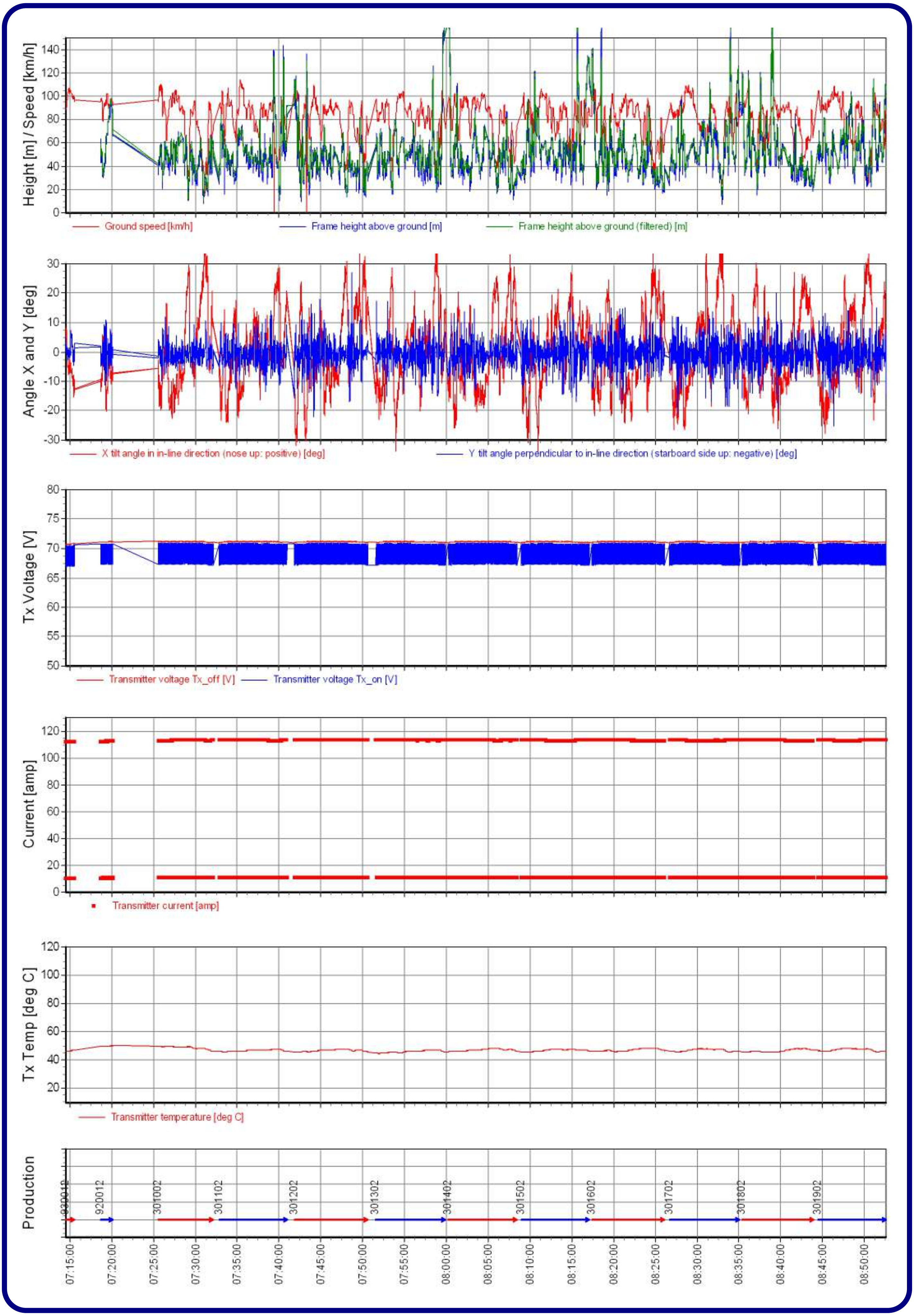

Height [m] / Speed [km/h]
Ground speed [km/h]
Frame height above ground [m]
Frame height above ground (filtered) [m]
Angle X and Y [deg]
X tilt angle in in-line direction (nose up: positive) [deg]
Y tilt angle perpendicular to in-line direction (starboard side up: negative) [deg]
Tx Voltage [V]
Transmitter voltage Tx_off [V]
Transmitter voltage Tx_on [V]
Current [amp]
Transmitter current [amp]
Tx Temp [deg C]
Transmitter temperature [deg C]
Production
920007
301801
301901
302001
302101
302201
302301
302401
302501
302601
302701

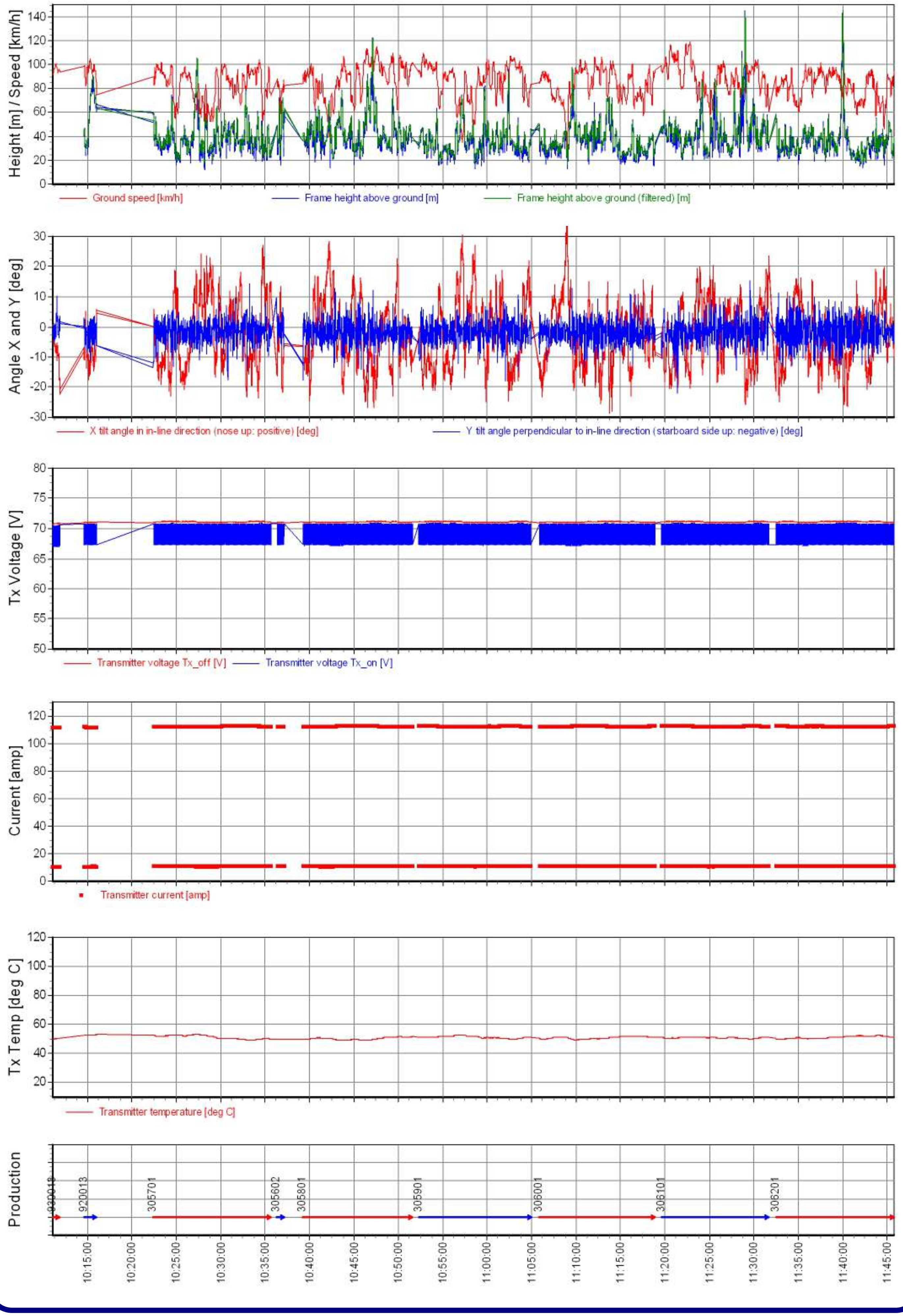

Height [m] / Speed [km/h]
Ground speed [km/h]
Frame height above ground [m]
Frame height above ground (filtered) [m]
Angle X and Y [deg]
X tilt angle in in-line direction (nose up: positive) [deg]
Y tilt angle perpendicular to in-line direction (starboard side up: negative) [deg]
Tx Voltage [V]
Transmitter voltage Tx_off [V]
Transmitter voltage Tx_on [V]
Current [amp]
Transmitter current [amp]
Tx Temp [deg C]
Transmitter temperature [deg C]
Production
930008
920008
305601
09:03:00
09:04:00
09:05:00
09:06:00
09:07:00
09:08:00
09:09:00
09:10:00
09:11:00
09:12:00
09:13:00
09:14:00
09:15:00
09:16:00
09:17:00
09:18:00
09:19:00
09:20:00
09:21:00
09:22:00
09:23:00
09:24:00
09:25:00
09:26:00
09:27:00
09:28:00
09:29:00
09:30:00
09:31:00
09:32:00
09:33:00
09:34:00
09:35:00
09:36:00
09:37:00
09:38:00
09:39:00


Height [m] / Speed [km/h]
Ground speed [km/h]
Frame height above ground [m]
Frame height above ground (filtered) [m]
Angle X and Y [deg]
X tilt angle in in-line direction (nose up: positive) [deg]
Y tilt angle perpendicular to in-line direction (starboard side up: negative) [deg]
Tx Voltage [V]
Transmitter voltage Tx_off [V]
Transmitter voltage Tx_on [V]
Current [amp]
Transmitter current [amp]
Tx Temp [deg C]
Transmitter temperature [deg C]
Production
920009
302702
302801
302901
303001
303101
303201
303301
303401
11:35:00
11:40:00
11:45:00
11:50:00
11:55:00
12:00:00
12:05:00
12:10:00
12:15:00
12:20:00
12:25:00
12:30:00
12:35:00
12:40:00
12:45:00
12:50:00
12:55:00
13:00:00
13:05:00

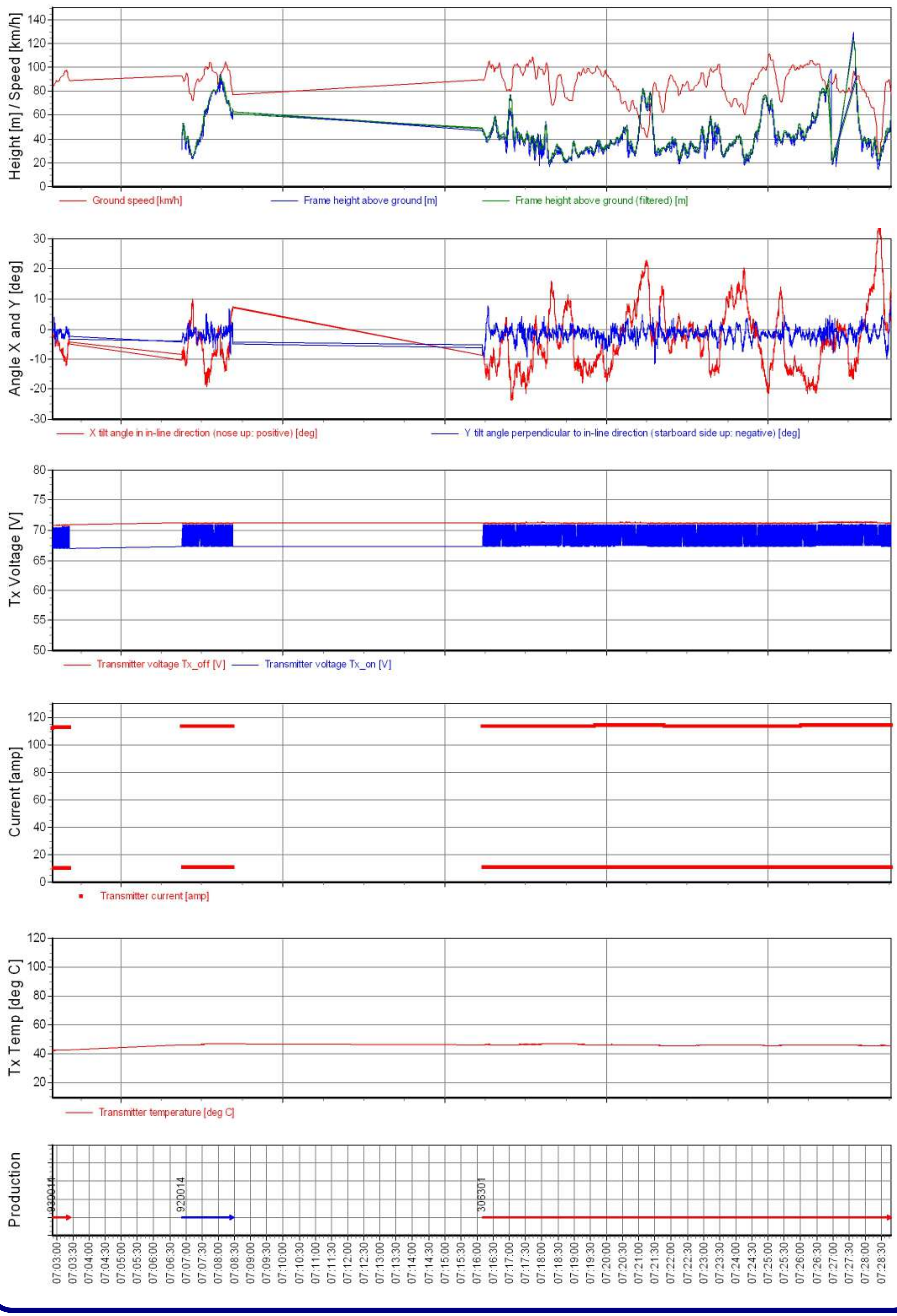

Height [m] / Speed [km/h]
Ground speed [km/h]
Frame height above ground [m]
Frame height above ground (filtered) [m]
Angle X and Y [deg]
X tilt angle in in-line direction (nose up: positive) [deg]
Y tilt angle perpendicular to in-line direction (starboard side up: negative) [deg]
Tx Voltage [V]
Transmitter voltage Tx_off [V]
Transmitter voltage Tx_on [V]
Current [amp]
Transmitter current [amp]
Tx Temp [deg C]
Transmitter temperature [deg C]
Production
930010
920010
303501
303601
303701
303801
303901
304001
07:50:00
07:55:00
08:00:00
08:05:00
08:10:00
08:15:00
08:20:00
08:25:00
08:30:00
08:35:00
08:40:00
08:45:00
08:50:00
08:55:00
09:00:00
09:05:00
09:10:00
09:15:00
09:20:00

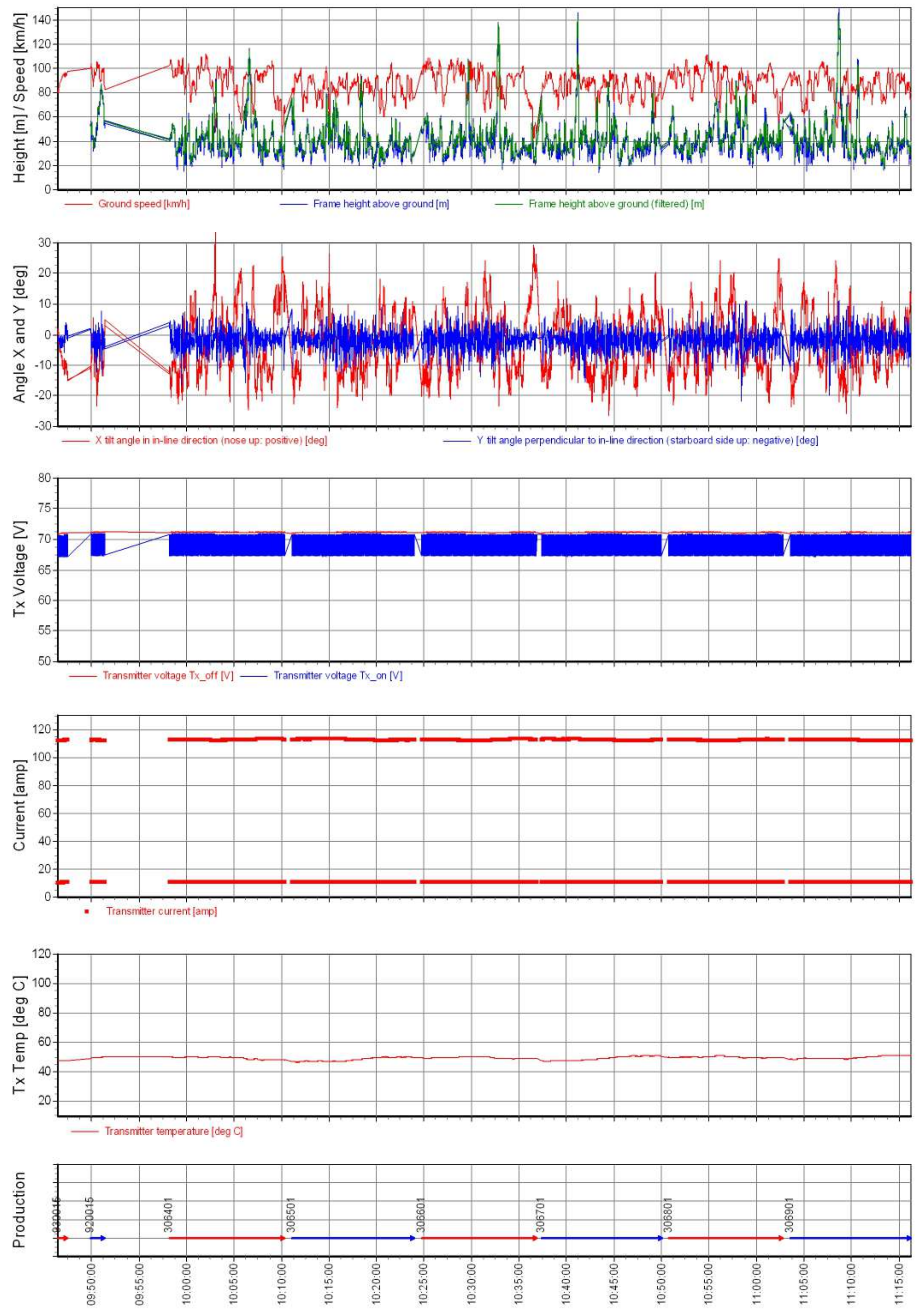

Height [m] / Speed [km/h]
Ground speed [km/h]
Frame height above ground [m]
Frame height above ground (filtered) [m]
Angle X and Y [deg]
X tilt angle in in-line direction (nose up: positive) [deg]
Y tilt angle perpendicular to in-line direction (starboard side up: negative) [deg]
Tx Voltage [V]
Transmitter voltage Tx_off [V]
Transmitter voltage Tx_on [V]
Current [amp]
Transmitter current [amp]
Tx Temp [deg C]
Transmitter temperature [deg C]
Production
920011
304101
304201
304301
302802
302703
302602
302502
302402
302302
302202


Height [m] / Speed [km/h]
Ground speed [km/h]
Frame height above ground [m]
Frame height above ground (filtered) [m]
Angle X and Y [deg]
X tilt angle in in-line direction (nose up: positive) [deg]
Y tilt angle perpendicular to in-line direction (starboard side up: negative) [deg]
Tx Voltage [V]
Transmitter voltage Tx_off [V]
Transmitter voltage Tx_on [V]
Current [amp]
Transmitter current [amp]
Tx Temp [deg C]
Transmitter temperature [deg C]
Production
920012
301002
301102
301202
301302
301402
301502
301602
301702
301802
301902
07:15:00
07:20:00
07:25:00
07:30:00
07:35:00
07:40:00
07:45:00
07:50:00
07:55:00
08:00:00
08:05:00
08:10:00
08:15:00
08:20:00
08:25:00
08:30:00
08:35:00
08:40:00
08:45:00
08:50:00

