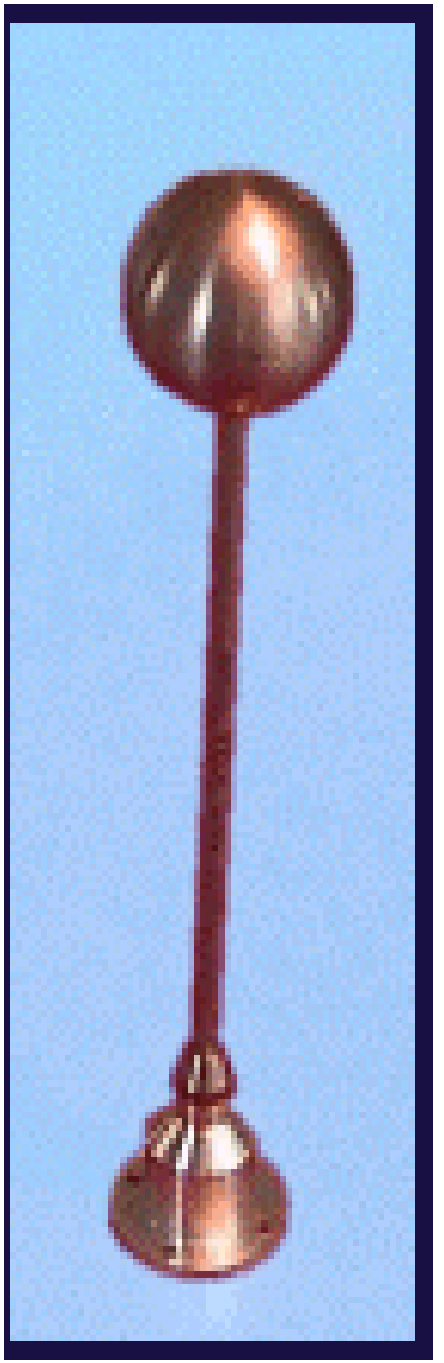
ROSETTA PLASMA CONSORTIUM
LANGMUIR PROBE

Probe Radius:	25 mm
Bias Voltage Range:	±31 V
Bias Current Range:	±44 nA
Current Measurement Range:	±0.2 mA (low gain) ±0.01 mA (high gain)
Voltage Measurement Range:	±40 V
Analog Anti-Aliasing Filters:	20 Hz, 4 kHz, 8 kHz
Digital Filters:	Flexible, in Flight Software
Number of spherical Probes:	2
Probe Surface Coating:	Titanium Nitride
ADCs for Each Probe:	16 bit at 18.75 kHz (high rate) 20 bit at 57.8 Hz (low rate)
Boom Length:	2.24 m for Probe 1 1.62 m for Probe 2

Each probe can individually operate in bias voltage or bias current mode

Internal offset determination and calibration by possibility to sweep over open probe or internal resistor

One of the probes can be used by RPC-MIP in its long Debye length mode



RPC LAP
Data Set Evaluation Tools

Evaluation -
- Machine: IBM lenovo T60p ThinkPad
- Operating System: openSUSE 10.2

Staging -
- Machine: Dell Precision T3400
- Operating System: Red Hat Enterprise Linux

Data Processing -
- Machine: Sun Ultra-350
- Operating System: Sun Solaris OS 5.9

RPC LAP Data Sets

ro-a-rpclap-2-ast2-edited-v1.0

ro-a-rpclap-3-ast2-calib-v1.0

ro-a-rpclap-2-ast2-edited-v1.0
ro-a-rpclap-3-ast2-calib-v1.0
voldesc.cat

- The volume name keyword is different for both data sets and does not look correct. What should it be?

DATA_SET_ID = "RO-A-RPCLAP-2-AST2-EDITED-V1.0" has VOLUME_NAME = "N/A"

and

DATA_SET_ID = "RO-A-RPCLAP-3-AST2-CALIB-V1.0" has VOLUME_NAME = "<EDIT TO REFLECT DATASET ID>"

ro-a-rpclap-3-ast2-calib-v1.0/INDEX INDEXINFO.TXT

- Publication date is incorrect and does not agree with the edited data set:

  PUBLICATION_DATE = 2009-08-20

ro-a-rpclap-2-ast2-edited-v1.0/INDEX
ro-a-rpclap-3-ast2-calib-v1.0/INDEX
INDEX.LBL

- Edited version contains the following information not included in the calib version:

  VOLUME_ID = "ROLAP_1001"

- Edited version contains characters

  RELEASE_ID = "0001"
  REVISION_ID = "0000"

while the calib version: contains numbers

RELEASE_ID = 0001
REVISION_ID = 0000

This same situation occurs in other files throughout the data set.

ro-a-rpclap-2-ast2-edited-v1.0/DOCUMENT
ro-a-rpclap-3-ast2-calib-v1.0/DOCUMENT
DOCINFO.TXT

- The DOCINFO.TXT file does not include descriptions of the following document files listed in the subdirectory FLIGHT_REPORTS:

```
IRFU-ROS-OPR-EARTH2_V10.LBL
IRFU-ROS-OPR-EARTH2_V10.PDF
IRFU-ROS-OPR-LUT_V10.LBL
IRFU-ROS-OPR-LUT_V10.PDF
IRFU-ROS-OPR-STEINS_V10.LBL
IRFU-ROS-OPR-STEINS_V10.PDF
```

ro-a-rpclap-2-ast2-edited-v1.0/DOCUMENT
ro-a-rpclap-3-ast2-calib-v1.0/DOCUMENT
00_README.LBL
00_README.PDF
00_README.TXT

- The line length should be reformatted to make this document easier to read since it exceeds the normal 80 character line in most cases of text paragraphs. There is no indication in the LBL file that the PDF and TXT are not normal character length files.

- This file describes the process of creating data sets for the PSA/PDS archive and should not be included with in this archive. None of the described software tools are available in these data sets.

ro-a-rpclap-3-ast2-calib-v1.0/DOCUMENT FLIGHT_REPORTS/IRFU_ROS_OPR-LUT_V10.LBL

- Unquoted character string, does this make a difference?

PRODUCT_ID = IRFU-ROS-OPR-LUT_V10

ro-a-rpclap-2-ast2-edited-v1.0/DOCUMENT/FLIGHT_REPORTS ro-a-rpclap-3-ast2-calib-v1.0/DOCUMENT/FLIGHT_REPORTS IRFU_ROS_OPR-LUT_V10.PDF

- Two figures noted as Figure 5 exist, one in section 4.2 and the other in section 4.3. The second should be Figure 6 since there this is skipped in the figure numbering.
- In section 4.3, paragraph 1: this refers to Figure 5 and it should refer to Figure 6.
- In section 4.4, paragraph 1: the reference to Figure 6 should be Figure 7 and the reference to Figure 5 should be Figure 6.

ro-a-rpclap-3-ast2-calib-v1.0/DOCUMENT RO_IRFU_LAP_EAICD.LBL

- Another unquoted character string:
  DATA_SET_ID = RO-A-RPCLAP-3-AST2-CALIB-V1.0

ro-a-rpclap-2-ast2-edited-v1.0/DOCUMENT
ro-a-rpclap-3-ast2-calib-v1.0/DOCUMENT
RO_IRFU_LAP_EAICD.TXT

