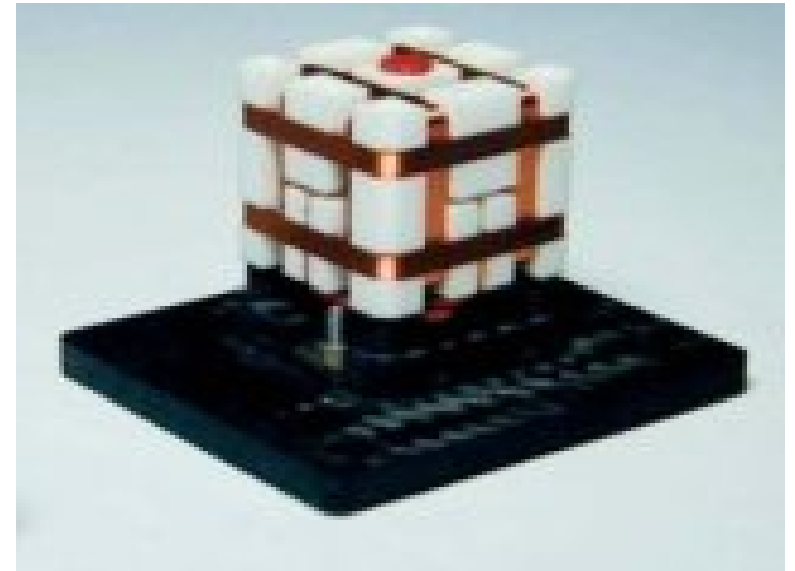


# ROSETTA PLASMA CONSORTIUM FLUXGATE MAGNETOMETER

Mass (sensor):	45 g
Volume (sensor):	23 cm <sup>3</sup>
Mass (electronics):	336 g
Mass (harness H10):	109 g
Mass (harness H11):	55 g
Power:	840 mW @ 28 V
Operation interval:	15 years
Sampling:	20 vectors/s
Bandwidth:	0 - 10 Hz
Resolution:	±0.031 nT
Dynamics range:	±16384 nT
Conversion:	7 * 20 Bit ADC
Operating Temperature Range:	-160 to +120 °C
Non-Operating Temperature Range:	-180 to +150 °C



Fluxgate-Magnetometer with  
a resolution of at least 40 pT

2 Sensors, OB/IB, 15 cm apart

1.5 m boom

Measuring B-Field in 3 components  
with a max. vector rate of 20 Hz

20 Bit ADC

# RPC MAG

## 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 MAG Data Sets

ro-a-rpcmag-2-ast2-raw-v3.0

ro-a-rpcmag-3-ast2-calibrated-v3.0

Level A: Instrument Coordinates

Level B: Spacecraft Coordinates

Level C: Ecliptic Coordinates

ro-a-rpcmag-4-ast2-resampled-v3.0

Level F: Averaged in Spacecraft Coordinates

Level G: Averaged in Ecliptic Coordinates

Level H: Averaged in Ecliptic Coordinates, Reaction  
Wheel Corrected

ro-a-rpcmag-2-ast2-raw-v3.0/CATALOG  
ro-a-rpcmag-3-ast2-calibrated-v3.0/CATALOG  
ro-a-rpcmag-4-ast2-resampled-v3.0/CATALOG  
CATINFO.TXT

- ▶ DATASET.CAT file description should be for mission phase AST2 (Lutetia), not AST1 (Steins) as noted.

# ro-a-rpcmag-4-ast2-resampled-v3.0/CATALOG DATASET.CAT

- ▶ Minor corrections sent to PDS.
- ▶ In the section Data Set Overview describing sources for LEVEL\_F, LEVEL\_G, and LEVEL\_H data, please briefly describe or point to a reference describing LEVEL\_K and LEVEL\_L data.
- ▶ In the section describing File name Convention, references are made to CLE and CLI which do not exist in this delivery. It is best to remove these references since they do not appear in the data set delivery.