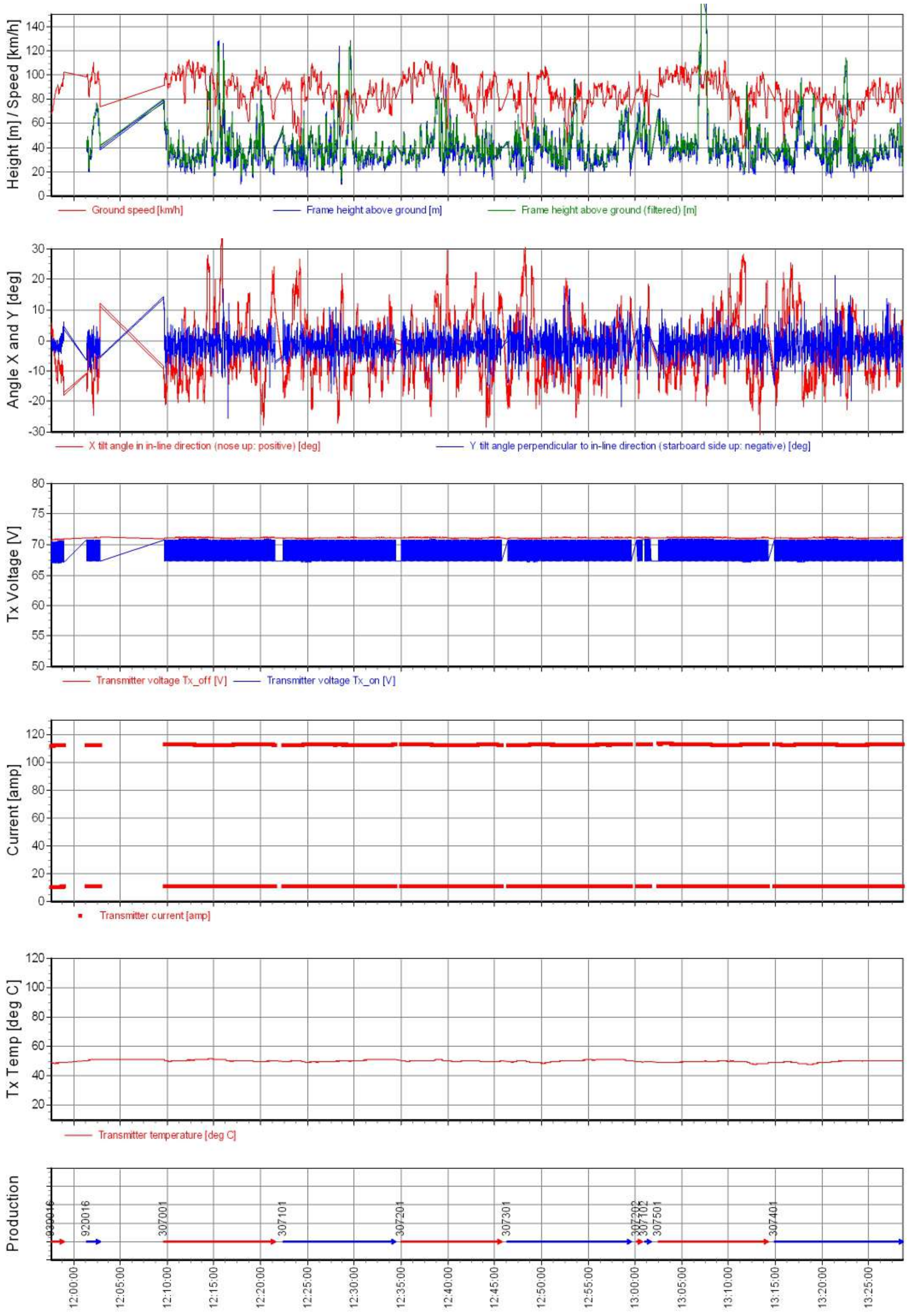


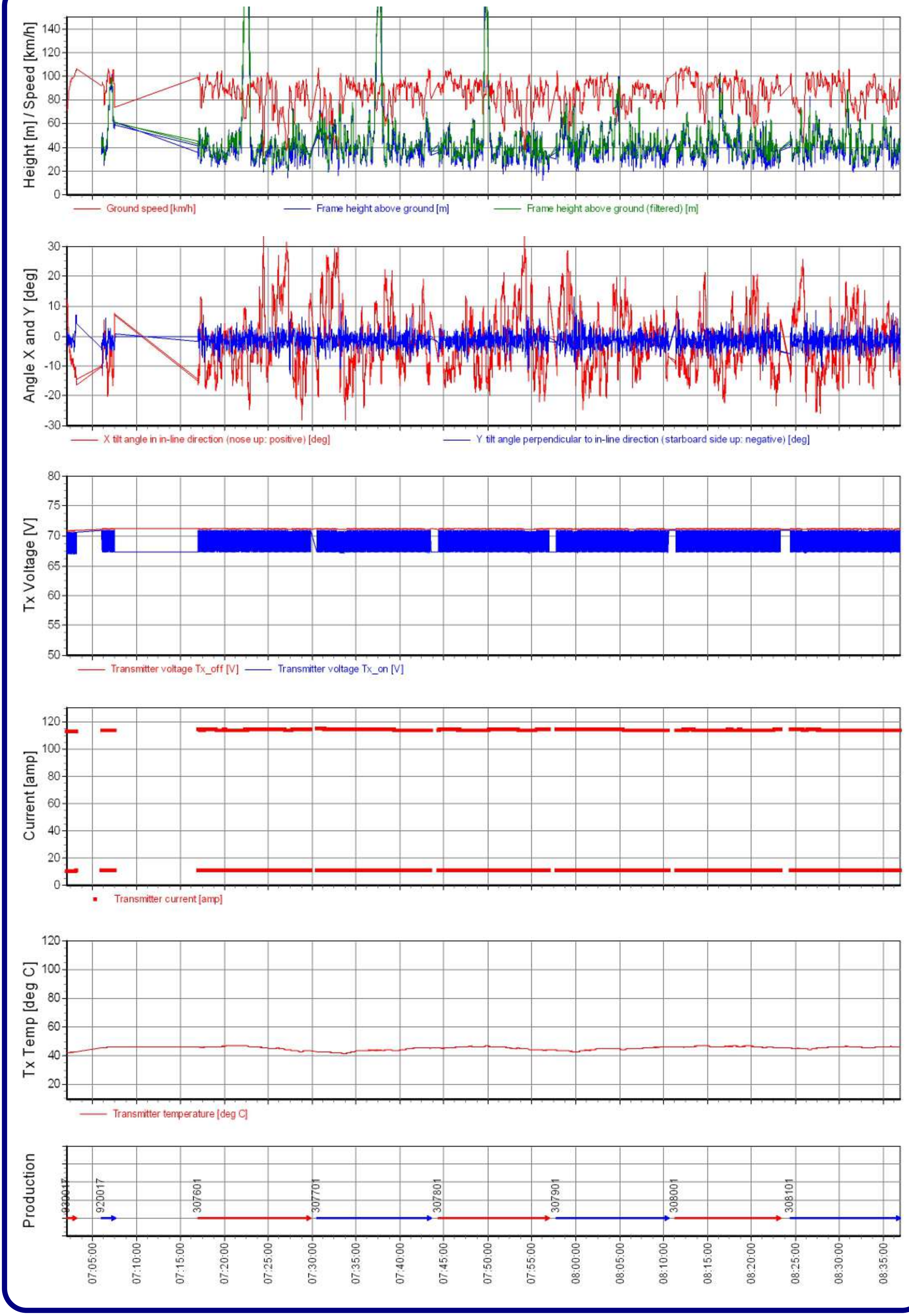
Height [m] / Speed [km/h]
Ground speed [km/h]
Frame height above ground [m]
Frame height above ground (filtered) [m]
Angle X and Y [deg]
X tilt angle in in-line direction (nose up: positive) [deg]
Y tilt angle perpendicular to in-line direction (starboard side up: negative) [deg]
Tx Voltage [V]
Transmitter voltage Tx_off [V]
Transmitter voltage Tx_on [V]
Current [amp]
Transmitter current [amp]
Tx Temp [deg C]
Transmitter temperature [deg C]
Production
920013
305701
305602
305801
305901
306001
306101
306201
10:15:00
10:20:00
10:25:00
10:30:00
10:35:00
10:40:00
10:45:00
10:50:00
10:55:00
11:00:00
11:05:00
11:10:00
11:15:00
11:20:00
11:25:00
11:30:00
11:35:00
11:40:00
11:45:00

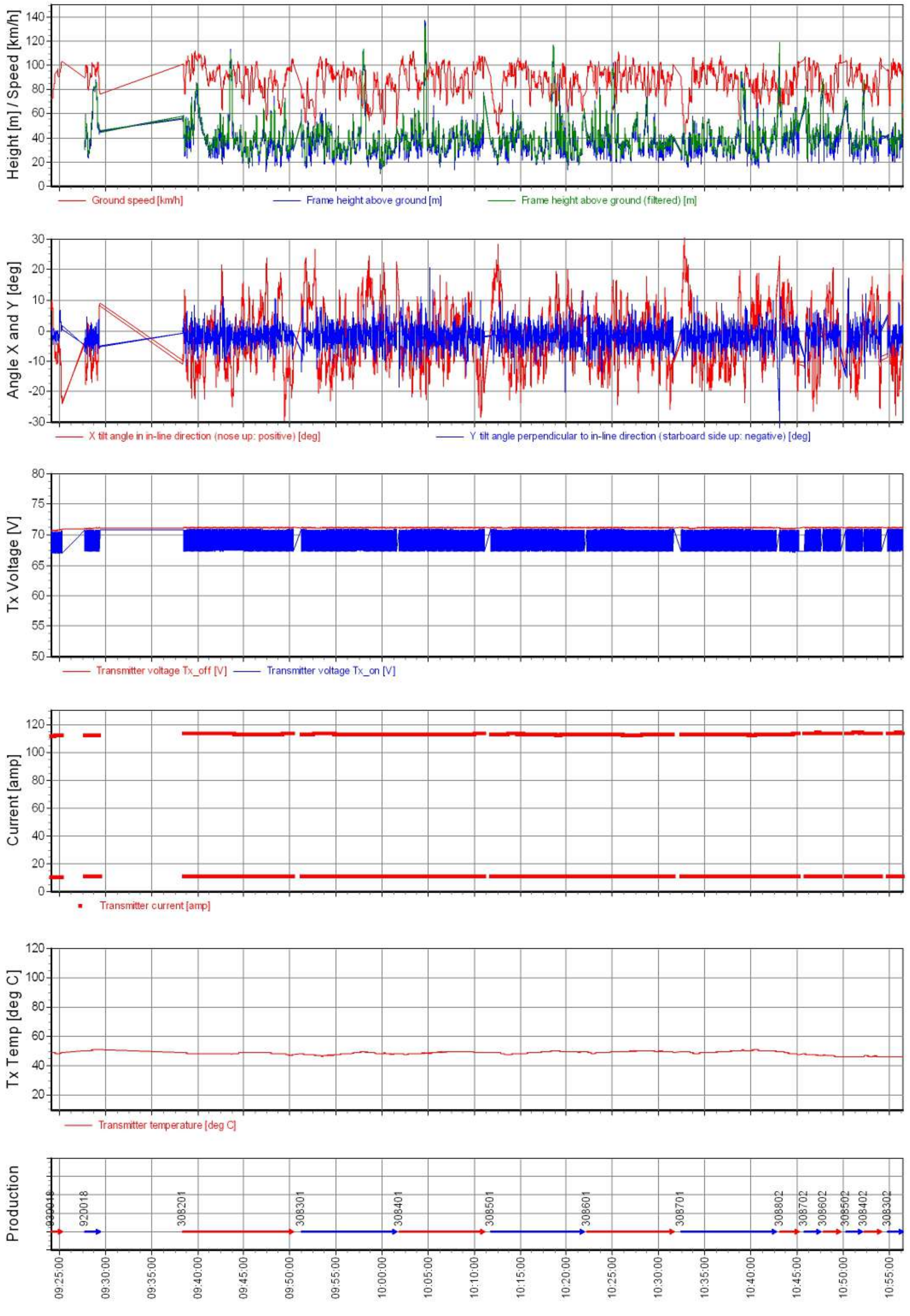

Height [m] / Speed [km/h]
Ground speed [km/h]
Frame height above ground [m]
Frame height above ground (filtered) [m]
Angle X and Y [deg]
X tilt angle in in-line direction (nose up: positive) [deg]
Y tilt angle perpendicular to in-line direction (starboard side up: negative) [deg]
Tx Voltage [V]
Transmitter voltage Tx_off [V]
Transmitter voltage Tx_on [V]
Current [amp]
Transmitter current [amp]
Tx Temp [deg C]
Transmitter temperature [deg C]
Production
930014
920014
306301

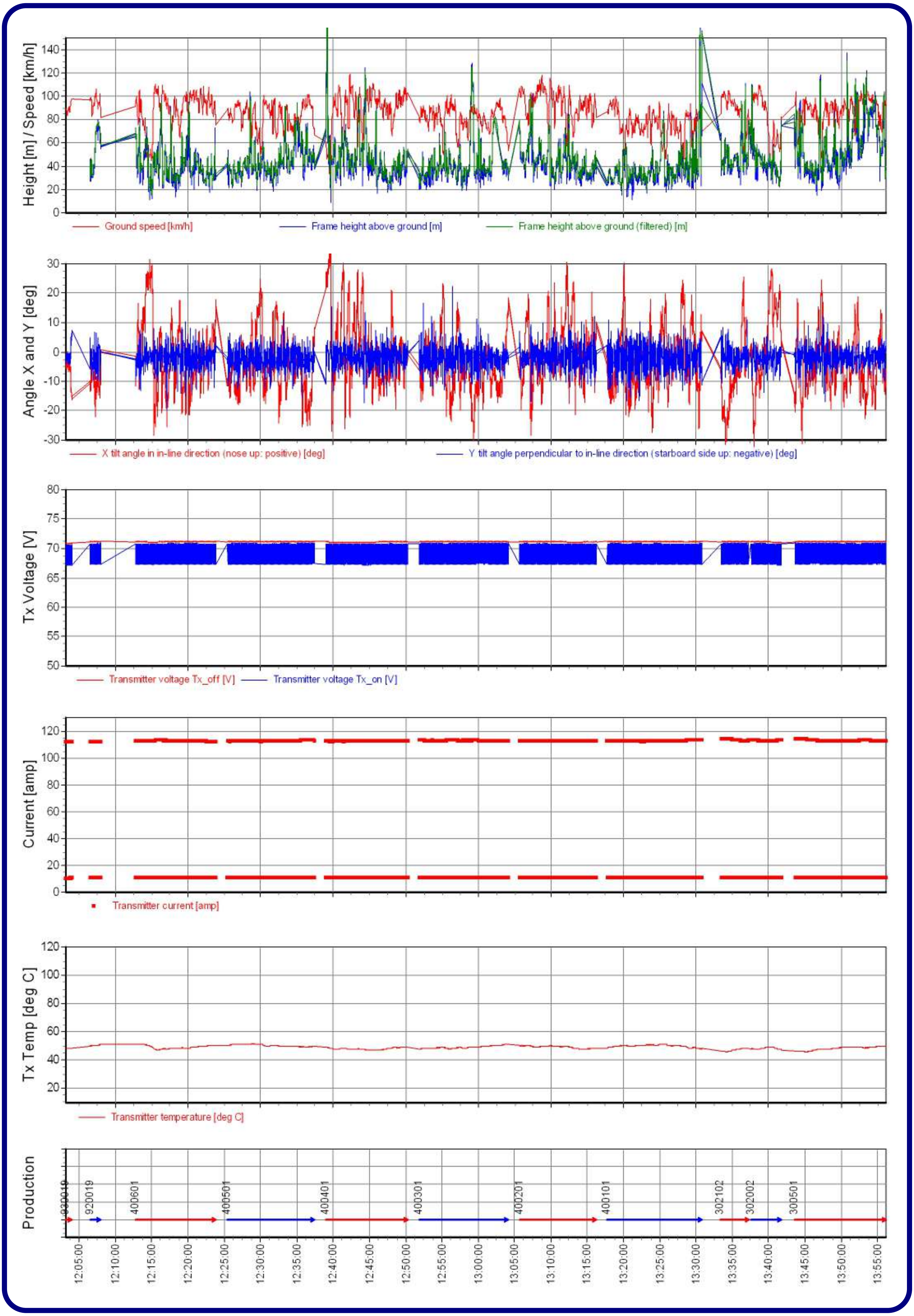


Height [m] / Speed [km/h]
Ground speed [km/h]
Frame height above ground [m]
Frame height above ground (filtered) [m]
Angle X and Y [deg]
X tilt angle in in-line direction (nose up: positive) [deg]
Y tilt angle perpendicular to in-line direction (starboard side up: negative) [deg]
Tx Voltage [V]
Transmitter voltage Tx_off [V]
Transmitter voltage Tx_on [V]
Current [amp]
Transmitter current [amp]
Tx Temp [deg C]
Transmitter temperature [deg C]
Production
920015
306401
306501
306601
306701
306801
306901
09:50:00
09:55:00
10:00:00
10:05:00
10:10:00
10:15:00
10:20:00
10:25:00
10:30:00
10:35:00
10:40:00
10:45:00
10:50:00
10:55:00
11:00:00
11:05:00
11:10:00
11:15:00

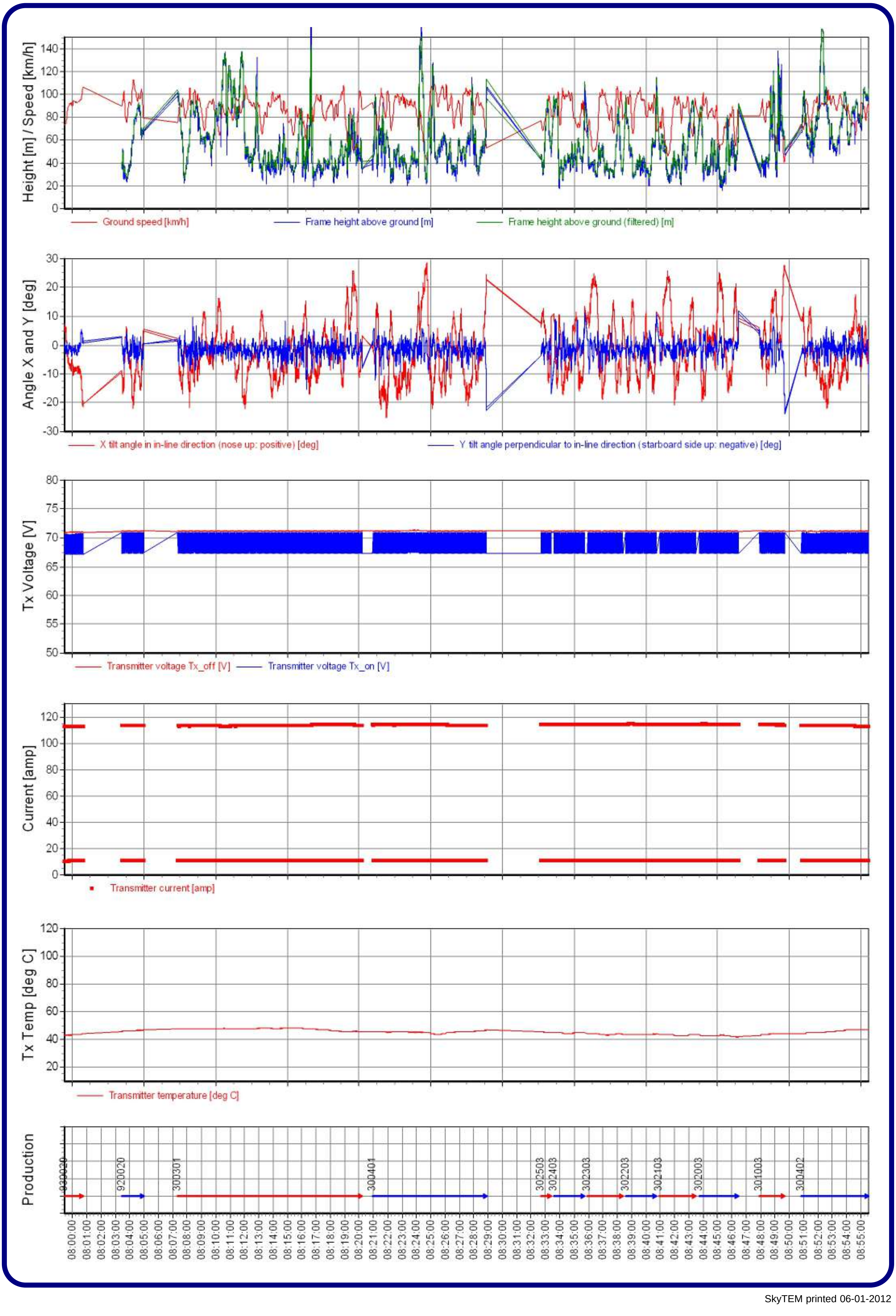

Height [m] / Speed [km/h]
Ground speed [km/h]
Frame height above ground [m]
Frame height above ground (filtered) [m]
Angle X and Y [deg]
X tilt angle in in-line direction (nose up: positive) [deg]
Y tilt angle perpendicular to in-line direction (starboard side up: negative) [deg]
Tx Voltage [V]
Transmitter voltage Tx_off [V]
Transmitter voltage Tx_on [V]
Current [amp]
Transmitter current [amp]
Tx Temp [deg C]
Transmitter temperature [deg C]
Production
920016
920016
307001
307101
307201
307301
307202
307102
307501
307401
12:00:00
12:05:00
12:10:00
12:15:00
12:20:00
12:25:00
12:30:00
12:35:00
12:40:00
12:45:00
12:50:00
12:55:00
13:00:00
13:05:00
13:10:00
13:15:00
13:20:00
13:25:00