- The ASCII required file of the EAICD does not exist in this data set.

ro-a-rpclap-2-ast2-edited-v1.0/DOCUMENT ro-a-rpclap-3-ast2-calib-v1.0/DOCUMENT RO_IRFU_LAP_EAICD.PDF

- This document needs to be updated. The date on this document is 6 November 2006.
- In Section 1.2 needs to be reorganized: the PDS description should be section 1.2.1 and the PSA section should be section 1.2.2.
- In Section 1.3 first paragraph: ESA logo covers some of the text.
- Some of the TBW items listed through out the text should be addressed.

ro-a-rpclap-2-ast2-edited-v1.0/DOCUMENT ro-a-rpclap-3-ast2-calib-v1.0/DOCUMENT RO_IRFU_LAP_EAICD.PDF – Cont. 1

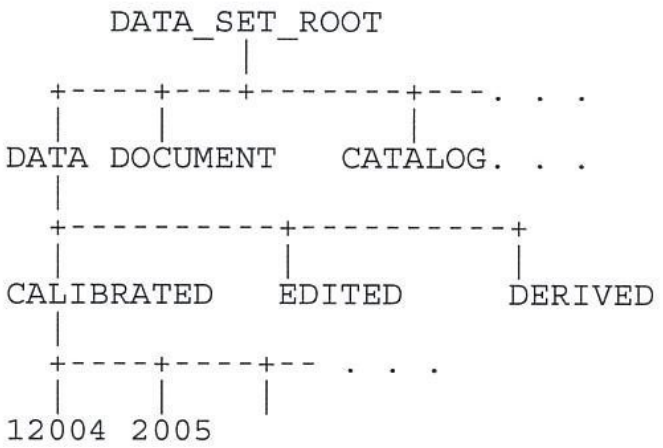
- Section 2.4.6 states that software will not be included in the datasets; however, a software directory exists in Section 3.4.6 and Section 3.4.6.6 suggests that it is populated. In addition, Section 3.4.6.9 describes inclusion of 00_README files which describe (not included) software.

ro-a-rpclap-2-ast2-edited-v1.0/DOCUMENT ro-a-rpclap-3-ast2-calib-v1.0/DOCUMENT RO_IRFU_LAP_EAICD.PDF – Cont. 2

- In Section 3.2.2, the date should be 2004, not 12004:

3.2.2 Data Directory Naming Convention

We intend to use one directory for each year, month and day as follows.



ro-a-rpclap-2-ast2-edited-v1.0/DOCUMENT ro-a-rpclap-3-ast2-calib-v1.0/DOCUMENT RO_IRFU_LAP_EAICD.PDF – Cont. 3

- In Section 3.2.3, the file naming convention does not agree with the file names in the data directory. The differences are the data file name uses an underscore (“_”) where the EAICD uses a dash (“-”) for the science files. For the housekeeping files, there is an extra underscore (“_”) between the alpha numeric counter and the “H” designation in the file names stored in the data directory.

ro-a-rpclap-2-ast2-edited-v1.0/DOCUMENT ro-a-rpclap-3-ast2-calib-v1.0/DOCUMENT RO_IRFU_LAP_EAICD.PDF – Cont. 4

- Section 3.4.6 remove SOFTWARE directory since it is not delivered to PSA/PDS.
- Section 3.4.6.1, these additional files were found in the Calibration Directory:

RPCLAP060704_CALIB_MEAS.LBL	RPCLAP080726_CALIB_MEAS.LBL
RPCLAP060704_CALIB_MEAS.TAB	RPCLAP080726_CALIB_MEAS.TAB
RPCLAP070223_CALIB_MEAS.LBL	RPCLAP080901_CALIB_MEAS.LBL
RPCLAP070223_CALIB_MEAS.TAB	RPCLAP080901_CALIB_MEAS.TAB
RPCLAP080713_CALIB_MEAS.LBL	RPCLAP100707_CALIB_MEAS.LBL
RPCLAP080713_CALIB_MEAS.TAB	RPCLAP100707_CALIB_MEAS.TAB
RPCLAP080719_CALIB_MEAS.LBL	RPCLAP100712_CALIB_MEAS.LBL
RPCLAP080719_CALIB_MEAS.TAB	RPCLAP100712_CALIB_MEAS.TAB

ro-a-rpclap-2-ast2-edited-v1.0/DOCUMENT ro-a-rpclap-3-ast2-calib-v1.0/DOCUMENT RO_IRFU_LAP_EAICD.PDF – Cont. 5

- Section 3.4.6.2 also includes the files the catalog files ROSETTA_INSTHOST.CAT and ROSETTA_MSN.CAT
- Section 3.4.6.4 is not included in the directory structure given in Section 3.4.6, so why is the Browse Directory description included here?
- Section 3.4.6.5 is not included in the directory structure given in Section 3.4.6, so why is the Geometry Directory description included here? Perhaps ESA did not provide the Geometry directory?

ro-a-rpclap-2-ast2-edited-v1.0/DOCUMENT ro-a-rpclap-3-ast2-calib-v1.0/DOCUMENT RO_IRFU_LAP_EAICD.PDF – Cont. 6

- Section 3.4.6.6 is not included this delivery, so why is the Software Directory described and why are programs promised?
- Section 3.4.6.7 is not included in the directory structure given in Section 3.4.6, so why is the Gazetter Directory included here?
- Section 3.4.6.8 is not included in the directory structure given in Section 3.4.6, so why is the Label Directory included here?
- Section 3.4.6.9 why is 00_README included describing software which is not included in this delivery?

ro-a-rpclap-2-ast2-edited-v1.0/DOCUMENT ro-a-rpclap-3-ast2-calib-v1.0/DOCUMENT RO_IRFU_LAP_EAICD.PDF – Cont. 7

- The entire Section 3.5 is TBW. It is time to write this section!
- In Section 3.6, there are a lot of TBWs. Please complete this text!

ro-a-rpclap-2-ast2-edited-v1.0/CATALOG
ro-a-rpclap-3-ast2-calib-v1.0/CATALOG
RPCLAP_SOFTWARE.CAT

- Why is this file included when no software is included?

ro-a-rpclap-2-ast2-edited-v1.0/CATALOG
ro-a-rpclap-3-ast2-calib-v1.0/CATALOG
RPCLAP_REF.CAT

- Reference Key ID “ALTWEGGETAL2012” is missing the year in description of reference.
- Reference Key ID “ANDREWSETAL2011” is missing the author in description of reference.
- Reference Key ID “BESSEL1999” is missing the the title; it should be: "Spectrophotometry: Revised Standards and Techniques". Also, the journal abbreviation should be "Publ. Astron. Soc. Pac.”

ro-a-rpclap-2-ast2-edited-v1.0/CATALOG ro-a-rpclap-3-ast2-calib-v1.0/CATALOG RPCLAP_REF.CAT – Cont. 1

- Reference Key ID “HAMUYETAL1992” has an incorrect title; it should be: “Southern spectrophotometric standards. I”. Also, the journal abbreviation should be "Publ. Astron. Soc. Pac.”
- Reference Key ID “HAMUYETAL1994” has an incorrect title; it should be: “Southern spectrophotometric standards. II”. Also, the journal abbreviation should be "Publ. Astron. Soc. Pac.”

ro-a-rpclap-2-ast2-edited-v1.0/CATALOG ro-a-rpclap-3-ast2-calib-v1.0/CATALOG RPCLAP_REF.CAT – Cont. - 2

- Reference Key ID “KUPPERS2011” is missing the year in description of reference.
- Reference Key ID “LANDOLT1992” the journal is abbreviated “Astron. J.”, not “AJ”.
- Reference Key ID “SOUBUIRAN&TRIAUD2004” the journal is abbreviated “Astron. Astrophys.”, not “A&A”.

ro-a-rpclap-2-ast2-edited-v1.0/CATALOG
ro-a-rpclap-3-ast2-calib-v1.0/CATALOG
RPCLAP_INST.CAT

- References to ERIKSSON2007A and ERIKSSON2008A do not exist in the DOCUMENTS directory as stated.
- Coordinate X on the Probe 2 listed in the LAP Sensor Locations table is incorrect. This value should be negative (or else boom 2 pokes through the spacecraft). The value of the X coordinate in this document needs to be corrected in earlier versions as well.