# ro-a-rpcmag-4-ast2-resampled-v3.0/CATALOG DATASET.CAT – Cont. 1

- ▶ In the section describing File name Convention, under Heater or Reaction Wheel influenced data, references are made to CLK and CLL which do not exist in this delivery. It is best to remove these references and replace the CLK Example file names with CLH file names. Also in this section, shouldn't the CLI reference be to CLH?

ro-a-rpcmag-2-ast2-raw-v3.0/CATALOG  
ro-a-rpcmag-3-ast2-calibrated-v3.0/CATALOG  
ro-a-rpcmag-4-ast2-resampled-v3.0/CATALOG  
RPCMAG\_SOFTWARE.CAT

- ▶ No software is delivered so this file should not be included. The normal state is that no software is delivered to the archive since long-term software maintenance is not reasonable in most cases. Software delivery is a rare event. The Archive checking tool PVV which is used by the RPC MAG team should be corrected to reflect the normal state of the delivery and should not submit unnecessary files like this file.

ro-a-rpcmag-2-ast2-raw-v3.0/CATALOG  
ro-a-rpcmag-3-ast2-calibrated-v3.0/CATALOG  
ro-a-rpcmag-4-ast2-resampled-v3.0/CATALOG  
RPCMAG\_INST.CAT

- ▶ Under the section called Time Stamps of Data Packets, the Primary Vector 1 Hz and 5 Hz Time Shift seems to be switched. Please check this to verify it is correct.
- ▶ Under 3) Housekeeping Data: Voltages, the conversion refers to the magnetic field instead of the voltages: “As the ADC is operated in bipolar mode the nominal relation between counts and magnetic field is as follows:”



ro-a-rpcmag-2-ast2-raw-v3.0/CATALOG  
ro-a-rpcmag-3-ast2-calibrated-v3.0/CATALOG  
ro-a-rpcmag-4-ast2-resampled-v3.0/CATALOG  
RPCMAG\_INST.CAT – Cont. 1

- ▶ Under 3) Housekeeping Data: Voltages, the range of voltage values is  $\pm 5$  volts yet the min voltage is -2.5 volts and the max voltage is +2.5 volts. The formulas listed in this section do not appear to be able to represent this range. In addition, if a 5 volt quantity is measured, the engineers typically allow a 10% measurement margin, so the max and min values might be  $\pm 5.5$  volts. Please check this.

ro-a-rpcmag-2-ast2-raw-v3.0/CATALOG  
ro-a-rpcmag-3-ast2-calibrated-v3.0/CATALOG  
ro-a-rpcmag-4-ast2-resampled-v3.0/CATALOG  
RPCMAG\_INST.CAT – Cont. 2

- ▶ The References section needs to be edited for consistency. Journal abbreviations should follow standard abbreviations and reference formats should be consistent.
- ▶ Additional text corrections were sent to PDS.

ro-a-rpcmag-2-ast2-raw-v3.0/CATALOG  
ro-a-rpcmag-3-ast2-calibrated-v3.0/CATALOG  
ro-a-rpcmag-4-ast2-resampled-v3.0/CATALOG  
ROSETTA\_TARGET.CAT

- ▶ Why is the flattening formula given for every planet except “EARTH”?
- ▶ For targets “JUPITER”, “MARS”, “SATURN”, and “VENUS” when describing the flattening formula, the radius described by the C\_AXIS\_RADIUS should be a “PR”, not an “ER” as stated.

ro-a-rpcmag-2-ast2-raw-v3.0/CATALOG  
ro-a-rpcmag-3-ast2-calibrated-v3.0/CATALOG  
ro-a-rpcmag-4-ast2-resampled-v3.0/CATALOG  
ROSETTA\_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 title; it should be: "Spectrophotometry: Revised Standards and Techniques". Also, the journal abbreviation should be "Publ. Astron. Soc. Pac." Journal abbreviations should follow ISI Standards:

<http://library.caltech.edu/reference/abbreviations>

ro-a-rpcmag-2-ast2-raw-v3.0/CATALOG  
ro-a-rpcmag-3-ast2-calibrated-v3.0/CATALOG  
ro-a-rpcmag-4-ast2-resampled-v3.0/CATALOG  
ROSETTA\_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-rpcmag-2-ast2-raw-v3.0/CATALOG  
ro-a-rpcmag-3-ast2-calibrated-v3.0/CATALOG  
ro-a-rpcmag-4-ast2-resampled-v3.0/CATALOG  
ROSETTA\_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”.
- ▶ Some references like “CREMONESEETALK2012”, “THOMASETAL2011”, and “VINCENTETAL2011” for example have an inconsistent order relative to the rest of the reference formats in this file. The reference formats should be consistent!

ro-a-rpcmag-2-ast2-raw-v3.0/CATALOG  
ro-a-rpcmag-3-ast2-calibrated-v3.0/CATALOG  
ro-a-rpcmag-4-ast2-resampled-v3.0/CATALOG  
ROSETTA\_REF.CAT – Cont. 3

- ▶ Attempted to get the referenced reports from REF.CAT file. Reference Key ID “BAERETAL1999” exists in PDS reference labels and I can even download this label, but I can not find this document anywhere. What good is it to reference a document which can not be obtained?
- ▶ Tested and found document for Reference Key ID “RO-EST-RP-3321”.
- ▶ Tested and did NOT find document for Reference Key ID “DSN871-049-041”

ro-a-rpcmag-2-ast2-raw-v3.0/DOCUMENT  
ro-a-rpcmag-3-ast2-calibrated-v3.0/DOCUMENT  
ro-a-rpcmag-4-ast2-resampled-v3.0/DOCUMENT  
CALIBRATION/RO\_IGEP\_TR0028.PDF

- ▶ Minor corrections sent to PDS.
- ▶ In section 4.2.1.2, there are multiple issues. First, the min and max values suggest a  $\pm 2.5$  volt range; however, the second sentence in this section states that this example is for the  $\pm 5$  volt range. Second, the 2.5 volt monitor data appears to be more than the example of a 16 bit ADC. Third, the 5 volt range data seems to fit best with an 8 bit ADC. Fourth, the formula suggests that the negative value of voltage has counts which are smaller than the positive voltage value which is opposite for the  $\pm 5$  volt data.



ro-a-rpcmag-2-ast2-raw-v3.0/DOCUMENT  
ro-a-rpcmag-3-ast2-calibrated-v3.0/DOCUMENT  
ro-a-rpcmag-4-ast2-resampled-v3.0/DOCUMENT  
CALIBRATION/RO\_IGEP\_TR0028.PDF – Cont. 1