Height [m] / Speed [km/h]
Ground speed [km/h]
Frame height above ground [m]
Frame height above ground (filtered) [m]
Angle X and Y [deg]
X tilt angle in in-line direction (nose up: positive) [deg]
Y tilt angle perpendicular to in-line direction (starboard side up: negative) [deg]
Tx Voltage [V]
Transmitter voltage Tx_off [V]
Transmitter voltage Tx_on [V]
Current [amp]
Transmitter current [amp]
Tx Temp [deg C]
Transmitter temperature [deg C]
Production
930017
920017
307601
307701
307801
307901
308001
308101
07:05:00
07:10:00
07:15:00
07:20:00
07:25:00
07:30:00
07:35:00
07:40:00
07:45:00
07:50:00
07:55:00
08:00:00
08:05:00
08:10:00
08:15:00
08:20:00
08:25:00
08:30:00
08:35:00


Height [m] / Speed [km/h]
Ground speed [km/h]
Frame height above ground [m]
Frame height above ground (filtered) [m]
Angle X and Y [deg]
X tilt angle in in-line direction (nose up: positive) [deg]
Y tilt angle perpendicular to in-line direction (starboard side up: negative) [deg]
Tx Voltage [V]
Transmitter voltage Tx_off [V]
Transmitter voltage Tx_on [V]
Current [amp]
Transmitter current [amp]
Tx Temp [deg C]
Transmitter temperature [deg C]
Production
920018
308201
308301
308401
308501
308601
308701
308802
308702
308602
308502
308402
308302
09:25:00
09:30:00
09:35:00
09:40:00
09:45:00
09:50:00
09:55:00
10:00:00
10:05:00
10:10:00
10:15:00
10:20:00
10:25:00
10:30:00
10:35:00
10:40:00
10:45:00
10:50:00
10:55:00

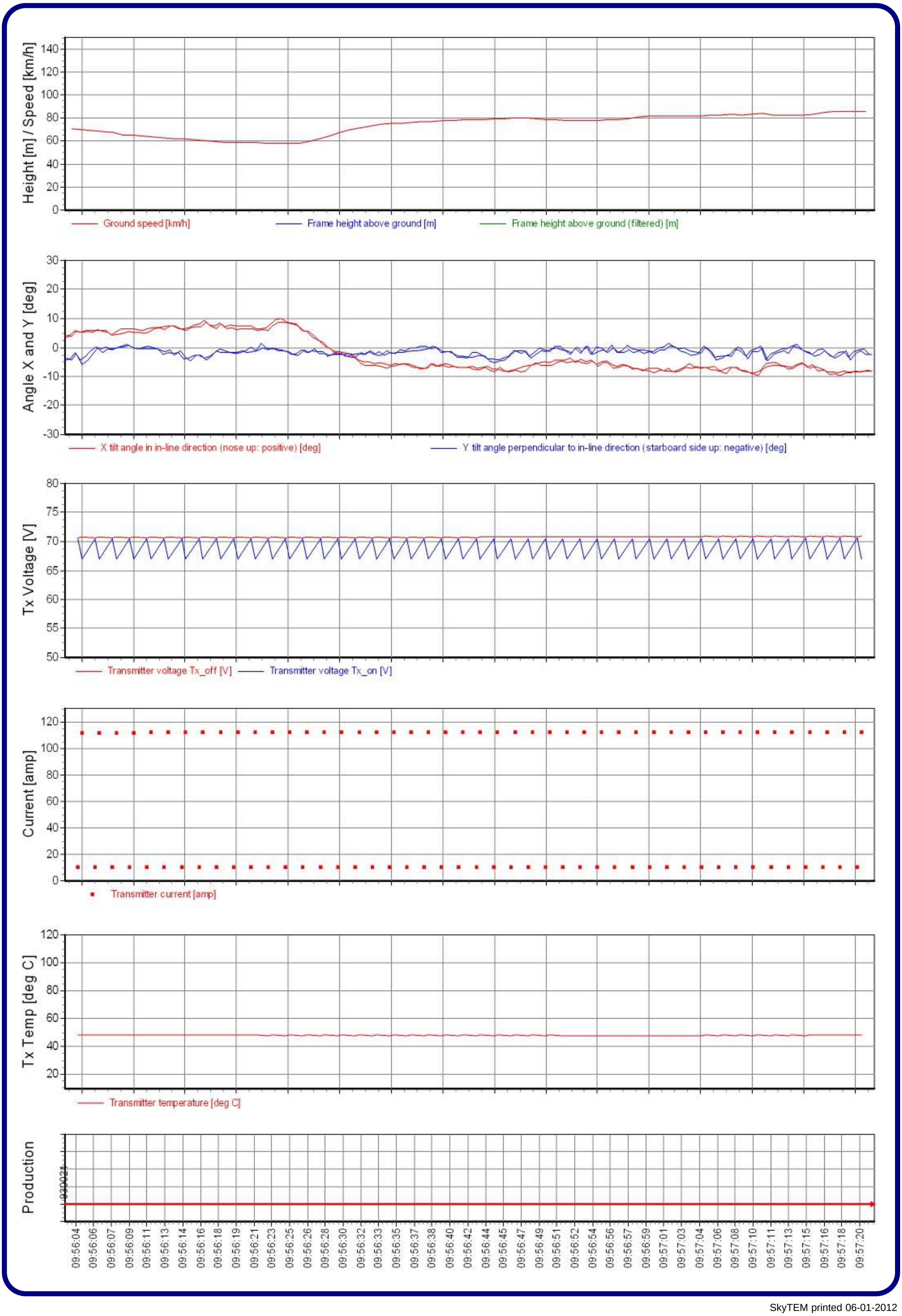

Height [m] / Speed [km/h]
Ground speed [km/h]
Frame height above ground [m]
Frame height above ground (filtered) [m]
Angle X and Y [deg]
X tilt angle in in-line direction (nose up: positive) [deg]
Y tilt angle perpendicular to in-line direction (starboard side up: negative) [deg]
Tx Voltage [V]
Transmitter voltage Tx_off [V]
Transmitter voltage Tx_on [V]
Current [amp]
Transmitter current [amp]
Tx Temp [deg C]
Transmitter temperature [deg C]
Production
920019
400601
400501
400401
400301
400201
400101
302102
302002
300501
12:05:00
12:10:00
12:15:00
12:20:00
12:25:00
12:30:00
12:35:00
12:40:00
12:45:00
12:50:00
12:55:00
13:00:00
13:05:00
13:10:00
13:15:00
13:20:00
13:25:00
13:30:00
13:35:00
13:40:00
13:45:00
13:50:00
13:55:00

20111127.01

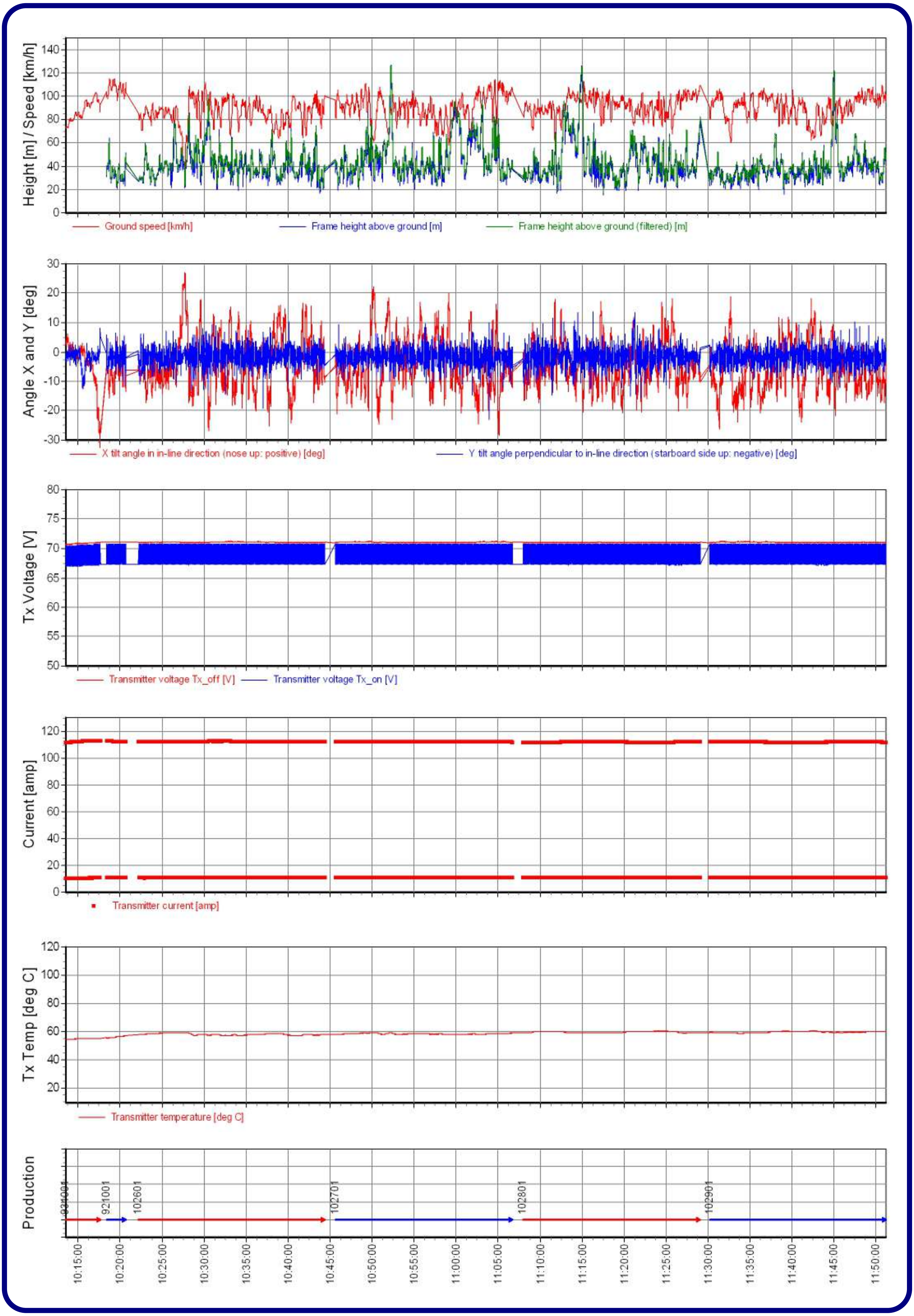


Height [m] / Speed [km/h]
Ground speed [km/h]
Frame height above ground [m]
Frame height above ground (filtered) [m]
Angle X and Y [deg]
X tilt angle in in-line direction (nose up: positive) [deg]
Y tilt angle perpendicular to in-line direction (starboard side up: negative) [deg]
Tx Voltage [V]
Transmitter voltage Tx_off [V]
Transmitter voltage Tx_on [V]
Current [amp]
Transmitter current [amp]
Tx Temp [deg C]
Transmitter temperature [deg C]
Production
920020
300301
300401
302503
302403
302303
302203
302103
302003
301003
300402
08:00:00
08:55:00

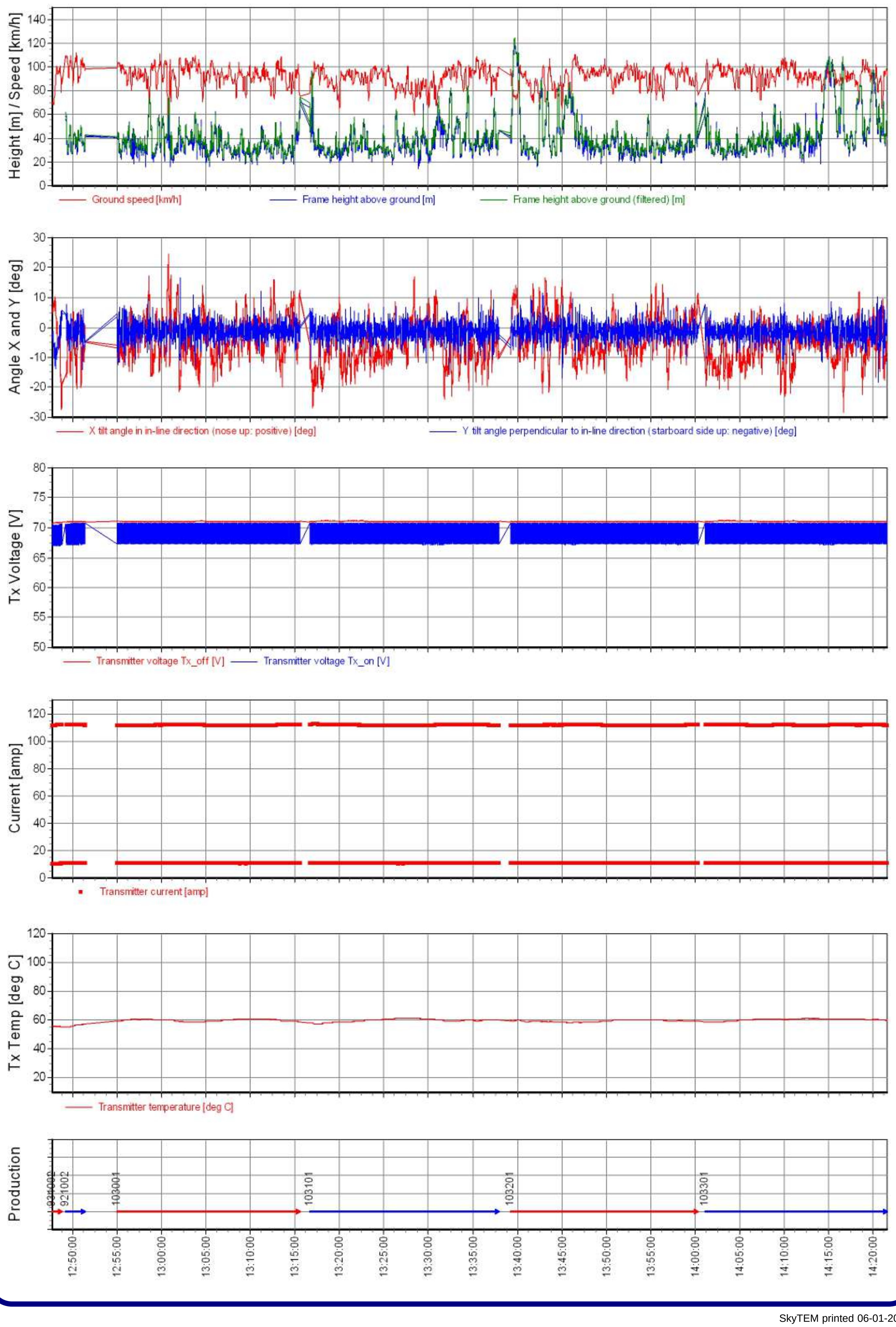
20111128.01

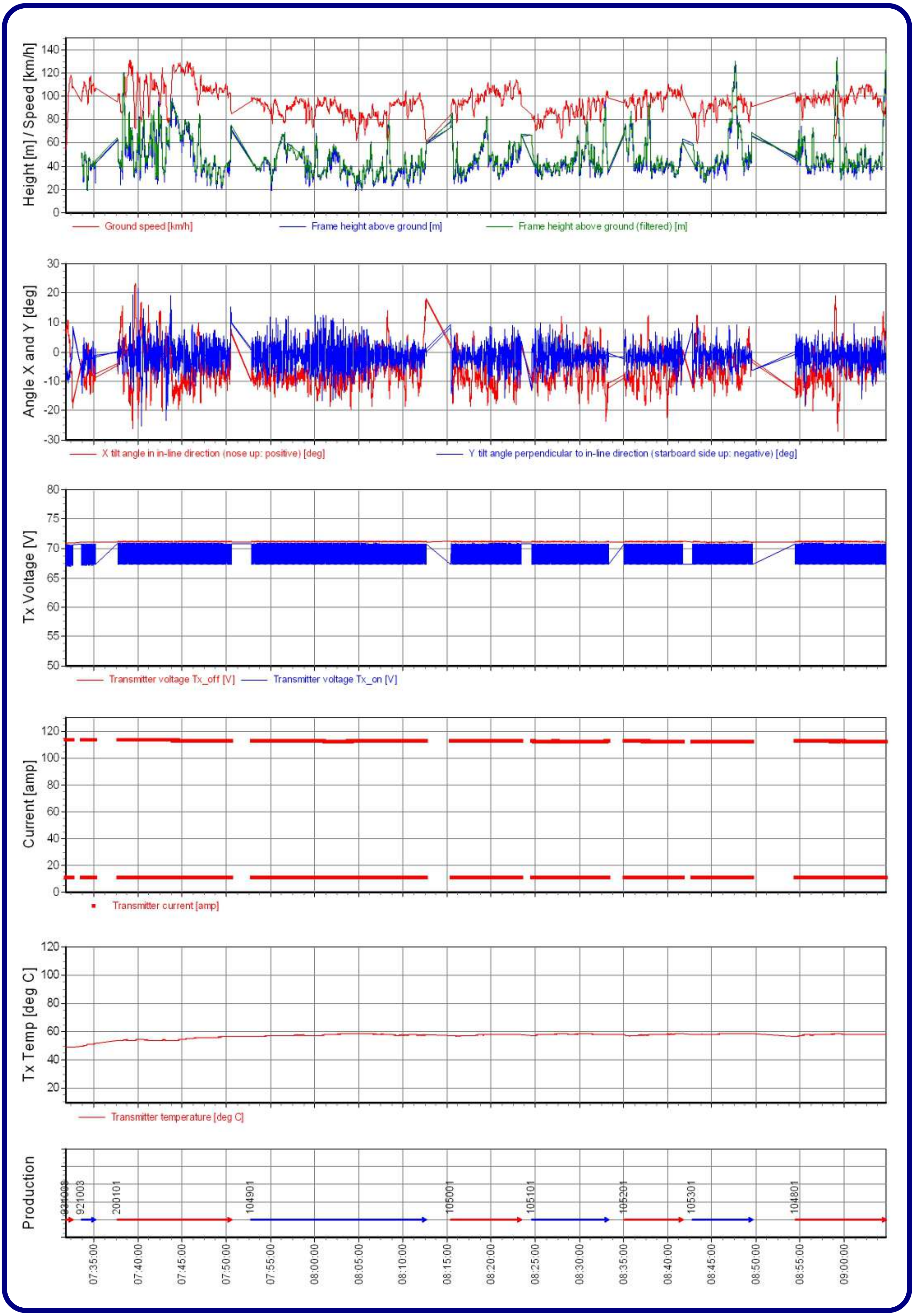

Height [m] / Speed [km/h]
Ground speed [km/h]
Frame height above ground [m]
Frame height above ground (filtered) [m]
Angle X and Y [deg]
X tilt angle in in-line direction (nose up: positive) [deg]
Y tilt angle perpendicular to in-line direction (starboard side up: negative) [deg]
Tx Voltage [V]
Transmitter voltage Tx_off [V]
Transmitter voltage Tx_on [V]
Current [amp]
Transmitter current [amp]
Tx Temp [deg C]
Transmitter temperature [deg C]
Production
09:56:04 09:56:06 09:56:07 09:56:09 09:56:11 09:56:13 09:56:14 09:56:16 09:56:18 09:56:19 09:56:21 09:56:23 09:56:25 09:56:26 09:56:28 09:56:30 09:56:32 09:56:33 09:56:35 09:56:37 09:56:38 09:56:40 09:56:42 09:56:44 09:56:45 09:56:47 09:56:49 09:56:51 09:56:52 09:56:54 09:56:56 09:56:57 09:56:59 09:57:01 09:57:03 09:57:04 09:57:06 09:57:08 09:57:10 09:57:11 09:57:13 09:57:15 09:57:16 09:57:18 09:57:20