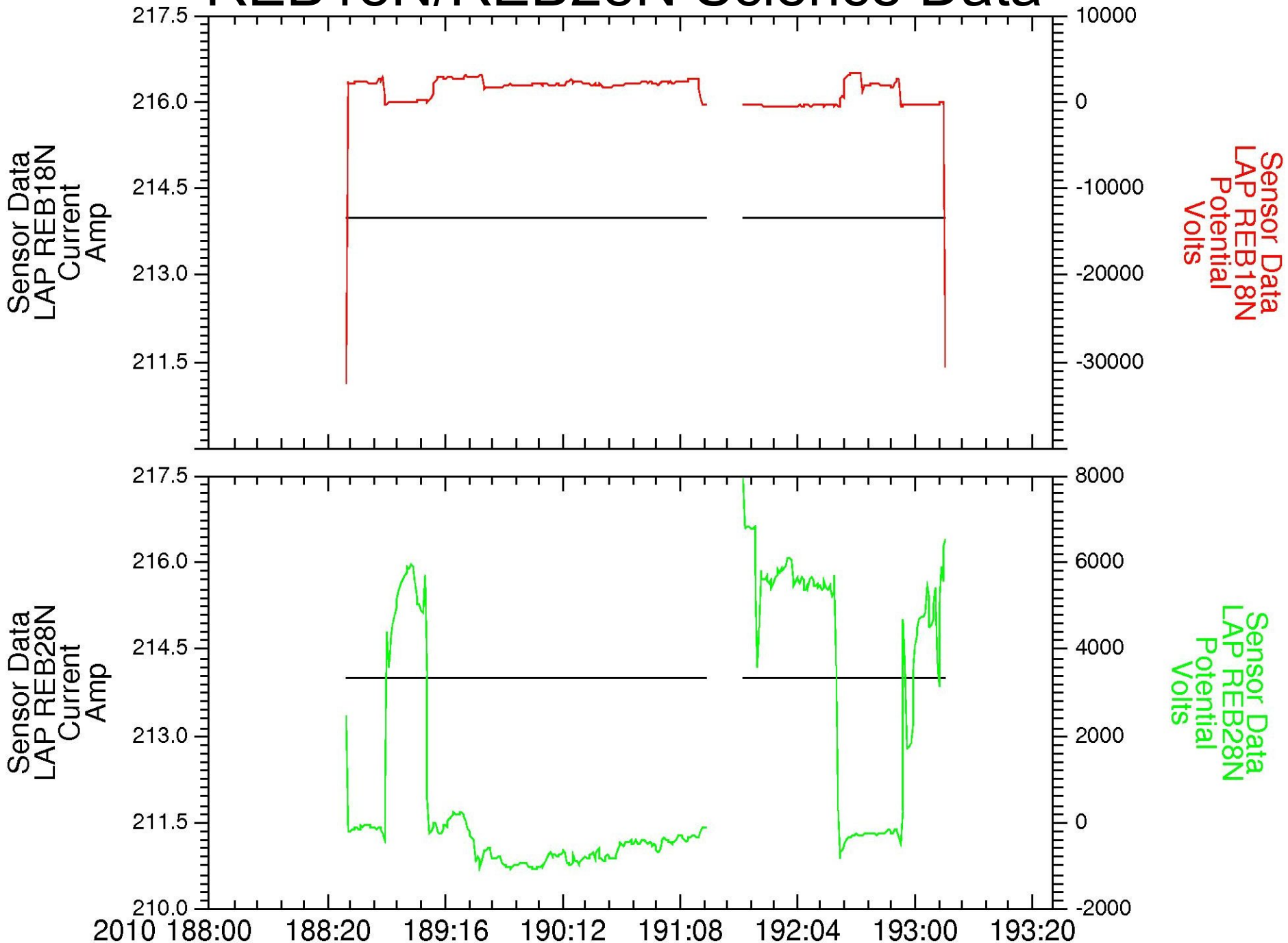
ro-a-rpclap-2-ast2-edited-v1.0/CATALOG
ro-a-rpclap-3-ast2-calib-v1.0/CATALOG
DATASET.CAT

- References to ERIKSSON2007A and ERIKSSON2008A do not exist in the DOCUMENTS directory as stated.
- Acknowledgement of no geometry information included, but no explanation as to why not.
- Acknowledgement that EAICD needs to be updated, but no explanation as to why this has yet to be done.

ro-a-rpclap-2-ast2-edited-v1.0/data Housekeeping

Records within the data file have been modified and are now time tagged. This improves the value of the housekeeping data as it helps indicate the instrument state.