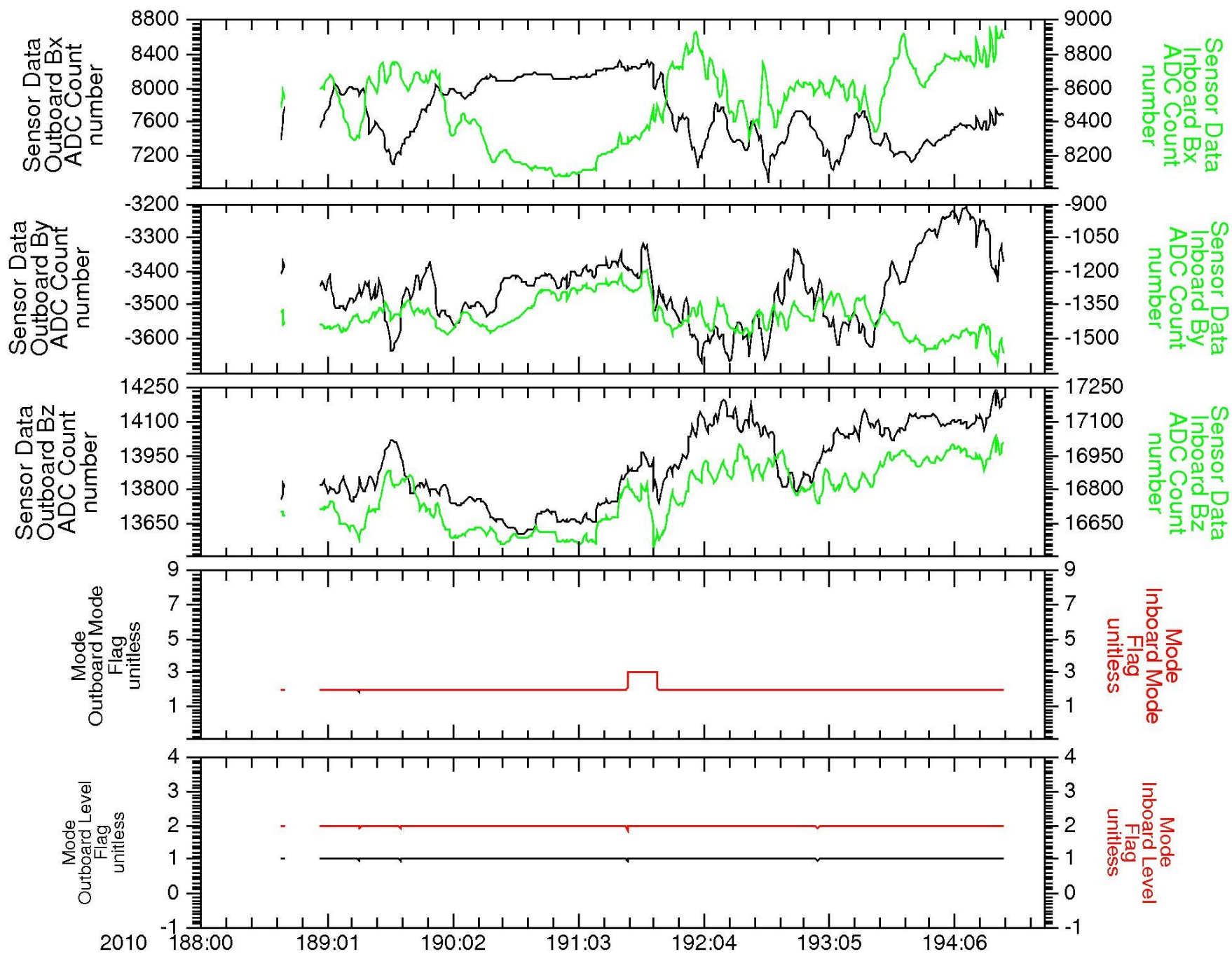
- ▶ In section 4.2.1.2, the statement “normal temperatures are computed from HK in a similar way”, it is not clear what are the minimum and maximum values which are used. It is also not clear the size of the ADC counts to use.
- ▶ In section 4.2.1.2, it is not clear what voltages use the 8 bit conversion. Please specify this information.
- ▶ In section 4.2.2.3, the temperature dependent offsets are described as 3<sup>rd</sup> order polynomial; however, the CALIB data files referred to are over specified with a list of six parameters (OC\_0 – OC-5). It is not clear why there are extra parameters.

ro-a-rpcmag-2-ast2-raw-v3.0/DOCUMENT  
ro-a-rpcmag-3-ast2-calibrated-v3.0/DOCUMENT  
ro-a-rpcmag-4-ast2-resampled-v3.0/DOCUMENT  
CALIBRATION/RO\_IGEP\_TR0028.PDF – Cont. 2

- ▶ In section 4.1, the relation between the MAG unit reference frame (URF) for each sensor is given in the RPCMAG\_SC\_ALIGN.TXT file located in the CALIB directory; however, the text refers to an equivalent SPICE file relating the URF to the spacecraft coordinates. A search of the SPICE data set did not produce the SPICE kernel reference ROS\_V15\_MAG.TF as cited in the text.