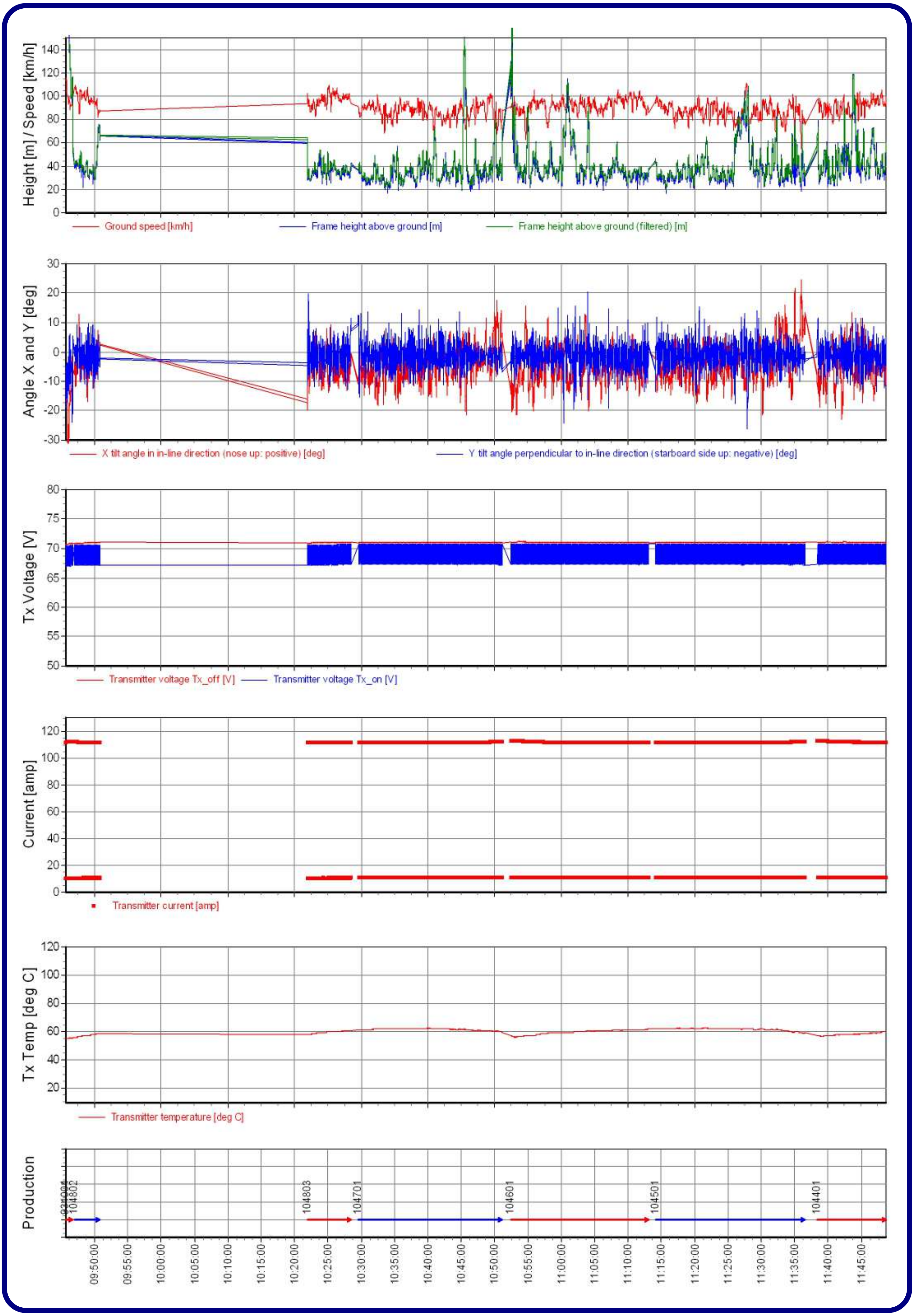
20111130.01

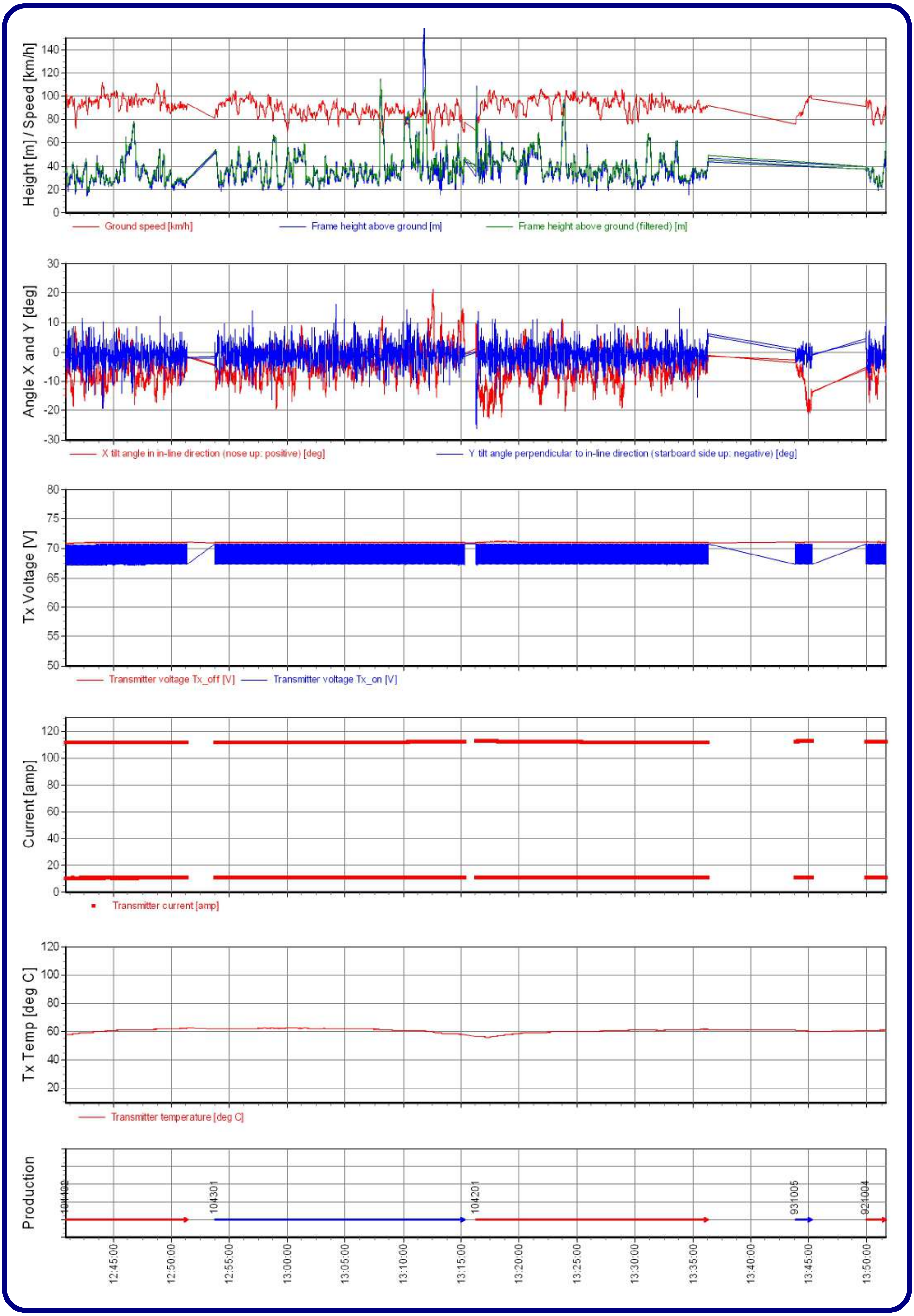


Height [m] / Speed [km/h]
Ground speed [km/h]
Frame height above ground [m]
Frame height above ground (filtered) [m]
Angle X and Y [deg]
X tilt angle in in-line direction (nose up: positive) [deg]
Y tilt angle perpendicular to in-line direction (starboard side up: negative) [deg]
Tx Voltage [V]
Transmitter voltage Tx_off [V]
Transmitter voltage Tx_on [V]
Current [amp]
Transmitter current [amp]
Tx Temp [deg C]
Transmitter temperature [deg C]
Production
921001
102601
102701
102801
102901
10:15:00
10:20:00
10:25:00
10:30:00
10:35:00
10:40:00
10:45:00
10:50:00
10:55:00
11:00:00
11:05:00
11:10:00
11:15:00
11:20:00
11:25:00
11:30:00
11:35:00
11:40:00
11:45:00
11:50:00

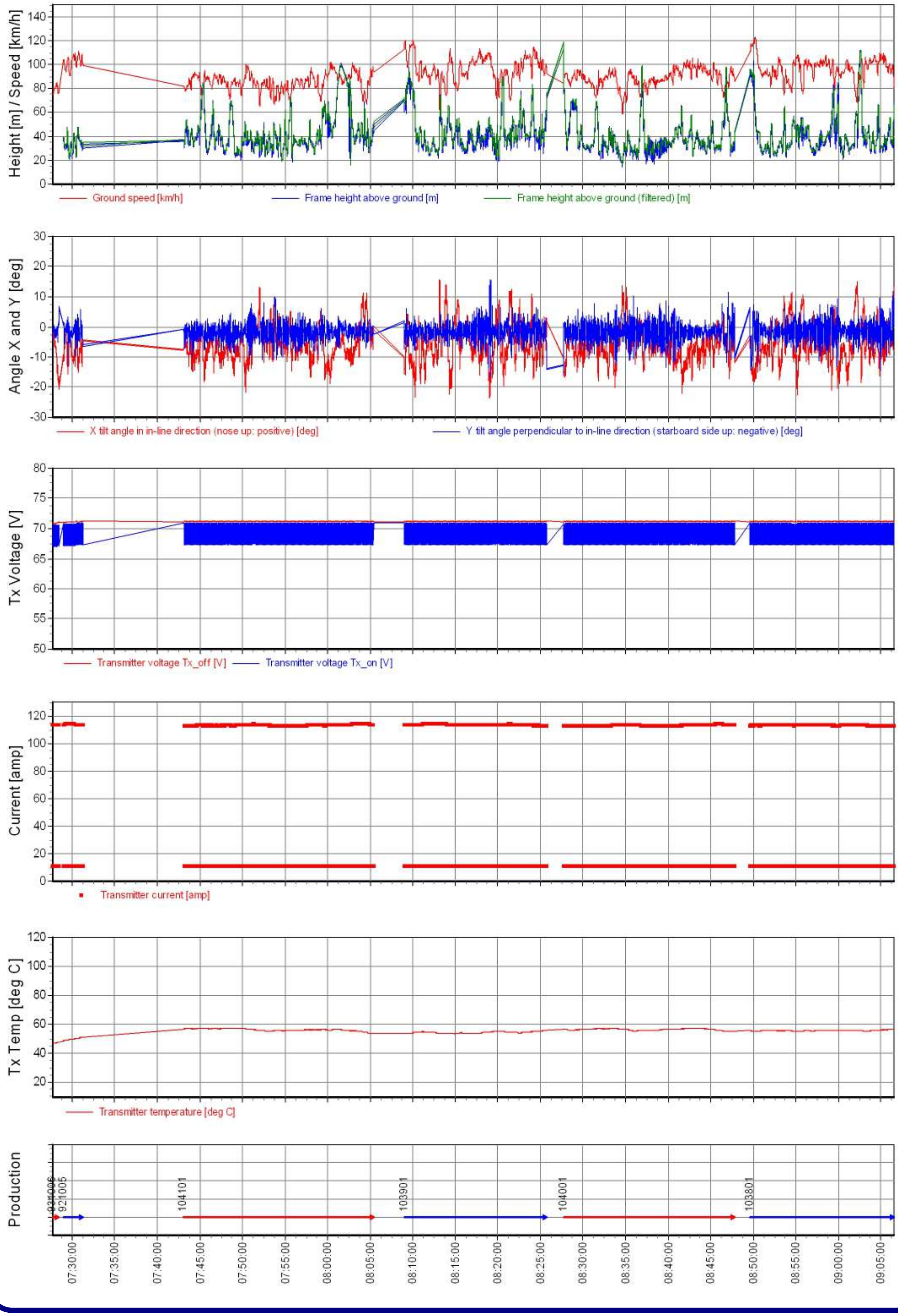

Height [m] / Speed [km/h]
Ground speed [km/h]
Frame height above ground [m]
Frame height above ground (filtered) [m]
Angle X and Y [deg]
X tilt angle in in-line direction (nose up: positive) [deg]
Y tilt angle perpendicular to in-line direction (starboard side up: negative) [deg]
Tx Voltage [V]
Transmitter voltage Tx_off [V]
Transmitter voltage Tx_on [V]
Current [amp]
Transmitter current [amp]
Tx Temp [deg C]
Transmitter temperature [deg C]
Production
921002
103001
103101
103201
103301
12:50:00
12:55:00
13:00:00
13:05:00
13:10:00
13:15:00
13:20:00
13:25:00
13:30:00
13:35:00
13:40:00
13:45:00
13:50:00
13:55:00
14:00:00
14:05:00
14:10:00
14:15:00
14:20:00

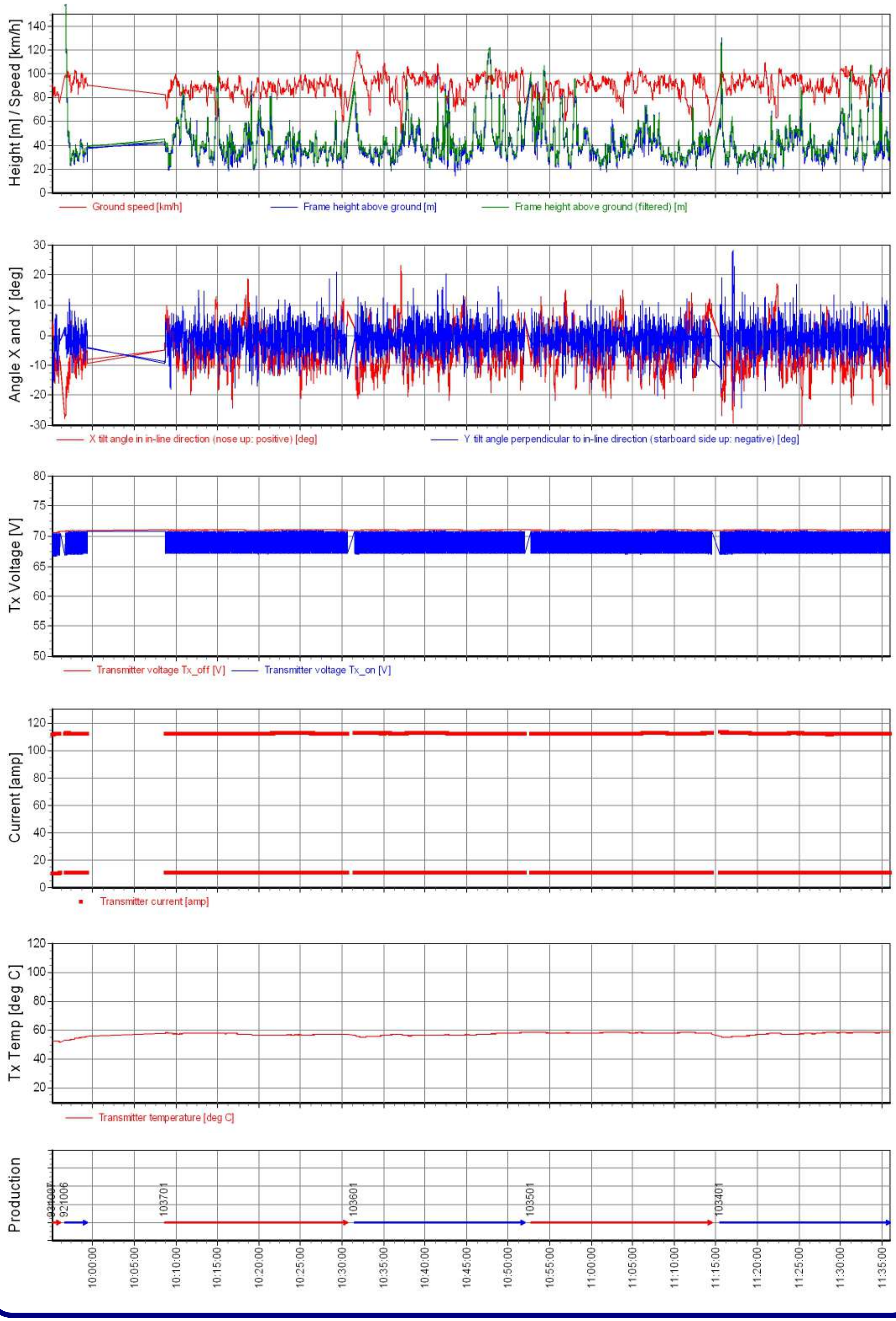

Height [m] / Speed [km/h]
Ground speed [km/h]
Frame height above ground [m]
Frame height above ground (filtered) [m]
Angle X and Y [deg]
X tilt angle in in-line direction (nose up: positive) [deg]
Y tilt angle perpendicular to in-line direction (starboard side up: negative) [deg]
Tx Voltage [V]
Transmitter voltage Tx_off [V]
Transmitter voltage Tx_on [V]
Current [amp]
Transmitter current [amp]
Tx Temp [deg C]
Transmitter temperature [deg C]
Production
921003
200101
104901
105001
105101
105201
105301
104801
07:35:00
07:40:00
07:45:00
07:50:00
07:55:00
08:00:00
08:05:00
08:10:00
08:15:00
08:20:00
08:25:00
08:30:00
08:35:00
08:40:00
08:45:00
08:50:00
08:55:00
09:00:00

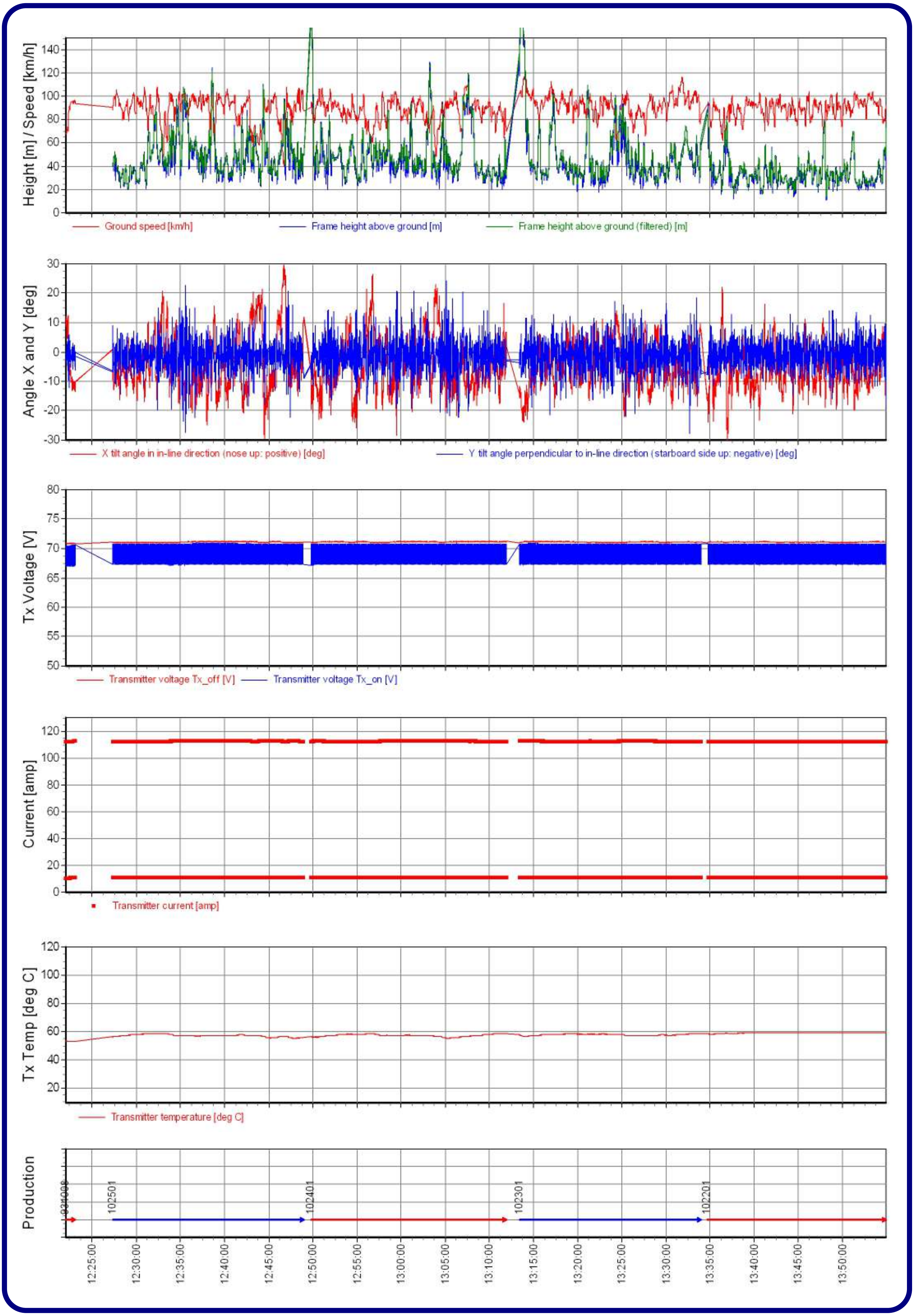

Height [m] / Speed [km/h]
Ground speed [km/h]
Frame height above ground [m]
Frame height above ground (filtered) [m]
Angle X and Y [deg]
X tilt angle in in-line direction (nose up: positive) [deg]
Y tilt angle perpendicular to in-line direction (starboard side up: negative) [deg]
Tx Voltage [V]
Transmitter voltage Tx_off [V]
Transmitter voltage Tx_on [V]
Current [amp]
Transmitter current [amp]
Tx Temp [deg C]
Transmitter temperature [deg C]
Production
104802
104803
104701
104601
104501
104401
09:50:00
09:55:00
10:00:00
10:05:00
10:10:00
10:15:00
10:20:00
10:25:00
10:30:00
10:35:00
10:40:00
10:45:00
10:50:00
10:55:00
11:00:00
11:05:00
11:10:00
11:15:00
11:20:00
11:25:00
11:30:00
11:35:00
11:40:00
11:45:00