ro-a-rpclap-2-ast2-edited-v1.0/data
REB18N/REB28N Science Data



ro-a-rpclap-2-ast2-edited-v1.0/DOCUMENT IRFU_ROS_OPR-LUT_V10.LBL

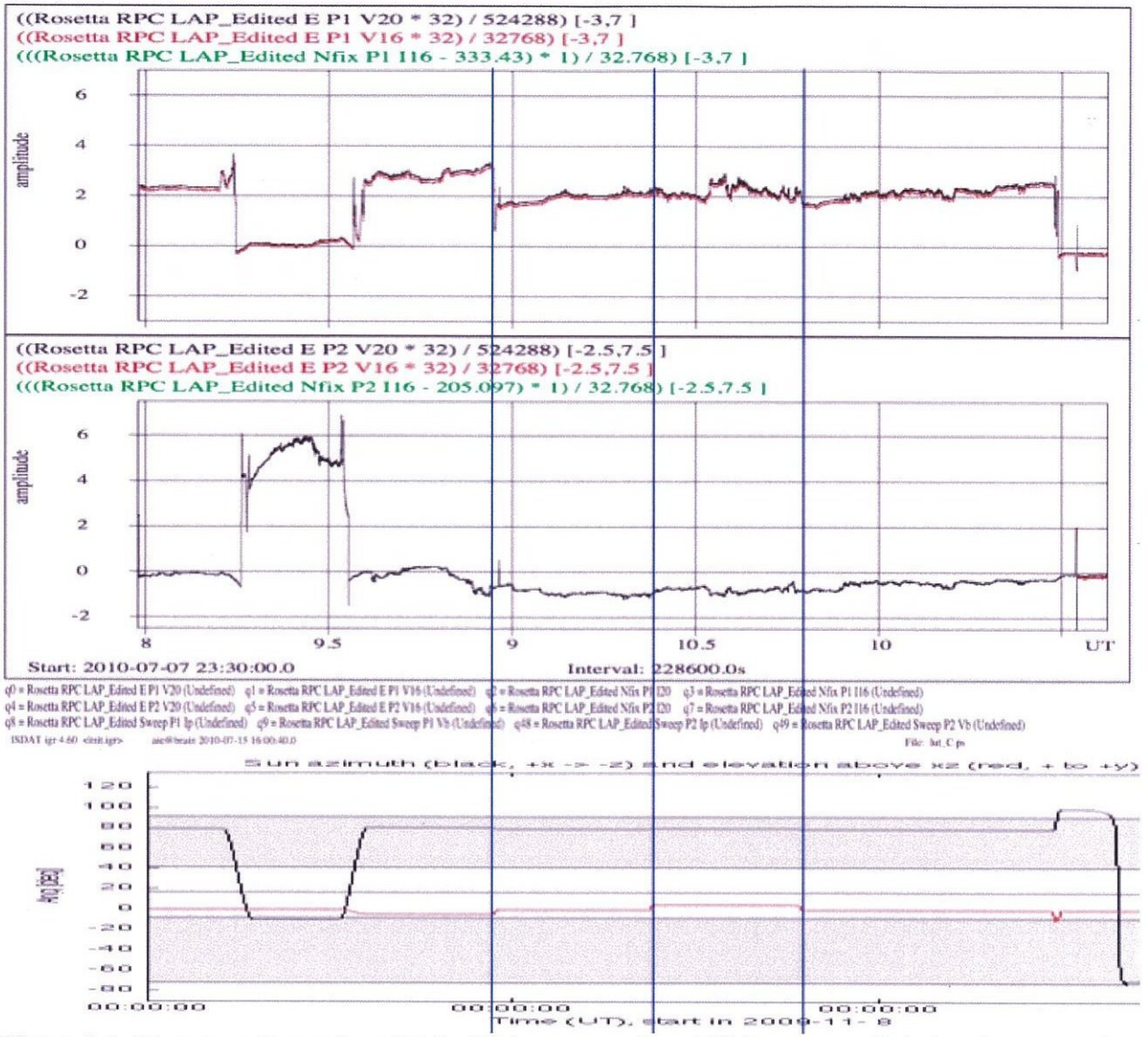
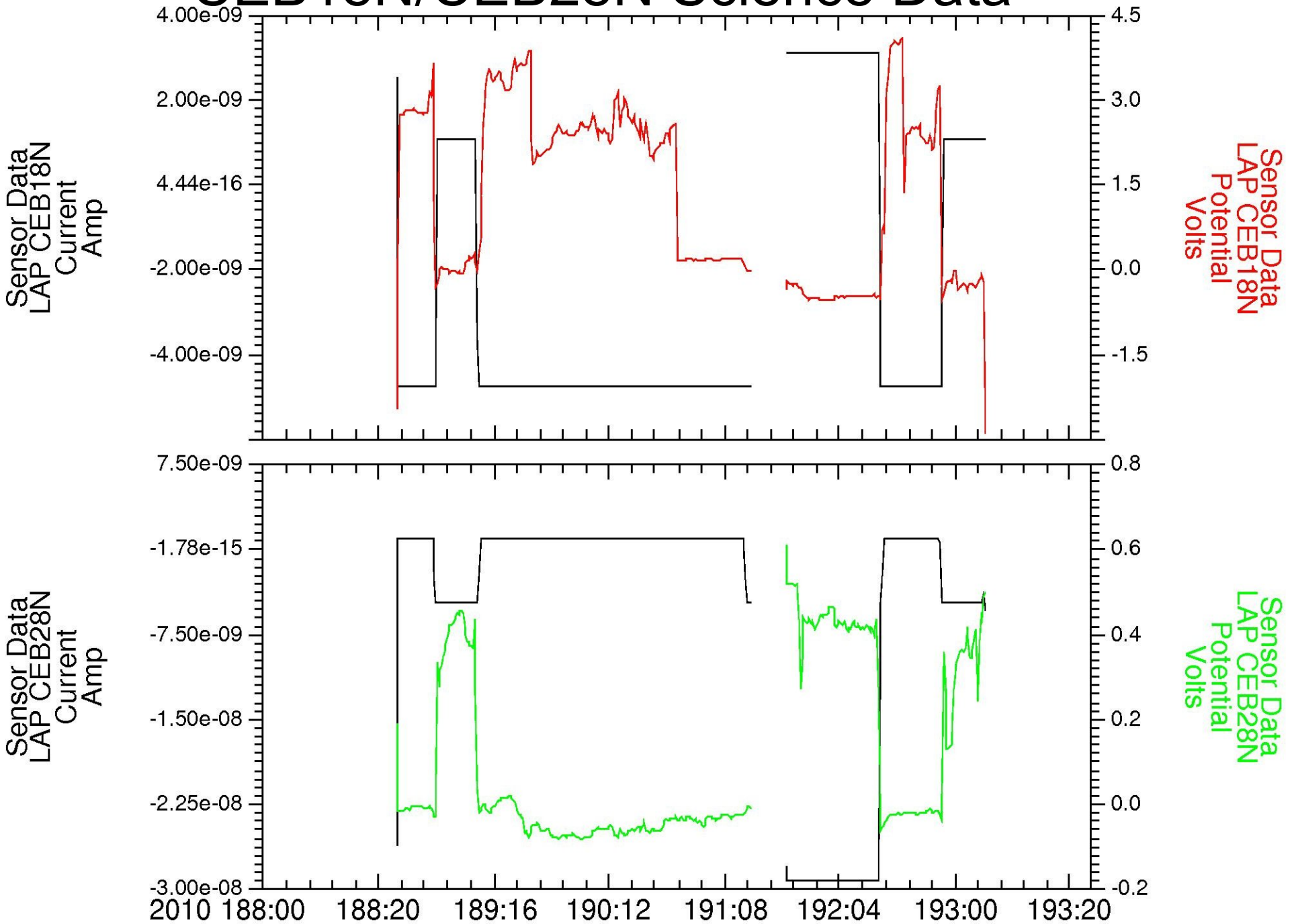


Figure 5. LAP probe voltages (in volts) for P1 (upper panel) and P2 (centre panel) during the approach to Lutetia, with spacecraft pointing as in Figure 2 (lower panel). Blue vertical lines indicate some of the times when the pointing of the pointing of the s/c Y axis (red line in lower plot) changes. In the top plot, red is 16-bit snapshots at 18.75 kHz sampling frequency, black 20-bit voltages at 57.8 Hz.