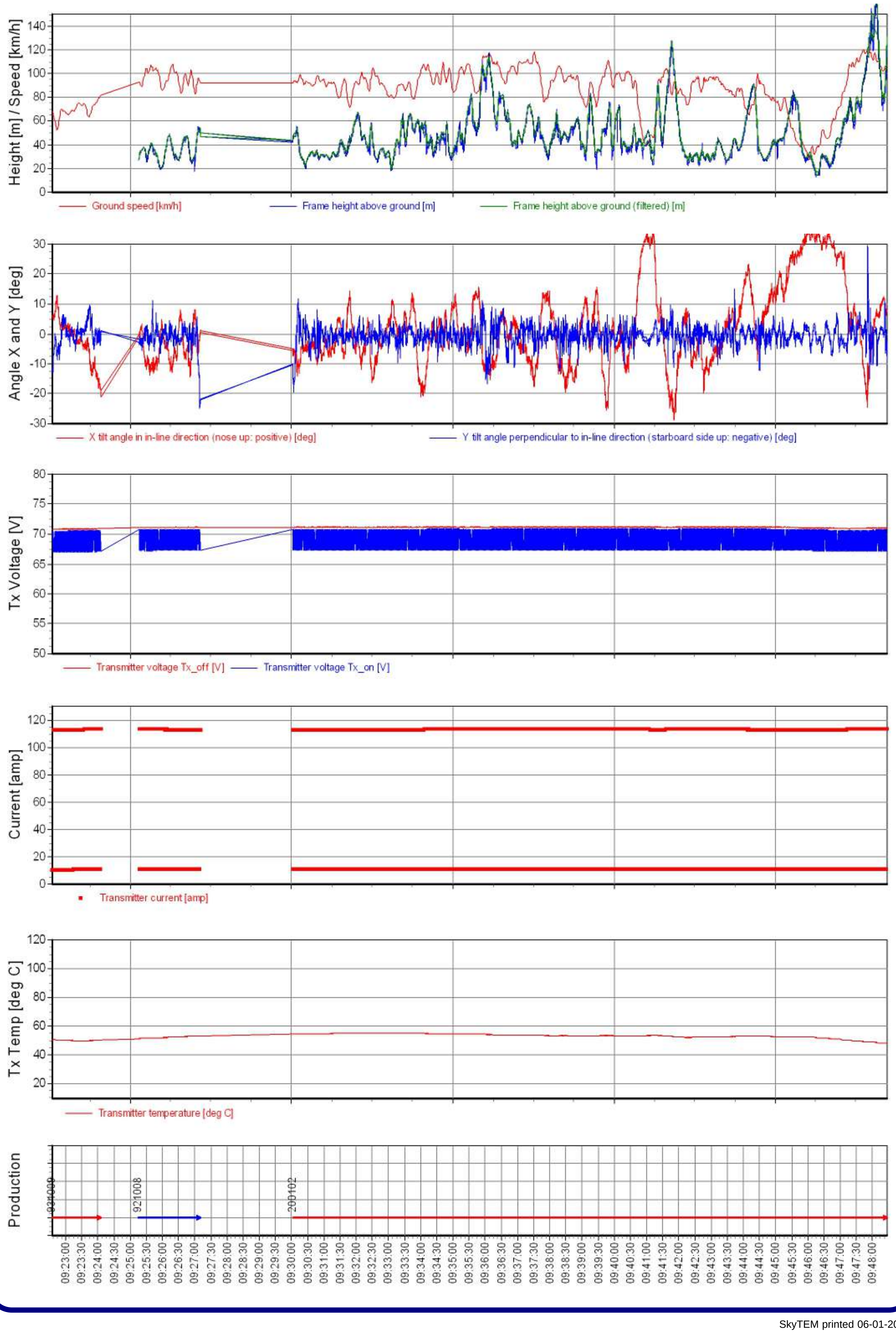
Height [m] / Speed [km/h]
Ground speed [km/h]
Frame height above ground [m]
Frame height above ground (filtered) [m]
Angle X and Y [deg]
X tilt angle in in-line direction (nose up: positive) [deg]
Y tilt angle perpendicular to in-line direction (starboard side up: negative) [deg]
Tx Voltage [V]
Transmitter voltage Tx_off [V]
Transmitter voltage Tx_on [V]
Current [amp]
Transmitter current [amp]
Tx Temp [deg C]
Transmitter temperature [deg C]
Production
104301
104201
931005
921004
12:45:00
12:50:00
12:55:00
13:00:00
13:05:00
13:10:00
13:15:00
13:20:00
13:25:00
13:30:00
13:35:00
13:40:00
13:45:00
13:50:00


Height [m] / Speed [km/h]
Ground speed [km/h]
Frame height above ground [m]
Frame height above ground (filtered) [m]
Angle X and Y [deg]
X tilt angle in in-line direction (nose up: positive) [deg]
Y tilt angle perpendicular to in-line direction (starboard side up: negative) [deg]
Tx Voltage [V]
Transmitter voltage Tx_off [V]
Transmitter voltage Tx_on [V]
Current [amp]
Transmitter current [amp]
Tx Temp [deg C]
Transmitter temperature [deg C]
Production
921005
104101
103901
104001
103801
07:30:00
07:35:00
07:40:00
07:45:00
07:50:00
07:55:00
08:00:00
08:05:00
08:10:00
08:15:00
08:20:00
08:25:00
08:30:00
08:35:00
08:40:00
08:45:00
08:50:00
08:55:00
09:00:00
09:05:00

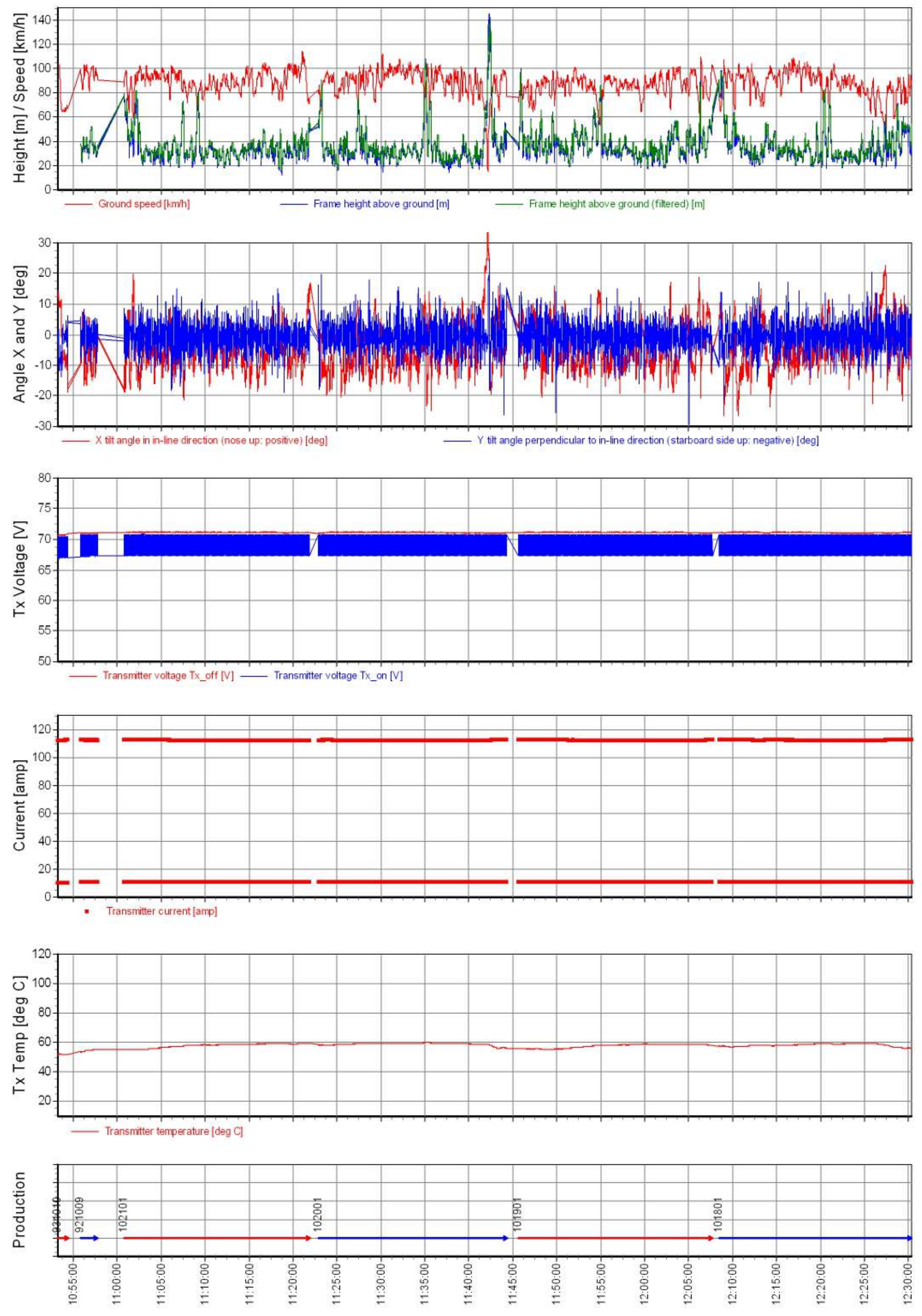

Height [m] / Speed [km/h]
Ground speed [km/h]
Frame height above ground [m]
Frame height above ground (filtered) [m]
Angle X and Y [deg]
X tilt angle in in-line direction (nose up: positive) [deg]
Y tilt angle perpendicular to in-line direction (starboard side up: negative) [deg]
Tx Voltage [V]
Transmitter voltage Tx_off [V]
Transmitter voltage Tx_on [V]
Current [amp]
Transmitter current [amp]
Tx Temp [deg C]
Transmitter temperature [deg C]
Production
921007
921006
103701
103601
103501
103401
10:00:00
10:05:00
10:10:00
10:15:00
10:20:00
10:25:00
10:30:00
10:35:00
10:40:00
10:45:00
10:50:00
10:55:00
11:00:00
11:05:00
11:10:00
11:15:00
11:20:00
11:25:00
11:30:00
11:35:00



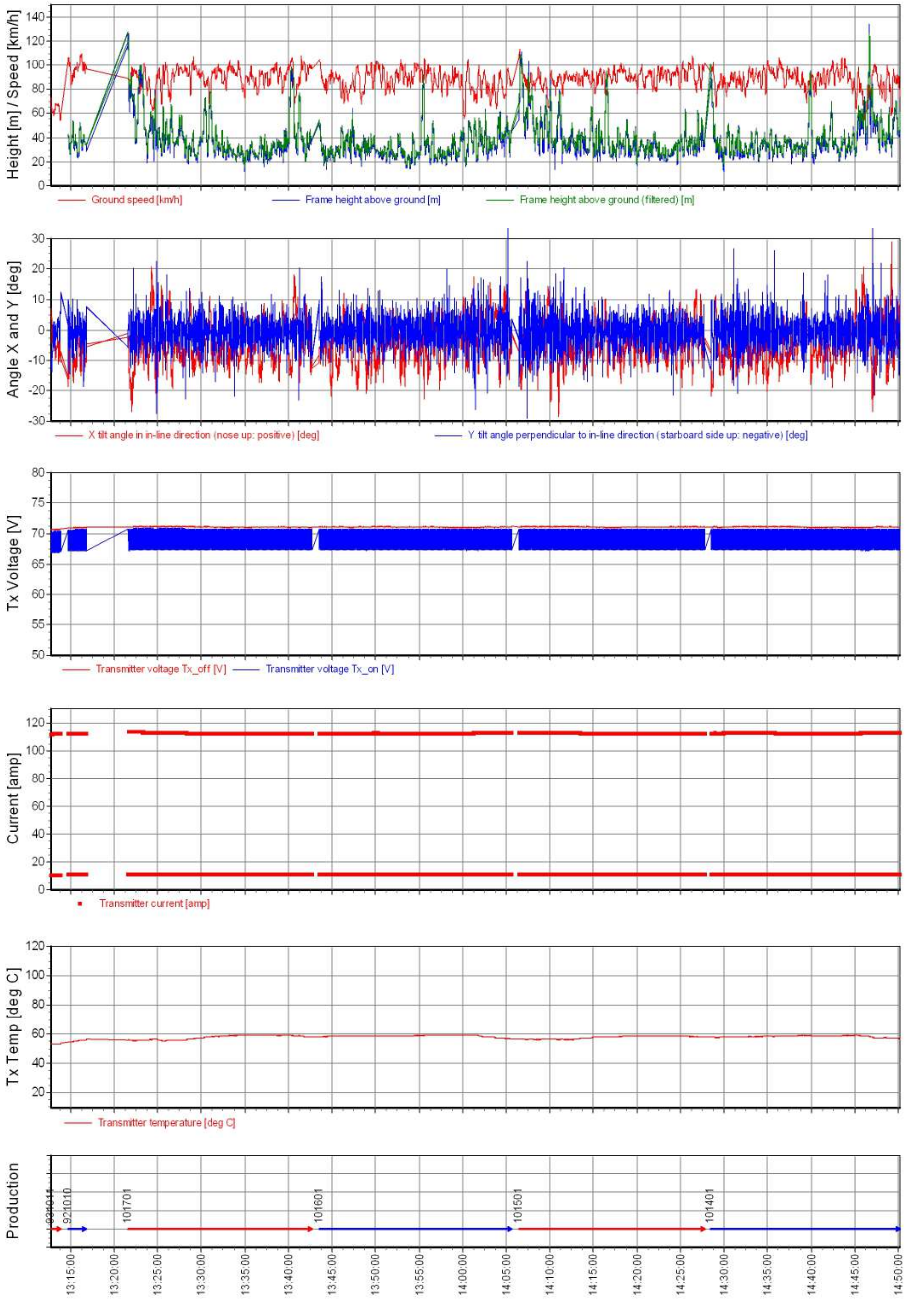
Height [m] / Speed [km/h]
Ground speed [km/h]
Frame height above ground [m]
Frame height above ground (filtered) [m]
Angle X and Y [deg]
X tilt angle in in-line direction (nose up: positive) [deg]
Y tilt angle perpendicular to in-line direction (starboard side up: negative) [deg]
Tx Voltage [V]
Transmitter voltage Tx_off [V]
Transmitter voltage Tx_on [V]
Current [amp]
Transmitter current [amp]
Tx Temp [deg C]
Transmitter temperature [deg C]
Production
102501
102401
102301
102201
12:25:00
12:30:00
12:35:00
12:40:00
12:45:00
12:50:00
12:55:00
13:00:00
13:05:00
13:10:00
13:15:00
13:20:00
13:25:00
13:30:00
13:35:00
13:40:00
13:45:00
13:50:00



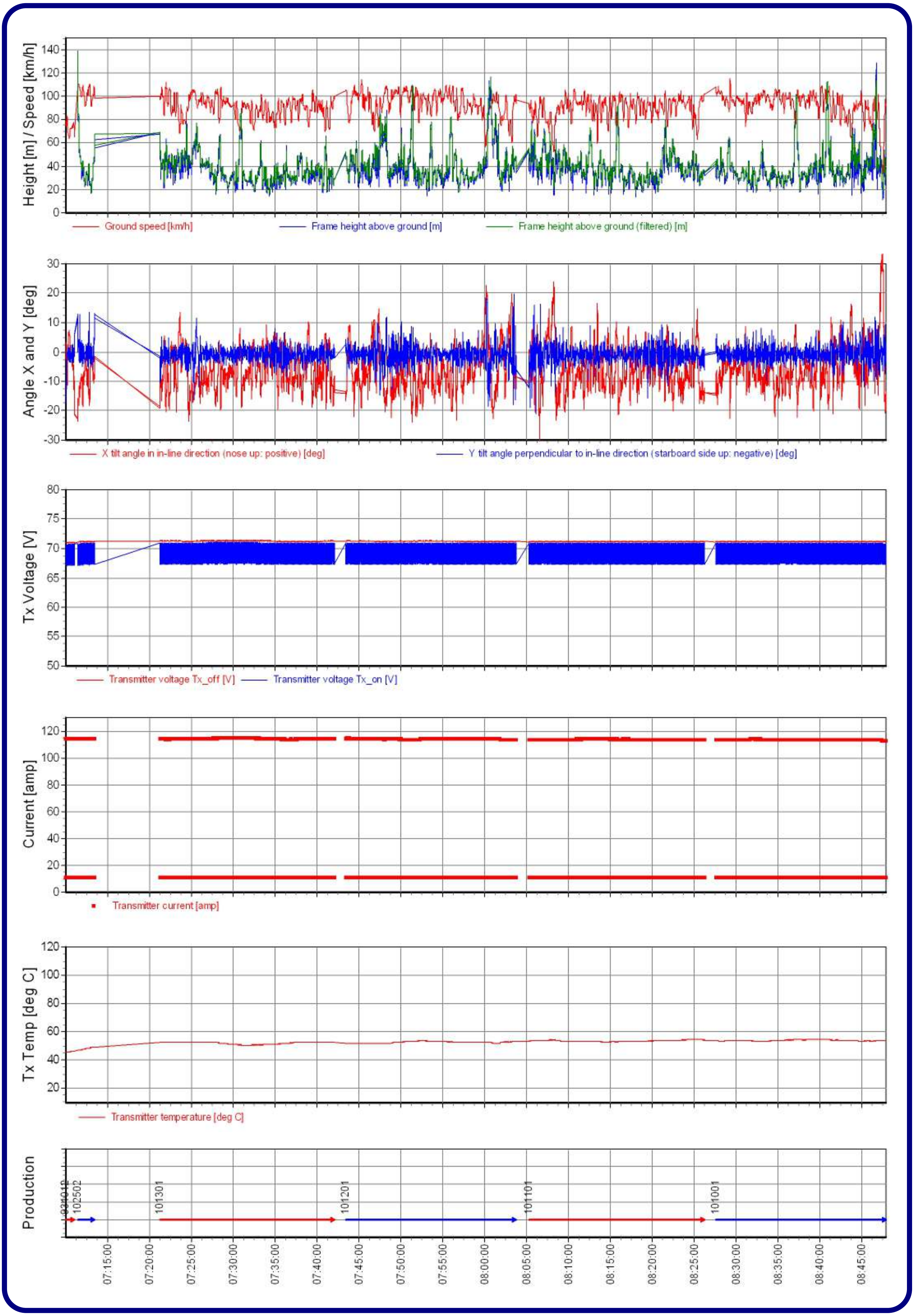
Height [m] / Speed [km/h]
Ground speed [km/h]
Frame height above ground [m]
Frame height above ground (filtered) [m]
Angle X and Y [deg]
X tilt angle in in-line direction (nose up: positive) [deg]
Y tilt angle perpendicular to in-line direction (starboard side up: negative) [deg]
Tx Voltage [V]
Transmitter voltage Tx_off [V]
Transmitter voltage Tx_on [V]
Current [amp]
Transmitter current [amp]
Tx Temp [deg C]
Transmitter temperature [deg C]
Production
921009
921008
200102