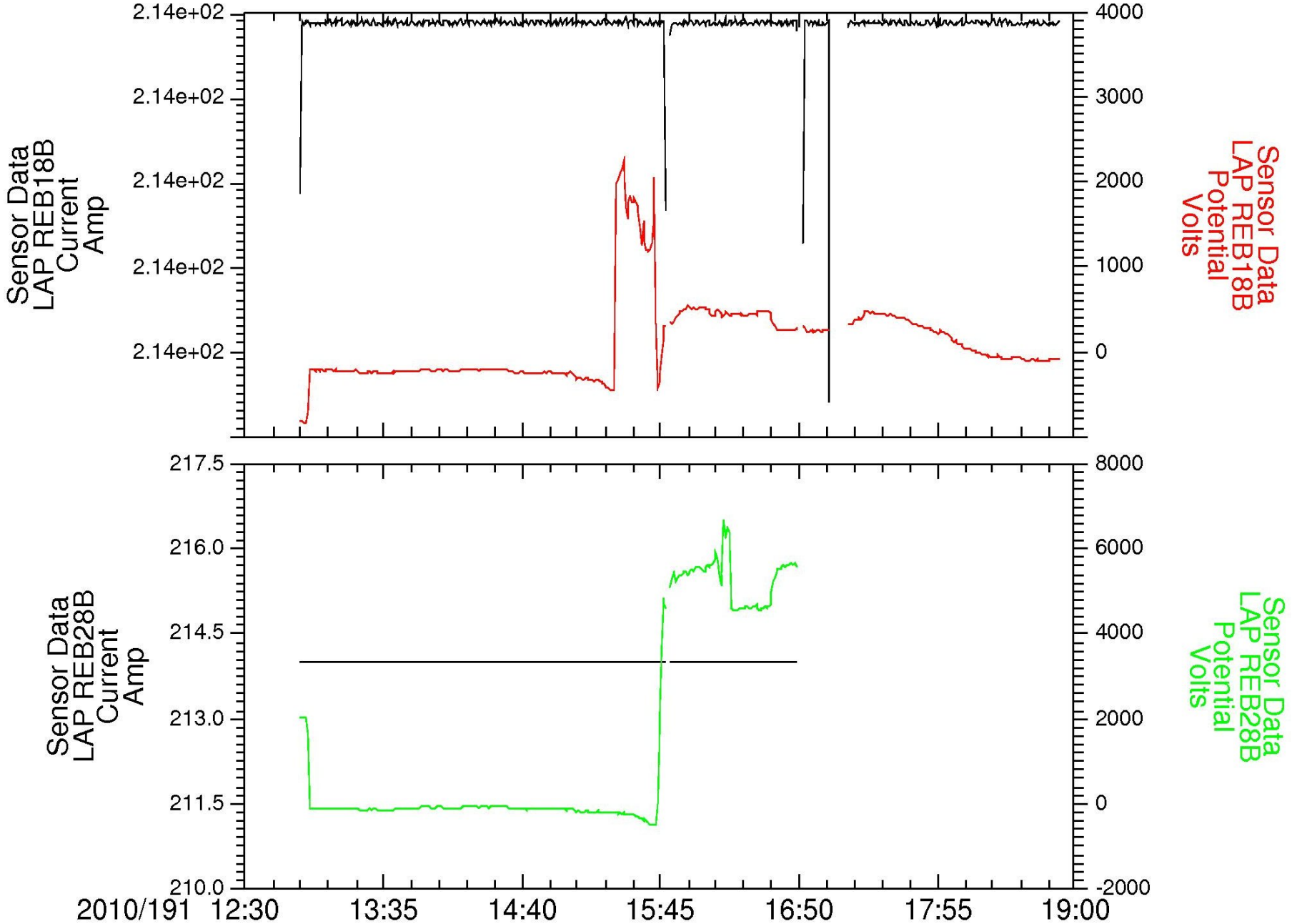
ro-a-rpclap-3-ast2-calib-v1.0/data
CEB18N/CEB28N Science Data



ro-a-rpclap-2-ast2-edited-v1.0/data
ro-a-rpclap-3-ast2-calib-v1.0/data
R/C EB 1/2 8N Science Data

- Both edited and calibrated science data were examined and they both replicate the shape of the voltage as shown in the flight report.
- Amplitude voltage numbers of the flight report do not agree with the edited data, but do agree with the calibrated.
- It is not clear why the edited currents do not replicate the shape of the calibrated currents. The flight report does not seem to contain this information.