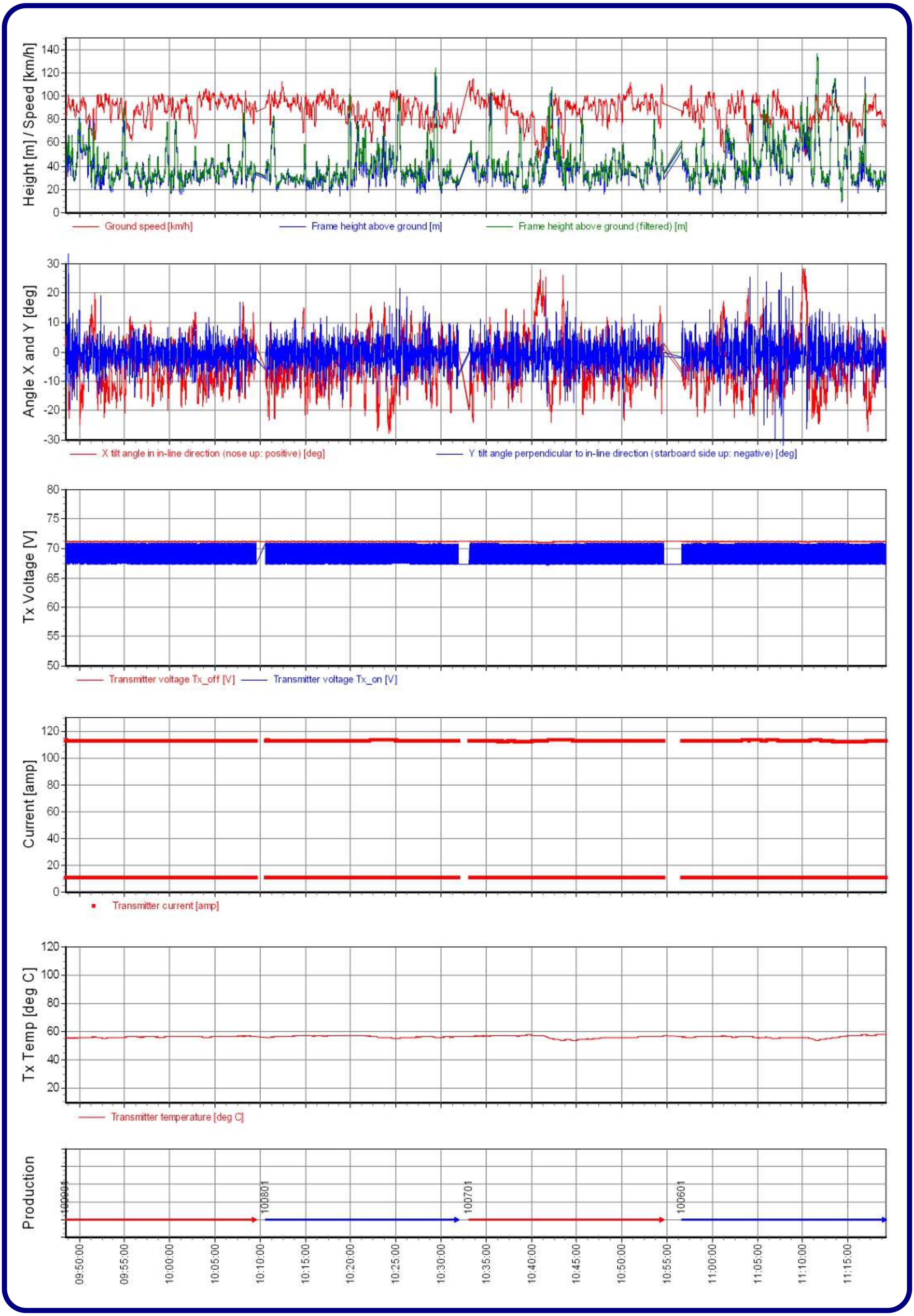


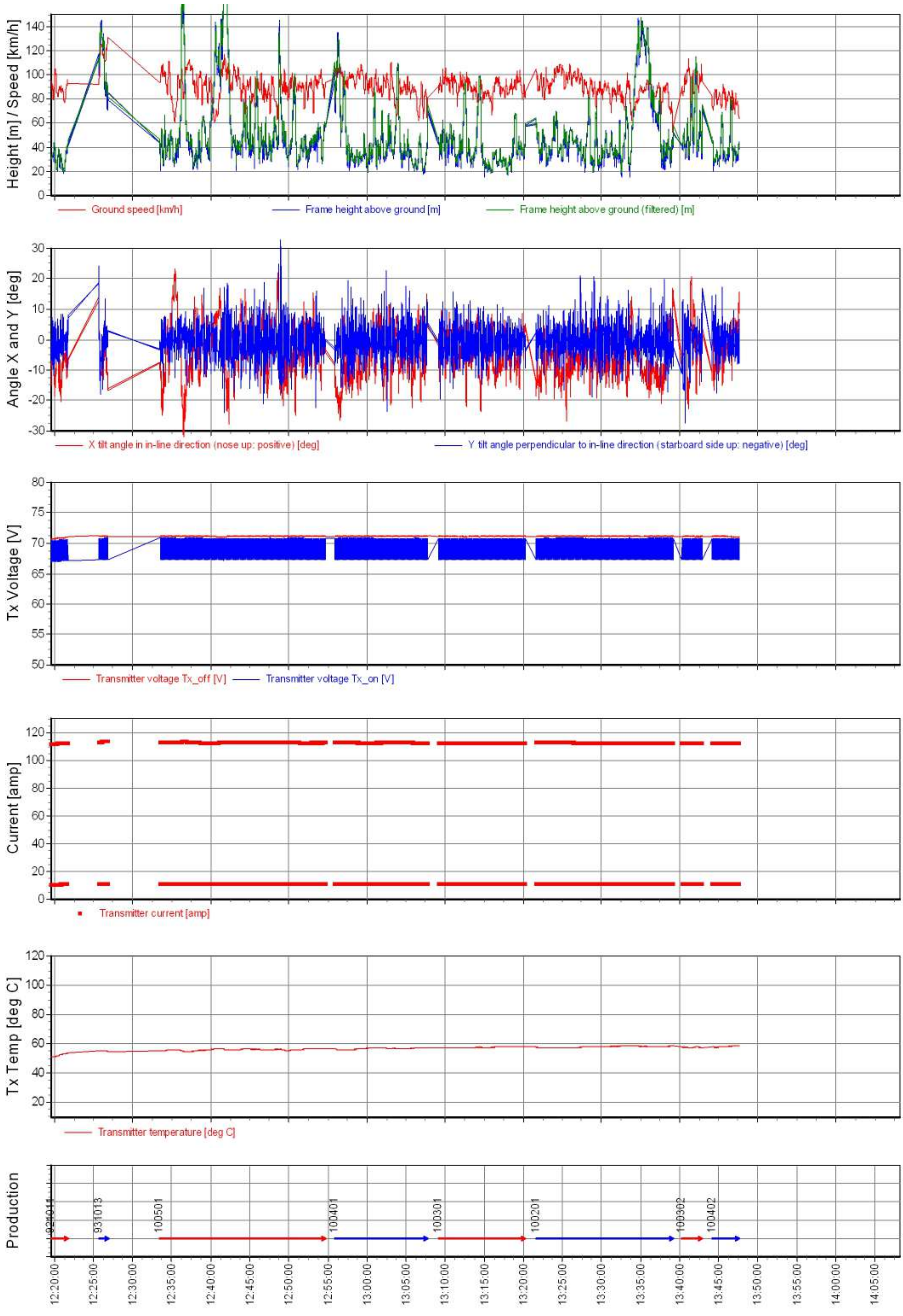
Height [m] / Speed [km/h]
Ground speed [km/h]
Frame height above ground [m]
Frame height above ground (filtered) [m]
Angle X and Y [deg]
X tilt angle in in-line direction (nose up: positive) [deg]
Y tilt angle perpendicular to in-line direction (starboard side up: negative) [deg]
Tx Voltage [V]
Transmitter voltage Tx_off [V]
Transmitter voltage Tx_on [V]
Current [amp]
Transmitter current [amp]
Tx Temp [deg C]
Transmitter temperature [deg C]
Production
921010
921009
102101
102001
101901
101801
10:55:00
11:00:00
11:05:00
11:10:00
11:15:00
11:20:00
11:25:00
11:30:00
11:35:00
11:40:00
11:45:00
11:50:00
11:55:00
12:00:00
12:05:00
12:10:00
12:15:00
12:20:00
12:25:00
12:30:00

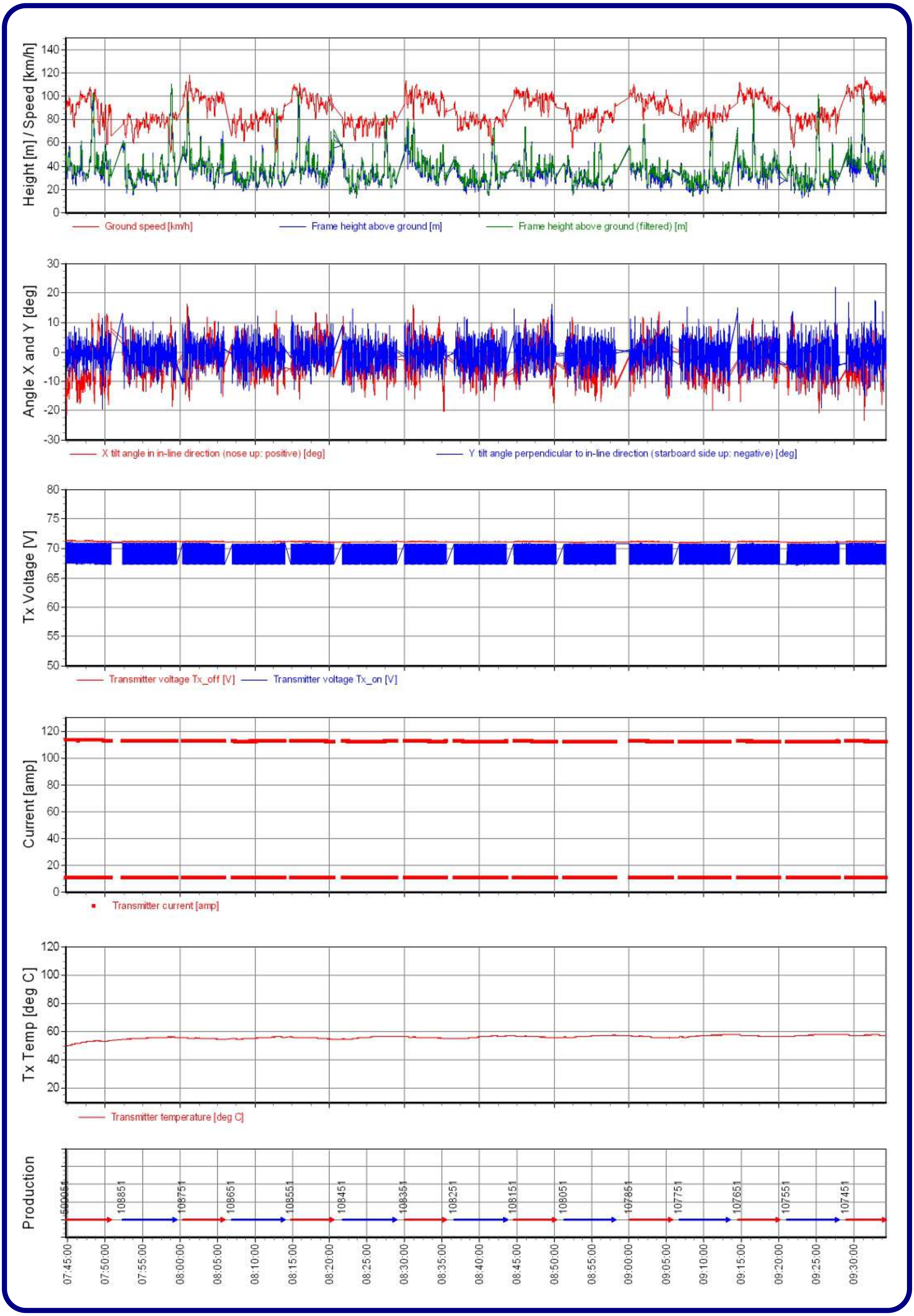


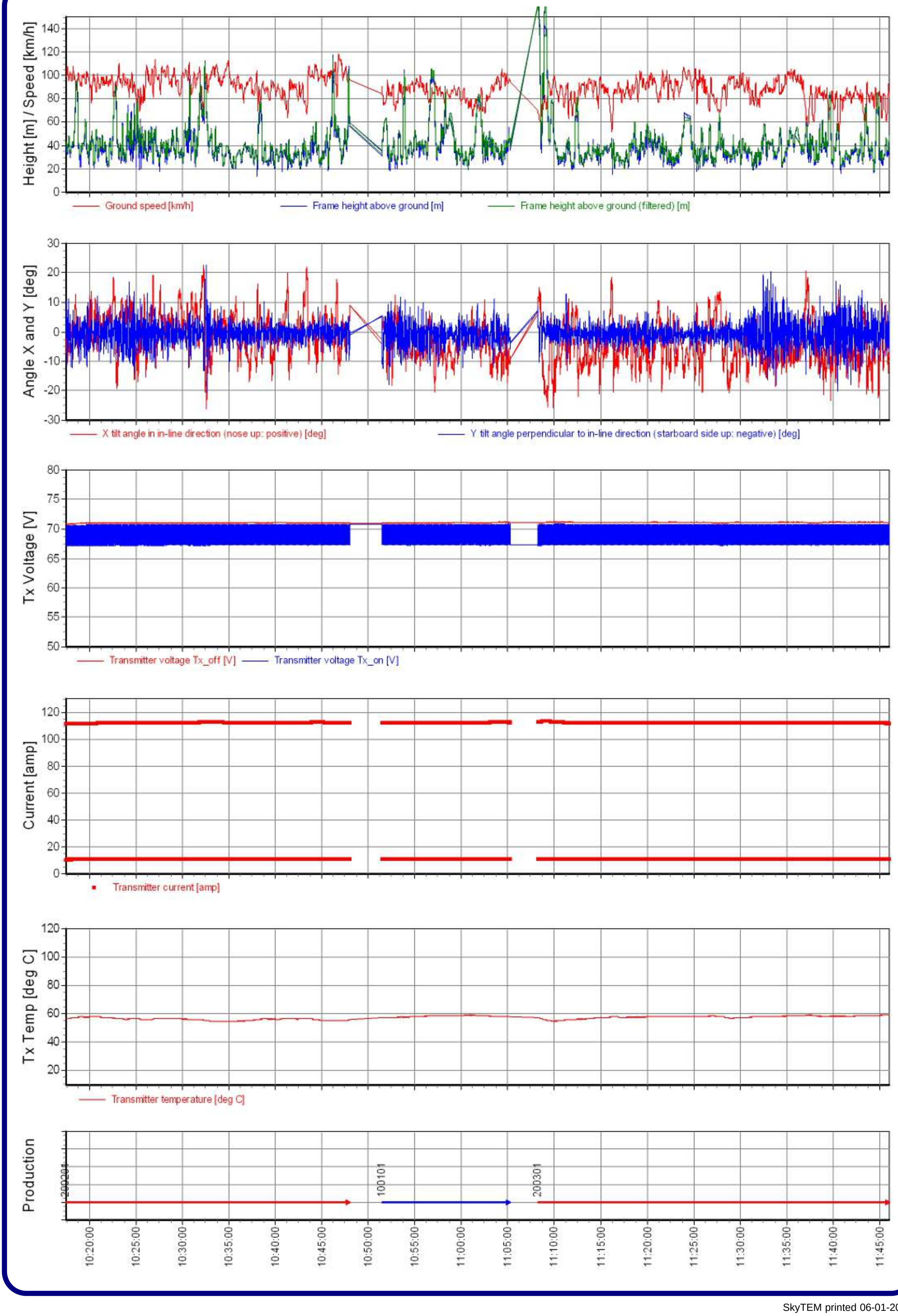
Height [m] / Speed [km/h]
Ground speed [km/h]
Frame height above ground [m]
Frame height above ground (filtered) [m]
Angle X and Y [deg]
X tilt angle in in-line direction (nose up: positive) [deg]
Y tilt angle perpendicular to in-line direction (starboard side up: negative) [deg]
Tx Voltage [V]
Transmitter voltage Tx_off [V]
Transmitter voltage Tx_on [V]
Current [amp]
Transmitter current [amp]
Tx Temp [deg C]
Transmitter temperature [deg C]
Production
921010
101701
101601
101501
101401
13:15:00
13:20:00
13:25:00
13:30:00
13:35:00
13:40:00
13:45:00
13:50:00
13:55:00
14:00:00
14:05:00
14:10:00
14:15:00
14:20:00
14:25:00
14:30:00
14:35:00
14:40:00
14:45:00
14:50:00

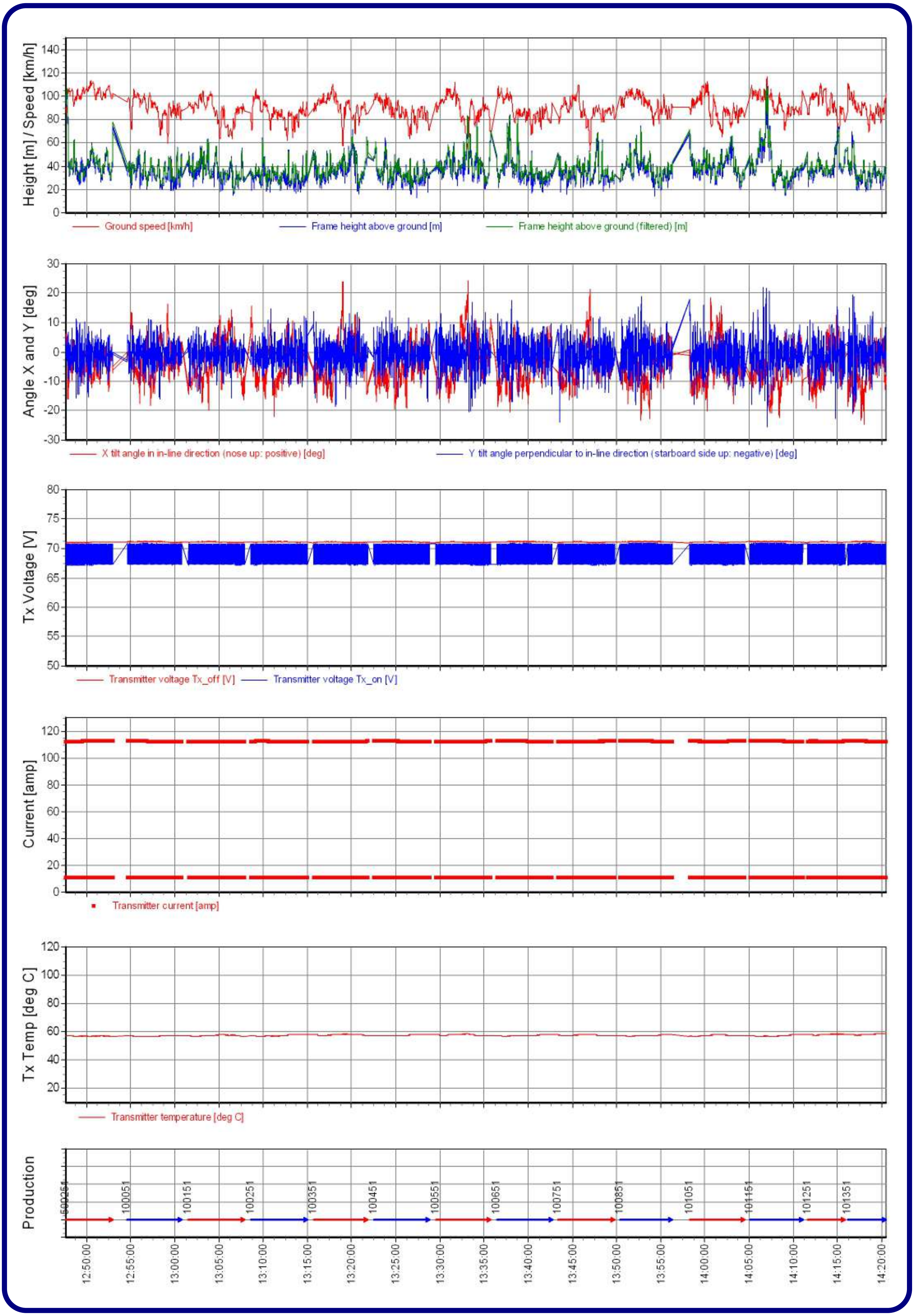

Height [m] / Speed [km/h]
Ground speed [km/h]
Frame height above ground [m]
Frame height above ground (filtered) [m]
Angle X and Y [deg]
X tilt angle in in-line direction (nose up: positive) [deg]
Y tilt angle perpendicular to in-line direction (starboard side up: negative) [deg]
Tx Voltage [V]
Transmitter voltage Tx_off [V]
Transmitter voltage Tx_on [V]
Current [amp]
Transmitter current [amp]
Tx Temp [deg C]
Transmitter temperature [deg C]
Production
102502
101301
101201
101101
101001
07:15:00
07:20:00
07:25:00
07:30:00
07:35:00
07:40:00
07:45:00
07:50:00
07:55:00
08:00:00
08:05:00
08:10:00
08:15:00
08:20:00
08:25:00
08:30:00
08:35:00
08:40:00
08:45:00

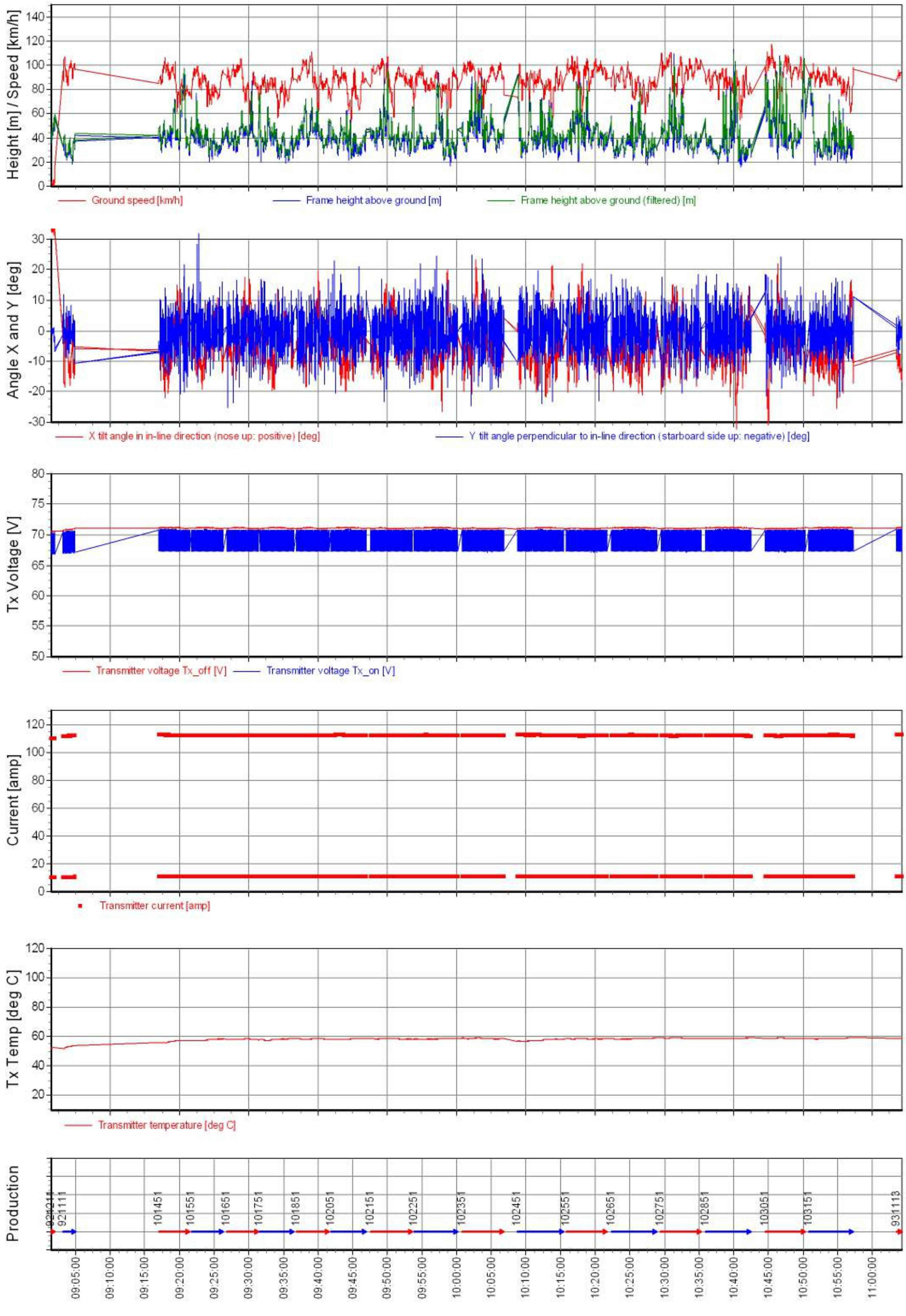

Height [m] / Speed [km/h]
Ground speed [km/h]
Frame height above ground [m]
Frame height above ground (filtered) [m]
Angle X and Y [deg]
X tilt angle in in-line direction (nose up: positive) [deg]
Y tilt angle perpendicular to in-line direction (starboard side up: negative) [deg]
Tx Voltage [V]
Transmitter voltage Tx_off [V]
Transmitter voltage Tx_on [V]
Current [amp]
Transmitter current [amp]
Tx Temp [deg C]
Transmitter temperature [deg C]
Production
100801
100701
100601
09:50:00
09:55:00
10:00:00
10:05:00
10:10:00
10:15:00
10:20:00
10:25:00
10:30:00
10:35:00
10:40:00
10:45:00
10:50:00
10:55:00
11:00:00
11:05:00
11:10:00
11:15:00


Height [m] / Speed [km/h]
Ground speed [km/h]
Frame height above ground [m]
Frame height above ground (filtered) [m]
Angle X and Y [deg]
X tilt angle in in-line direction (nose up: positive) [deg]
Y tilt angle perpendicular to in-line direction (starboard side up: negative) [deg]
Tx Voltage [V]
Transmitter voltage Tx_off [V]
Transmitter voltage Tx_on [V]
Current [amp]
Transmitter current [amp]
Tx Temp [deg C]
Transmitter temperature [deg C]
Production
931014
931013
100501
100401
100301
100201
100302
100402
12:20:00
12:25:00
12:30:00
12:35:00
12:40:00
12:45:00
12:50:00
12:55:00
13:00:00
13:05:00
13:10:00
13:15:00
13:20:00
13:25:00
13:30:00
13:35:00
13:40:00
13:45:00
13:50:00
13:55:00
14:00:00
14:05:00

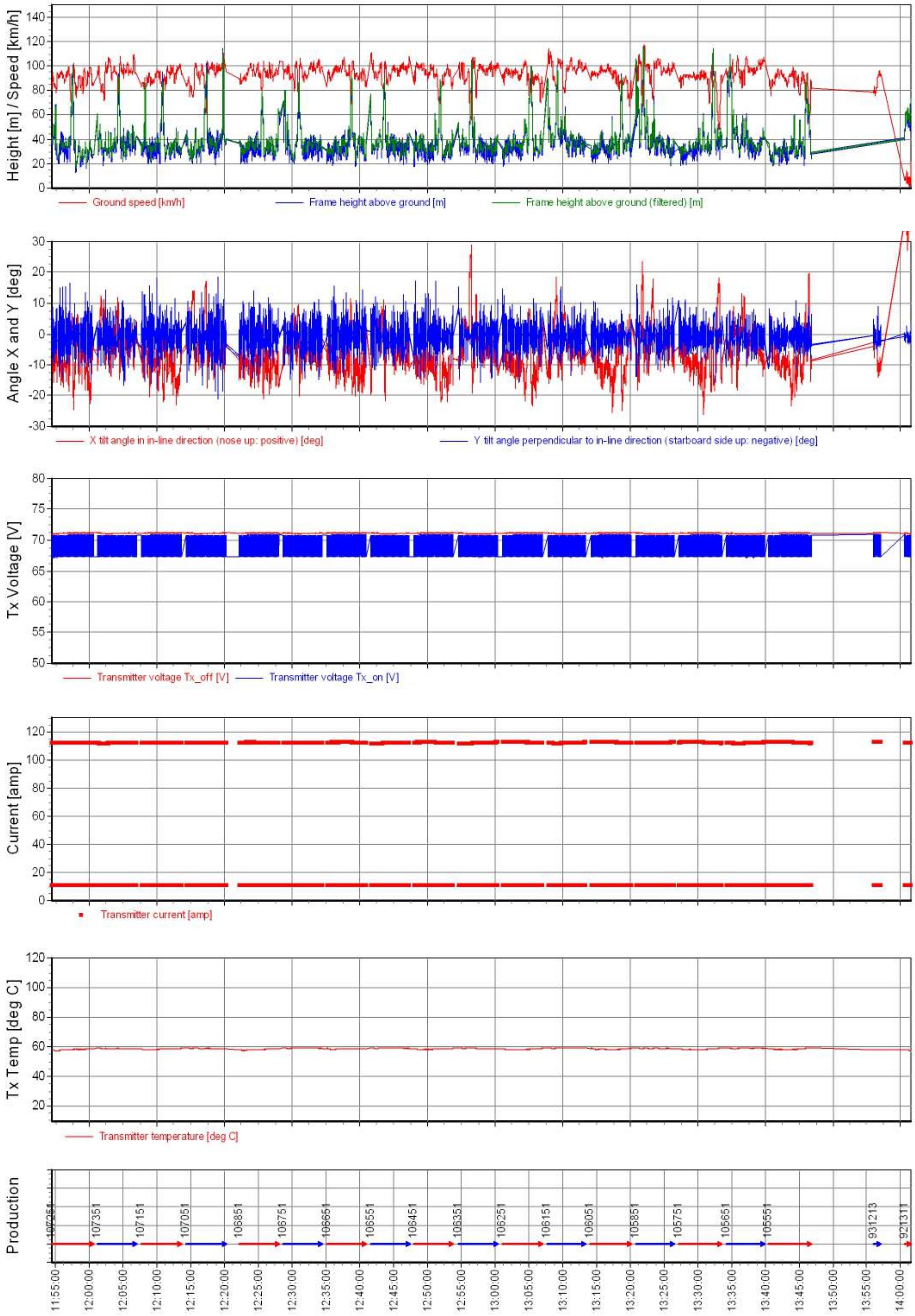

Height [m] / Speed [km/h]
Ground speed [km/h]
Frame height above ground [m]
Frame height above ground (filtered) [m]
Angle X and Y [deg]
X tilt angle in in-line direction (nose up: positive) [deg]
Y tilt angle perpendicular to in-line direction (starboard side up: negative) [deg]
Tx Voltage [V]
Transmitter voltage Tx_off [V]
Transmitter voltage Tx_on [V]
Current [amp]
Transmitter current [amp]
Tx Temp [deg C]
Transmitter temperature [deg C]
Production
108851
108751
108651
108551
108451
108351
108251
108151
108051
107851
107751
107651
107551
107451
07:45:00
07:50:00
07:55:00
08:00:00
08:05:00
08:10:00
08:15:00
08:20:00
08:25:00
08:30:00
08:35:00
08:40:00
08:45:00
08:50:00
08:55:00
09:00:00
09:05:00
09:10:00
09:15:00
09:20:00
09:25:00
09:30:00

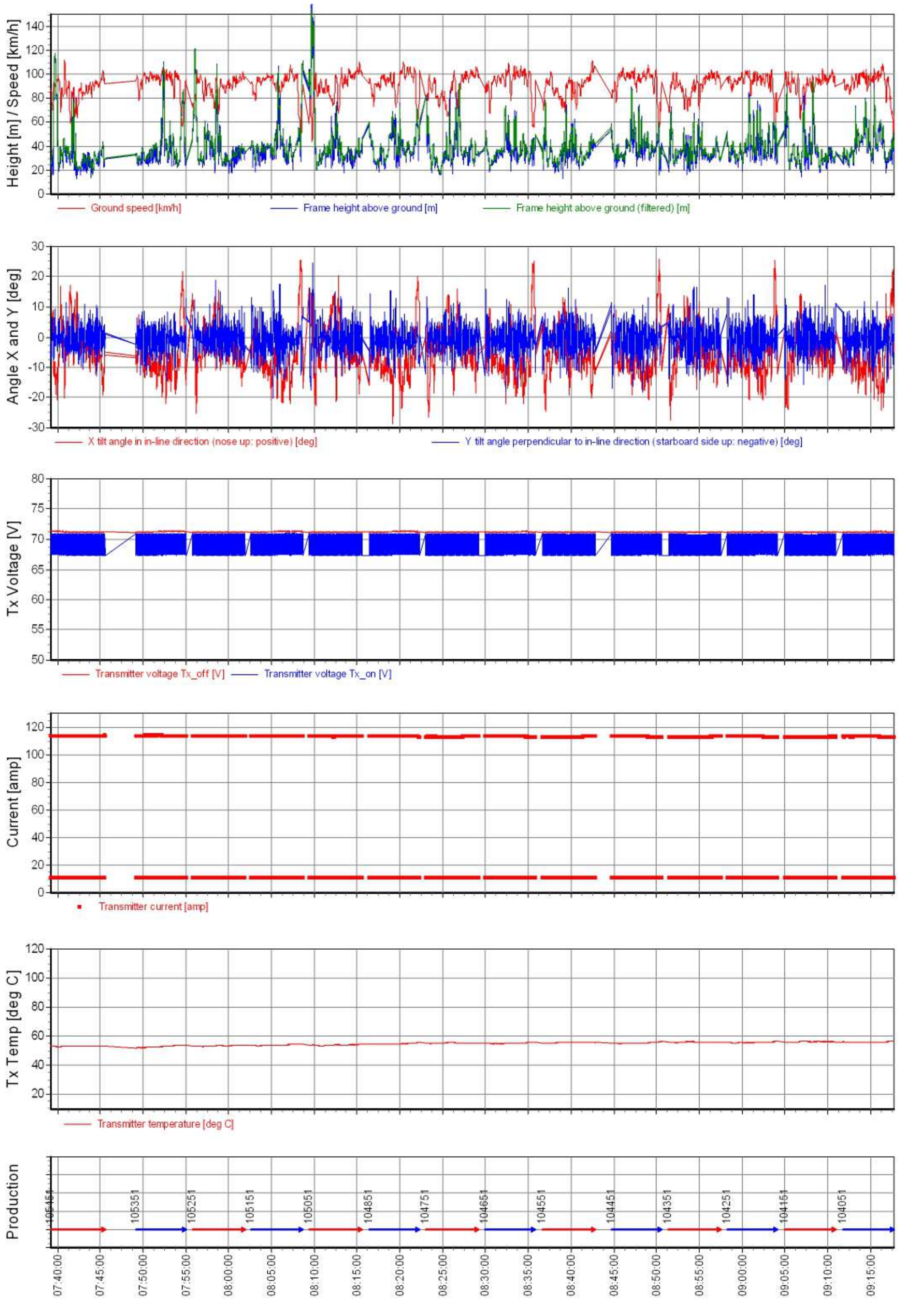

Height [m] / Speed [km/h]
Ground speed [km/h]
Frame height above ground [m]
Frame height above ground (filtered) [m]
Angle X and Y [deg]
X tilt angle in in-line direction (nose up: positive) [deg]
Y tilt angle perpendicular to in-line direction (starboard side up: negative) [deg]
Tx Voltage [V]
Transmitter voltage Tx_off [V]
Transmitter voltage Tx_on [V]
Current [amp]
Transmitter current [amp]
Tx Temp [deg C]
Transmitter temperature [deg C]
Production
200201
100101
200301
10:20:00
10:25:00
10:30:00
10:35:00
10:40:00
10:45:00
10:50:00
10:55:00
11:00:00
11:05:00
11:10:00
11:15:00
11:20:00
11:25:00
11:30:00
11:35:00
11:40:00
11:45:00


Height [m] / Speed [km/h]
Ground speed [km/h]
Frame height above ground [m]
Frame height above ground (filtered) [m]
Angle X and Y [deg]
X tilt angle in in-line direction (nose up: positive) [deg]
Y tilt angle perpendicular to in-line direction (starboard side up: negative) [deg]
Tx Voltage [V]
Transmitter voltage Tx_off [V]
Transmitter voltage Tx_on [V]
Current [amp]
Transmitter current [amp]
Tx Temp [deg C]
Transmitter temperature [deg C]
Production
100051
100151
100251
100351
100451
100551
100651
100751
100851
101051
101151
101251
101351
12:50:00
12:55:00
13:00:00
13:05:00
13:10:00
13:15:00
13:20:00
13:25:00
13:30:00
13:35:00
13:40:00
13:45:00
13:50:00
13:55:00
14:00:00
14:05:00
14:10:00
14:15:00
14:20:00

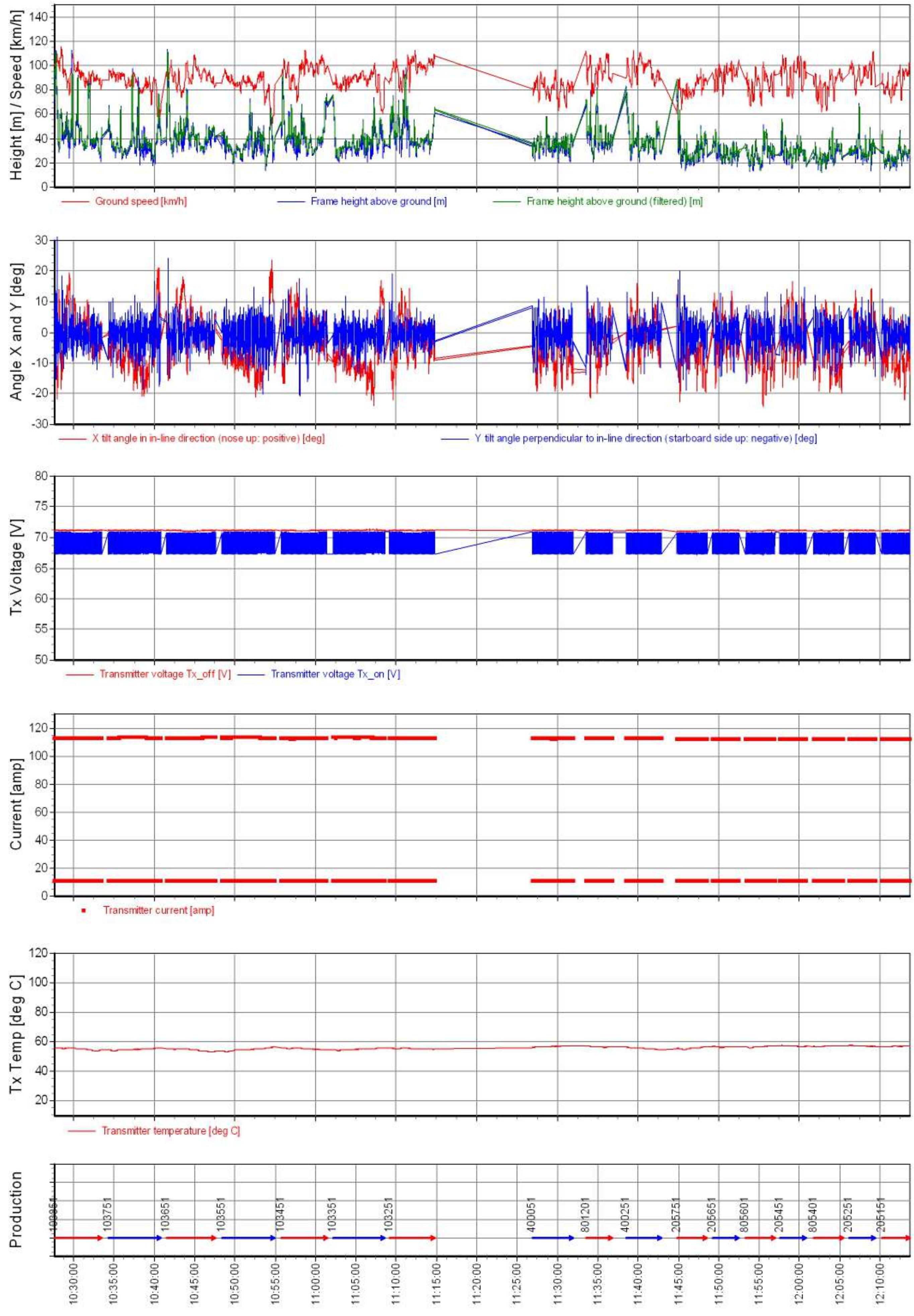


Height [m] / Speed [km/h]
Ground speed [km/h]
Frame height above ground [m]
Frame height above ground (filtered) [m]
Angle X and Y [deg]
X tilt angle in in-line direction (nose up: positive) [deg]
Y tilt angle perpendicular to in-line direction (starboard side up: negative) [deg]
Tx Voltage [V]
Transmitter voltage Tx_off [V]
Transmitter voltage Tx_on [V]
Current [amp]
Transmitter current [amp]
Tx Temp [deg C]
Transmitter temperature [deg C]
Production
921111
101451
101551
101651
101751
101851
102051
102151
102251
102351
102451
102551
102651
102751
102851
103051
103151
931113
09:05:00
09:10:00
09:15:00
09:20:00
09:25:00
09:30:00
09:35:00
09:40:00
09:45:00
09:50:00
09:55:00
10:00:00
10:05:00
10:10:00
10:15:00
10:20:00
10:25:00
10:30:00
10:35:00
10:40:00
10:45:00
10:50:00
10:55:00
11:00:00