ro-a-rpclap-2-ast2-edited-v1.0/data
REB18B/REB28B Science Data



ro-a-rpclap-2-ast2-edited-v1.0/DOCUMENT IRFU_ROS_OPR-LUT_V10.LBL

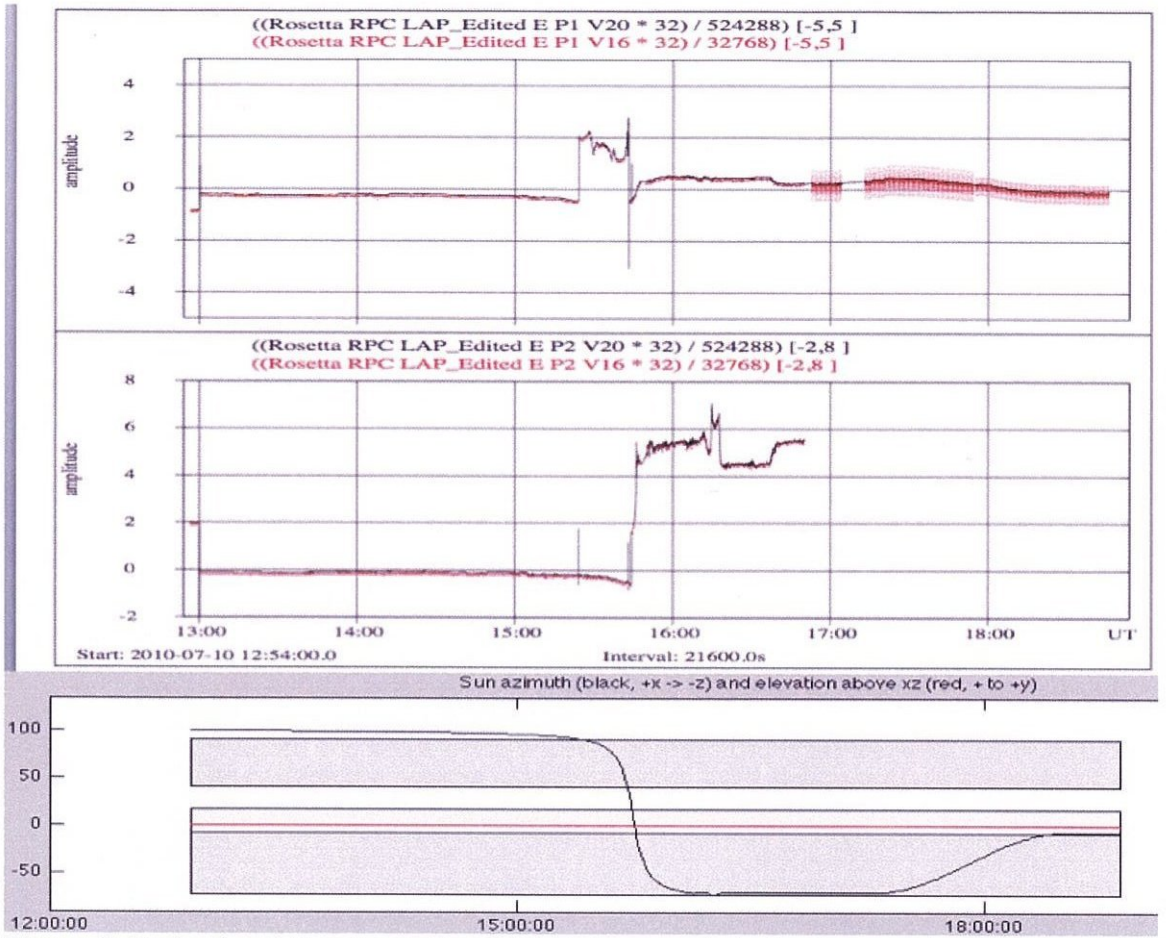
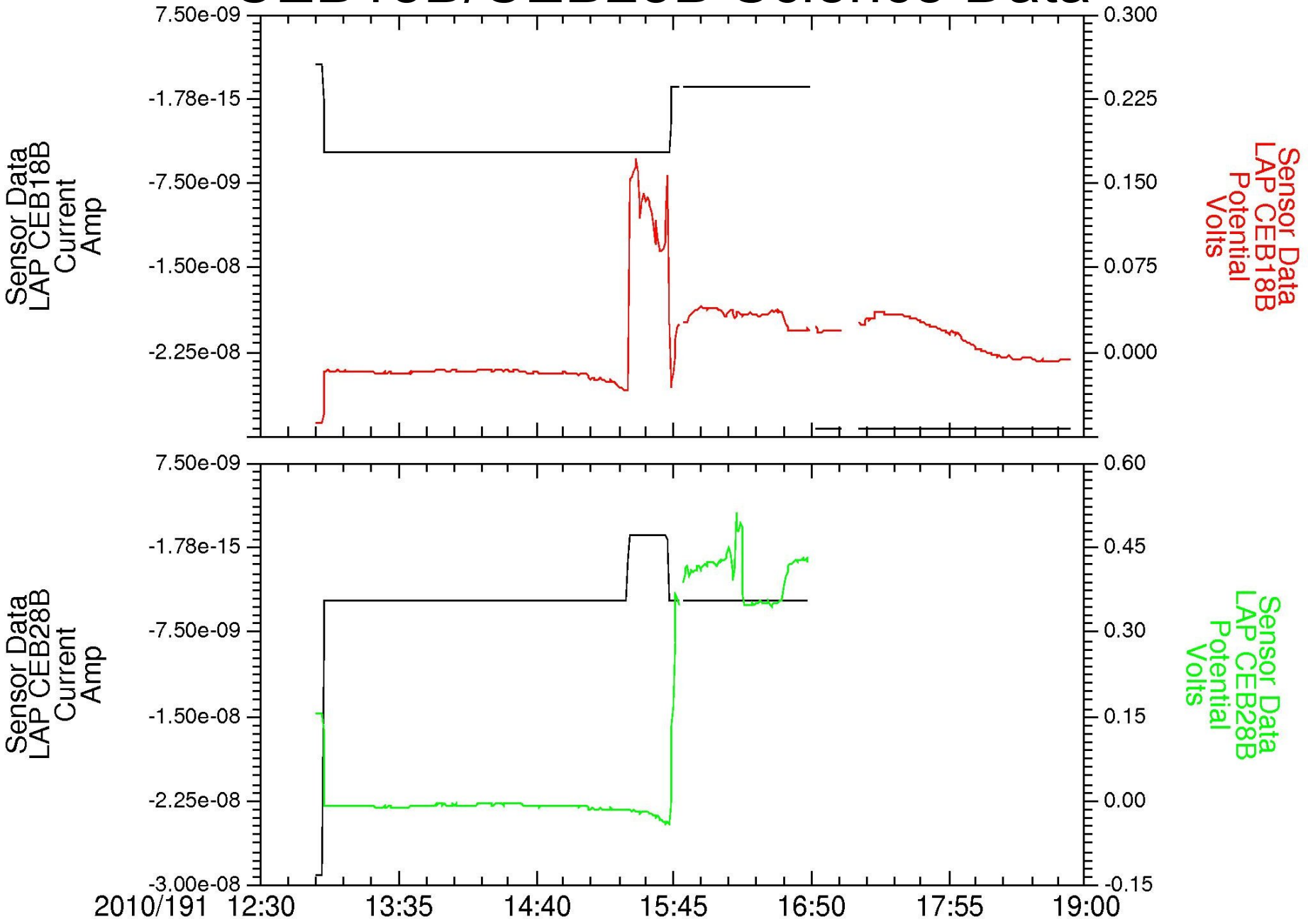


Figure 7. Probe 1 and 2 voltages (in volts) during a period of solar aspect angle around 100 degrees. In the two upper plots, red indicates 16-bit snapshots at 18.75 kHz sampling frequency, while black is 20-bit voltages at 57.8 Hz.

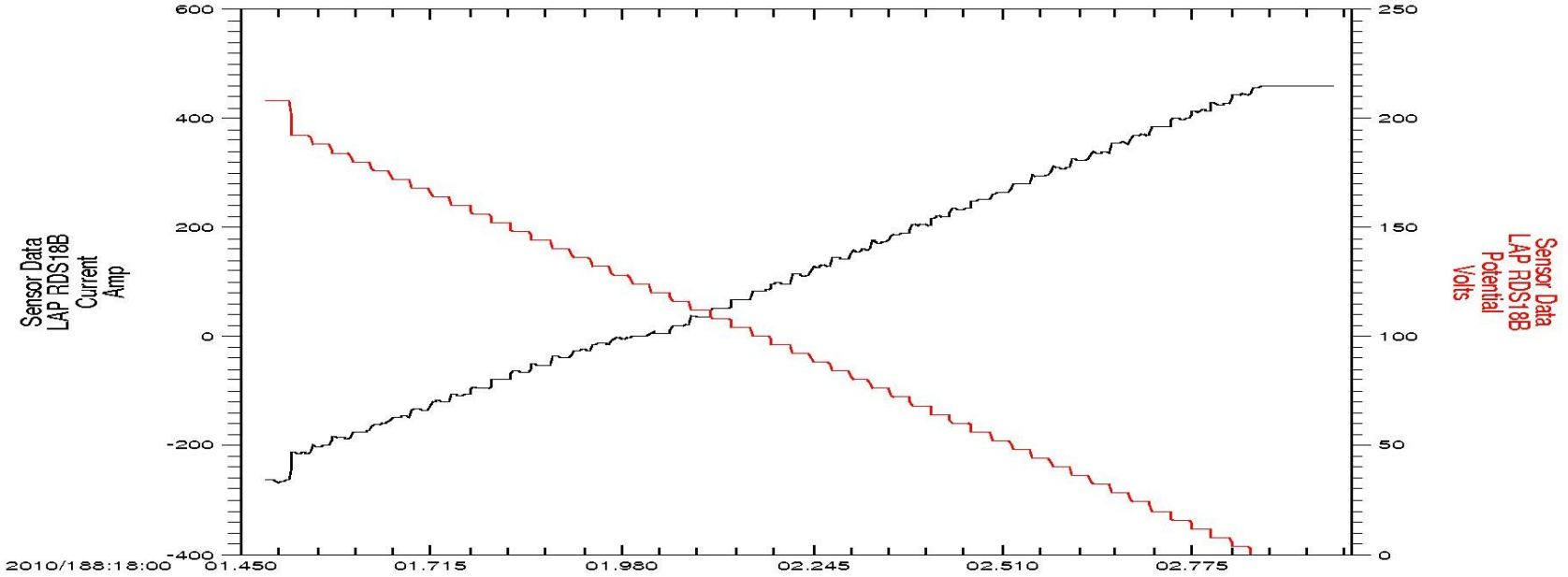
ro-a-rpclap-3-ast2-calib-v1.0/data
CEB18B/CEB28B Science Data

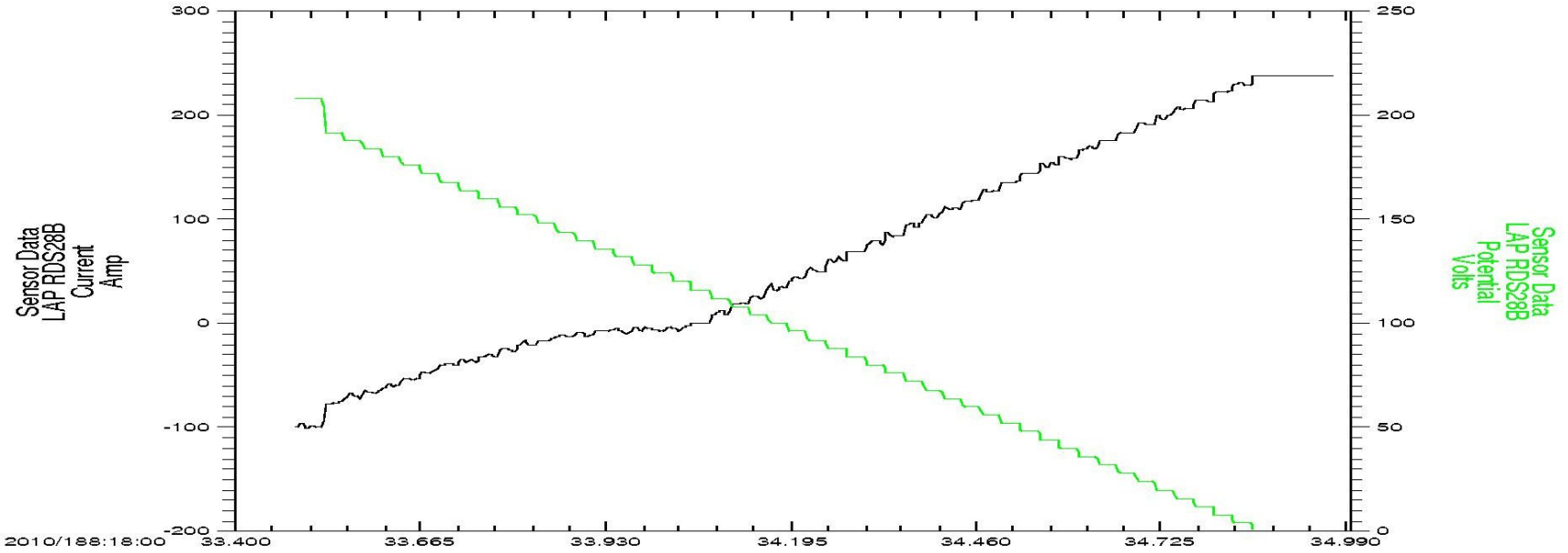


ro-a-rpclap-2-ast2-edited-v1.0/data
ro-a-rpclap-3-ast2-calib-v1.0/data
R/C EB 1/2 8B Science Data

- Both edited and calibrated science data were examined and they both replicate the shape of the voltage as shown in the flight report.
- Amplitude voltage numbers of the flight report do not agree with the edited data, but do agree with the calibrated.
- It is not clear why the edited currents do not replicate the shape of the calibrated currents. The flight report does not seem to contain this information.