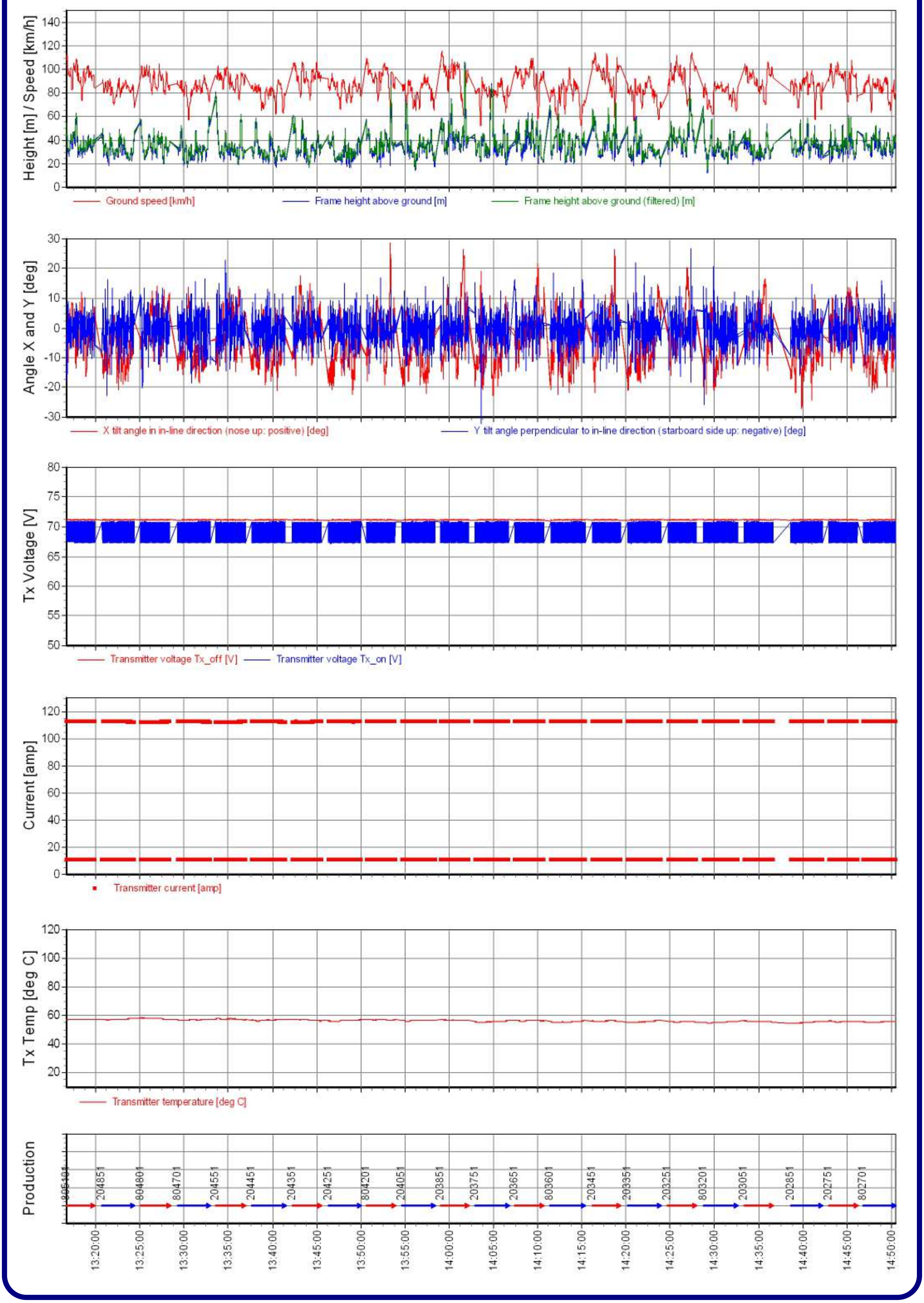

Height [m] / Speed [km/h]
Ground speed [km/h]
Frame height above ground [m]
Frame height above ground (filtered) [m]
Angle X and Y [deg]
X tilt angle in in-line direction (nose up: positive) [deg]
Y tilt angle perpendicular to in-line direction (starboard side up: negative) [deg]
Tx Voltage [V]
Transmitter voltage Tx_off [V]
Transmitter voltage Tx_on [V]
Current [amp]
Transmitter current [amp]
Tx Temp [deg C]
Transmitter temperature [deg C]
Production
107351
107151
107051
106851
106751
106651
106551
106451
106351
106251
106151
106051
105851
105751
105651
105551
931213
921311
11:55:00
12:00:00
12:05:00
12:10:00
12:15:00
12:20:00
12:25:00
12:30:00
12:35:00
12:40:00
12:45:00
12:50:00
12:55:00
13:00:00
13:05:00
13:10:00
13:15:00
13:20:00
13:25:00
13:30:00
13:35:00
13:40:00
13:45:00
13:50:00
13:55:00
14:00:00

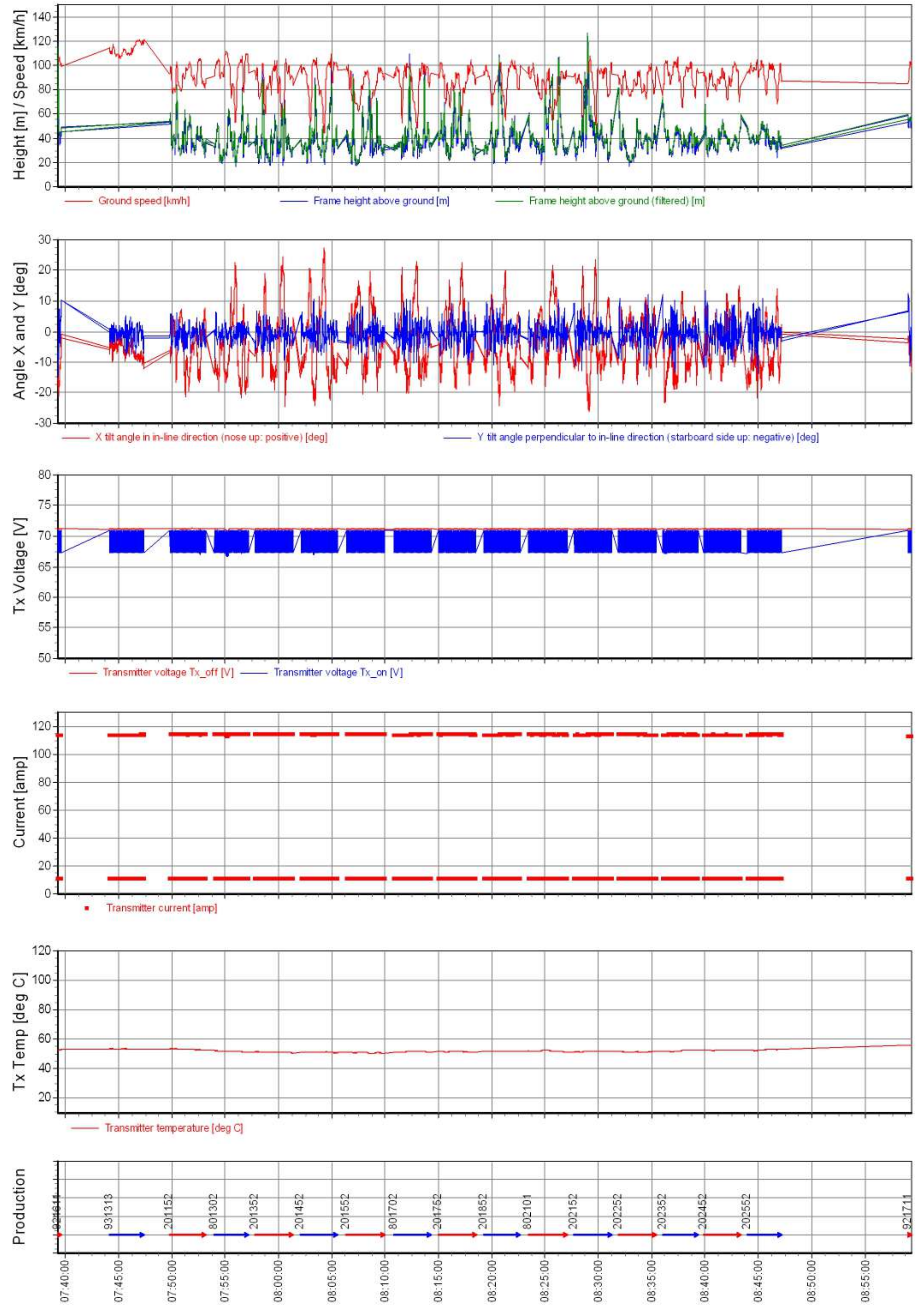

Height [m] / Speed [km/h]
Ground speed [km/h]
Frame height above ground [m]
Frame height above ground (filtered) [m]
Angle X and Y [deg]
X tilt angle in in-line direction (nose up: positive) [deg]
Y tilt angle perpendicular to in-line direction (starboard side up: negative) [deg]
Tx Voltage [V]
Transmitter voltage Tx_off [V]
Transmitter voltage Tx_on [V]
Current [amp]
Transmitter current [amp]
Tx Temp [deg C]
Transmitter temperature [deg C]
Production
105351
105251
105151
105051
104851
104751
104651
104551
104451
104351
104251
104151
104051
07:40:00
07:45:00
07:50:00
07:55:00
08:00:00
08:05:00
08:10:00
08:15:00
08:20:00
08:25:00
08:30:00
08:35:00
08:40:00
08:45:00
08:50:00
08:55:00
09:00:00
09:05:00
09:10:00
09:15:00

20111213.02



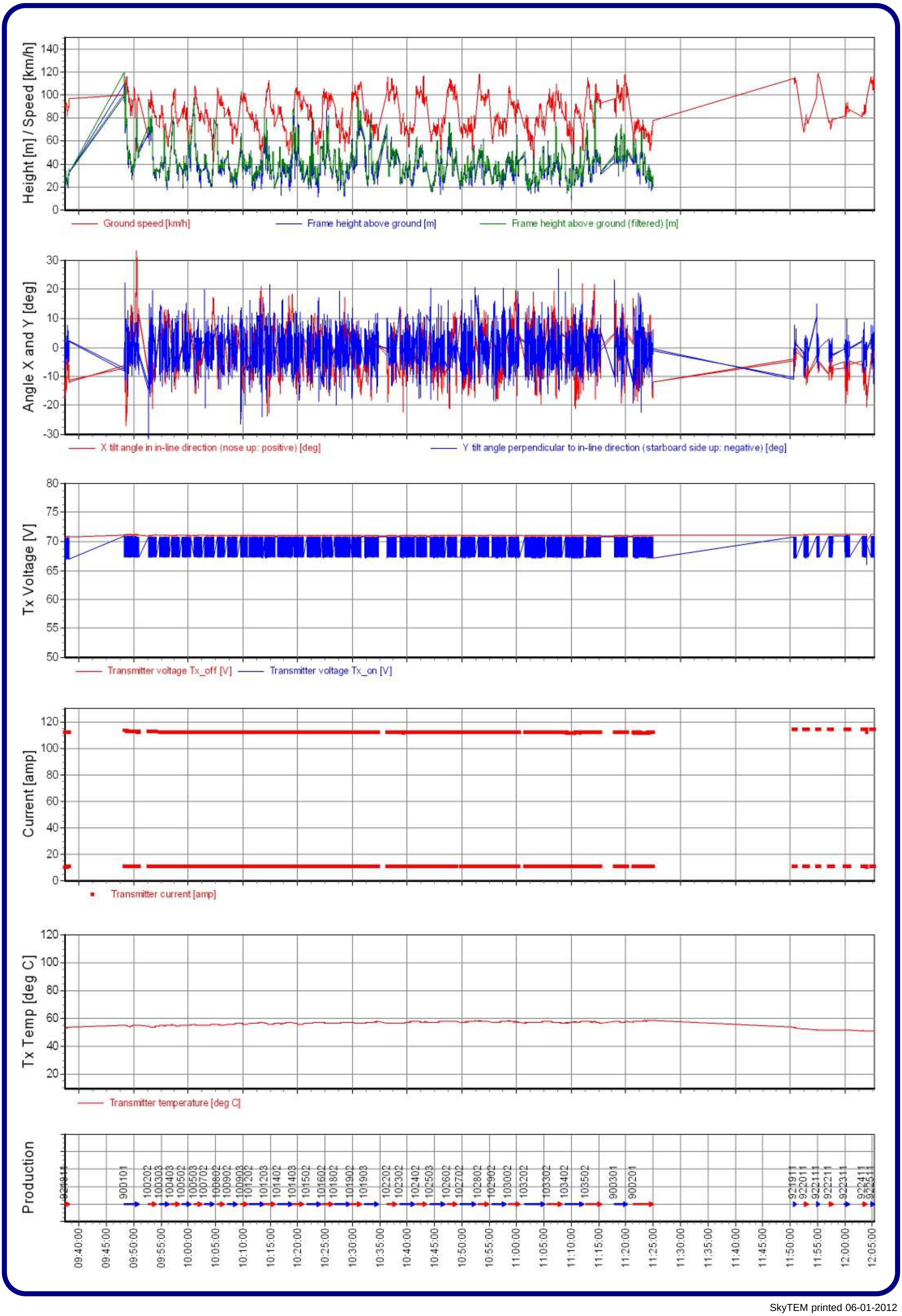
Height [m] / Speed [km/h]
Ground speed [km/h]
Frame height above ground [m]
Frame height above ground (filtered) [m]
Angle X and Y [deg]
X tilt angle in in-line direction (nose up: positive) [deg]
Y tilt angle perpendicular to in-line direction (starboard side up: negative) [deg]
Tx Voltage [V]
Transmitter voltage Tx_off [V]
Transmitter voltage Tx_on [V]
Current [amp]
Transmitter current [amp]
Tx Temp [deg C]
Transmitter temperature [deg C]
Production
103751
103651
103551
103451
103351
103251
400051
801201
400251
205751
205651
805601
205451
805401
205251
205151
10:30:00
10:35:00
10:40:00
10:45:00
10:50:00
10:55:00
11:00:00
11:05:00
11:10:00
11:15:00
11:20:00
11:25:00
11:30:00
11:35:00
11:40:00
11:45:00
11:50:00
11:55:00
12:00:00
12:05:00
12:10:00


Height [m] / Speed [km/h]
Ground speed [km/h]
Frame height above ground [m]
Frame height above ground (filtered) [m]
Angle X and Y [deg]
X tilt angle in in-line direction (nose up: positive) [deg]
Y tilt angle perpendicular to in-line direction (starboard side up: negative) [deg]
Tx Voltage [V]
Transmitter voltage Tx_off [V]
Transmitter voltage Tx_on [V]
Current [amp]
Transmitter current [amp]
Tx Temp [deg C]
Transmitter temperature [deg C]
Production
204851
804801
804701
204551
204451
204351
204251
804201
204051
203851
203751
203651
803601
203451
203351
203251
803201
203051
202851
202751
802701
13:20:00
13:25:00
13:30:00
13:35:00
13:40:00
13:45:00
13:50:00
13:55:00
14:00:00
14:05:00
14:10:00
14:15:00
14:20:00
14:25:00
14:30:00
14:35:00
14:40:00
14:45:00
14:50:00

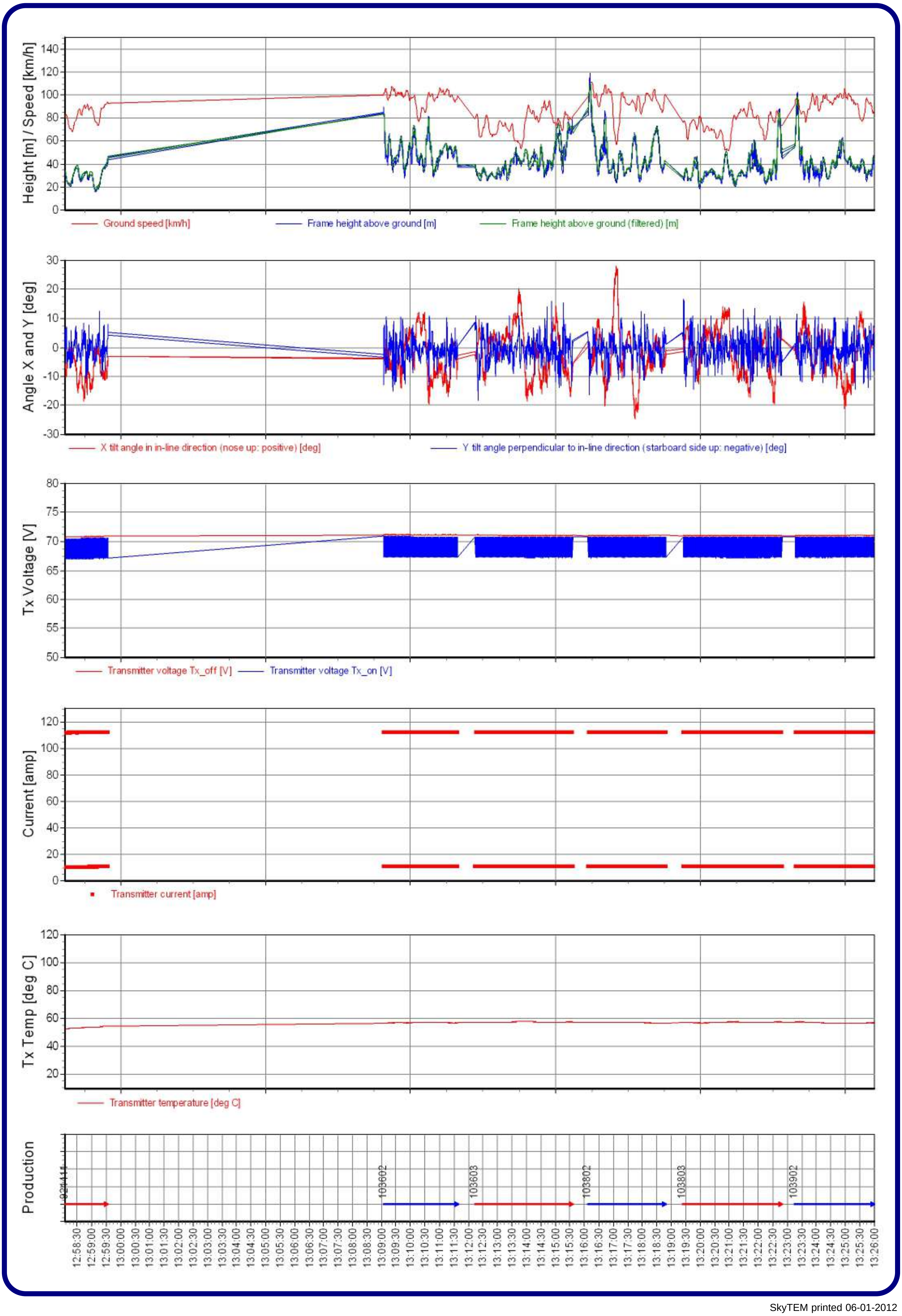


Height [m] / Speed [km/h]
Ground speed [km/h]
Frame height above ground [m]
Frame height above ground (filtered) [m]
Angle X and Y [deg]
X tilt angle in in-line direction (nose up: positive) [deg]
Y tilt angle perpendicular to in-line direction (starboard side up: negative) [deg]
Tx Voltage [V]
Transmitter voltage Tx_off [V]
Transmitter voltage Tx_on [V]
Current [amp]
Transmitter current [amp]
Tx Temp [deg C]
Transmitter temperature [deg C]
Production
931313
201152
801302
201352
201452
201552
801702
201752
201852
802101
202152
202252
202352
202452
202552
921711
07:40:00
07:45:00
07:50:00
07:55:00
08:00:00
08:05:00
08:10:00
08:15:00
08:20:00
08:25:00
08:30:00
08:35:00
08:40:00
08:45:00
08:50:00
08:55:00

20111214.02


Height [m] / Speed [km/h]
Ground speed [km/h]
Frame height above ground [m]
Frame height above ground (filtered) [m]
Angle X and Y [deg]
X tilt angle in in-line direction (nose up: positive) [deg]
Y tilt angle perpendicular to in-line direction (starboard side up: negative) [deg]
Tx Voltage [V]
Transmitter voltage Tx_off [V]
Transmitter voltage Tx_on [V]
Current [amp]
Transmitter current [amp]
Tx Temp [deg C]
Transmitter temperature [deg C]
Production
09:40:00
09:45:00
09:50:00
09:55:00
10:00:00
10:05:00
10:10:00
10:15:00
10:20:00
10:25:00
10:30:00
10:35:00
10:40:00
10:45:00
10:50:00
10:55:00
11:00:00
11:05:00
11:10:00
11:15:00
11:20:00
11:25:00
11:30:00
11:35:00
11:40:00
11:45:00
11:50:00
11:55:00
12:00:00
12:05:00

20111214.03



Height [m] / Speed [km/h]
Ground speed [km/h]
Frame height above ground [m]
Frame height above ground (filtered) [m]
Angle X and Y [deg]
X tilt angle in in-line direction (nose up: positive) [deg]
Y tilt angle perpendicular to in-line direction (starboard side up: negative) [deg]
Tx Voltage [V]
Transmitter voltage Tx_off [V]
Transmitter voltage Tx_on [V]
Current [amp]
Transmitter current [amp]
Tx Temp [deg C]
Transmitter temperature [deg C]
Production
103602
103603
103802
103803
103902
12:58:30
13:26:00

Appendix 5: Digital data

The digital data are listed in the following folders.

Data delivery folder	Sub folder	Sub folders	File format	Comment
01_Raw_Data_ EM_Mag			.gdb	Geosoft database including raw EM and mag data ready for import
02_RawData_ Workbench	Geofile		.geo	All files relevant for import in Workbench
	Maskfile		.lin	
	Rawdata		.sps & .skb	
03_Grids	01_mag	RMF TMI	.grd	Geosoft grids of magnetic data (TMI and RMF)
04_Maps	01_Mag		.map .pdf	Geosoft maps and pdf's of magnetic data.
	02_DEM		.map .pdf	Geosoft maps and pdf's of digital elevation model, planned and flown lines.
	03_LinePath		.pdf .tab	
	04_PlannedFlightLines		.pdf .tab	MapInfo .tab files of planned – and flown lines
05_Report			.pdf	Report and appendices