ro-a-rpclap-2-ast2-edited-v1.0/data
RDS18B/RDS28B Science Data





ro-a-rpclap-2-ast2-edited-v1.0/DOCUMENT IRFU_ROS_OPR-LUT_V10.LBL

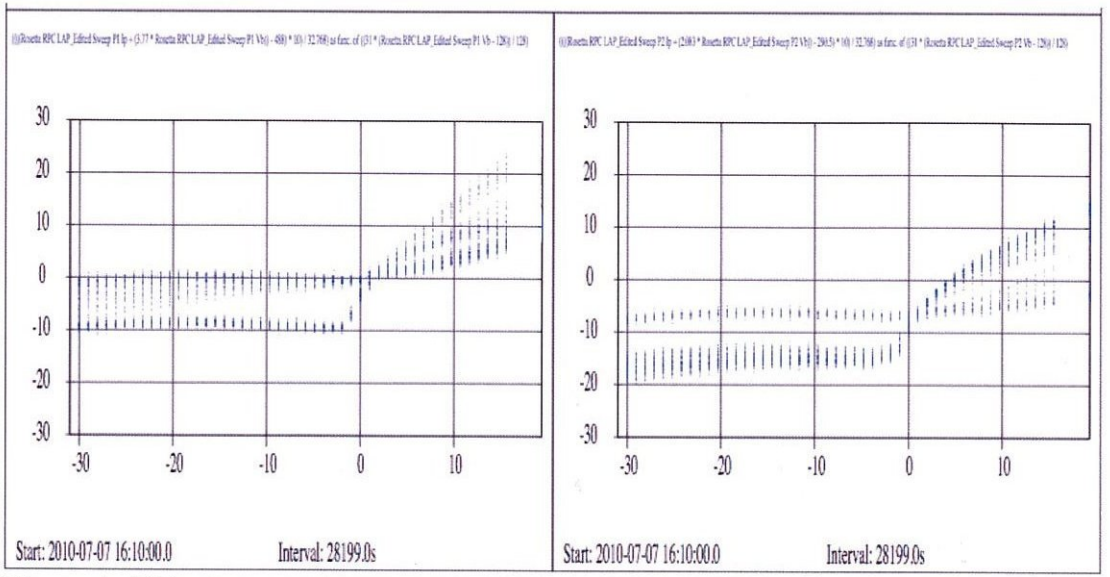
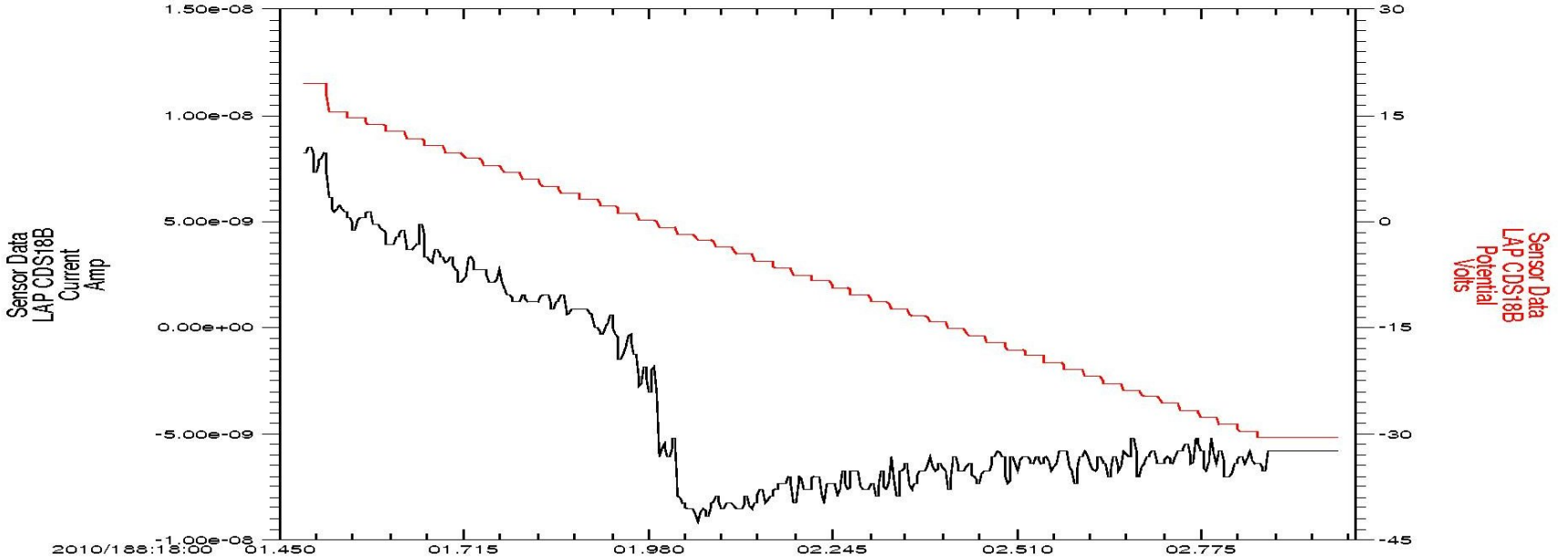
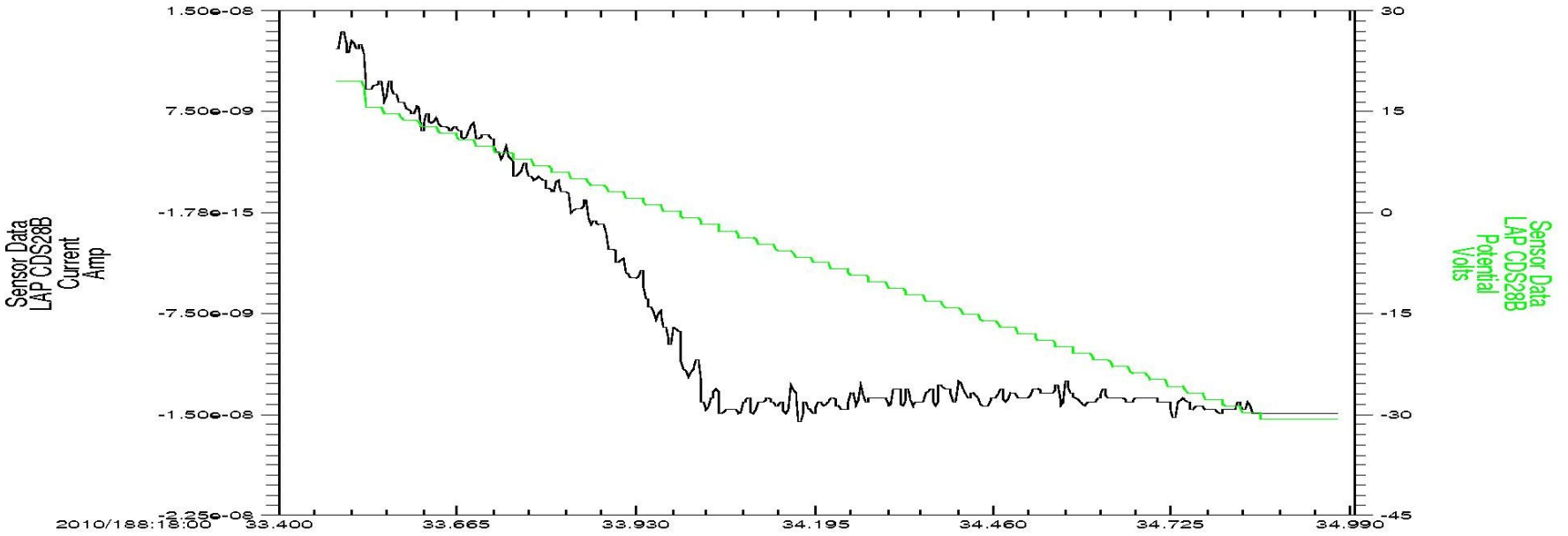


Figure 4. All LAP probe bias sweeps in block A (100707 16:10 - 23:10). P1 at left, P2 at right. Horizontal axes are bias voltage in volts, vertical axes measured current in nA.

ro-a-rpclap-3-ast2-calib-v1.0/data
CDS18B/CDS28B Science Data





ro-a-rpclap-2-ast2-edited-v1.0/data
ro-a-rpclap-3-ast2-calib-v1.0/data
R/C DS 1/2 8B Science Data

- Both edited and calibrated science data were examined and they both replicate the gross shape of the I-V curves as shown in the flight report.
- Amplitude voltage numbers of the flight report do not agree with the edited data, but are closer to the calibrated scales.
- It is not clear why the calibrated P2 current rises at large negative voltages (P1 due to contamination). They were expected to be flat or slightly negative slope. Please check this!

ro-a-rpclap-2-ast2-edited-v1.0/calib
ro-a-rpclap-3-ast2-calib-v1.0/calib
Calibration Documentation

- There are many files in the Calib Directory; however they are not explained. No calibration documentation could be found. What are all of these files and how are they applied. Please describe the procedure for converting the edited data into the calibrated data.

Backup Slides

ro-a-rpclap-2-ast2-edited-v1.0
ro-a-rpclap-3-ast2-calib-v1.0
aareadme.txt

- Minor correction sent to PDS.

ro-a-rpclap-2-ast2-edited-v1.0/INDEX
ro-a-rpclap-3-ast2-calib-v1.0/INDEX
INDEX.TAB

GOOD

ro-a-rpclap-2-ast2-edited-v1.0/INDEX INDEXINFO.TXT

GOOD

ro-a-rpclap-2-ast2-edited-v1.0/DOCUMENT
ro-a-rpclap-3-ast2-calib-v1.0/DOCUMENT
RO_IRFU_LAPMPF.LBL

GOOD

ro-a-rpclap-2-ast2-edited-v1.0/DOCUMENT
ro-a-rpclap-3-ast2-calib-v1.0/DOCUMENT
RO_IRFU_LAPMPF.PDF

- Some corrections sent to PDS.

ro-a-rpclap-2-ast2-edited-v1.0/DOCUMENT/FLIGHT_REPORTS IRFU_ROS_OPR-LUT_V10.LBL

GOOD

ro-a-rpclap-2-ast2-edited-v1.0/DOCUMENT
RO_IRFU_LAP_EAICD.LBL

GOOD

ro-a-rpclap-2-ast2-edited-v1.0/CATALOG
ro-a-rpclap-3-ast2-calib-v1.0/CATALOG
RPCLAP_PERS.CAT

GOOD

ro-a-rpclap-2-ast2-edited-v1.0/CATALOG
ro-a-rpclap-3-ast2-calib-v1.0/CATALOG
CATINFO.TXT

GOOD

ro-a-rpclap-2-ast2-edited-v1.0/CATALOG
ro-a-rpclap-3-ast2-calib-v1.0/CATALOG
ROSETTA_INSTHOST.CAT

GOOD

ro-a-rpclap-2-ast2-edited-v1.0/CATALOG
ro-a-rpclap-3-ast2-calib-v1.0/CATALOG
ROSETTA_MSN.CAT

Minor corrections sent to PDS