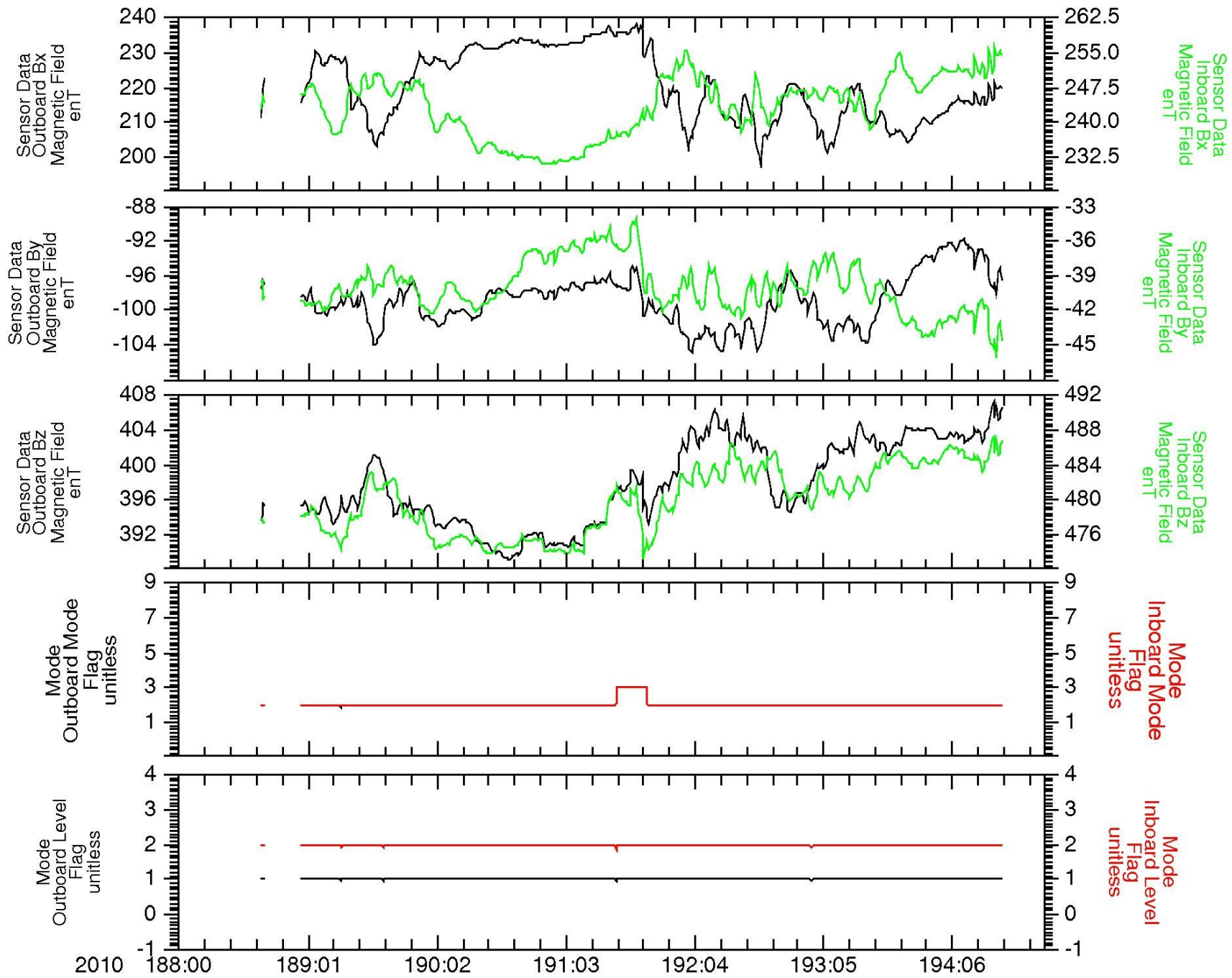
# ro-a-rpcmag-2-ast2-raw-v3.0/data

## Raw Science Data



# ro-a-rpcmag-2-ast2-raw-v3.0/data

## Adjusted Science Data



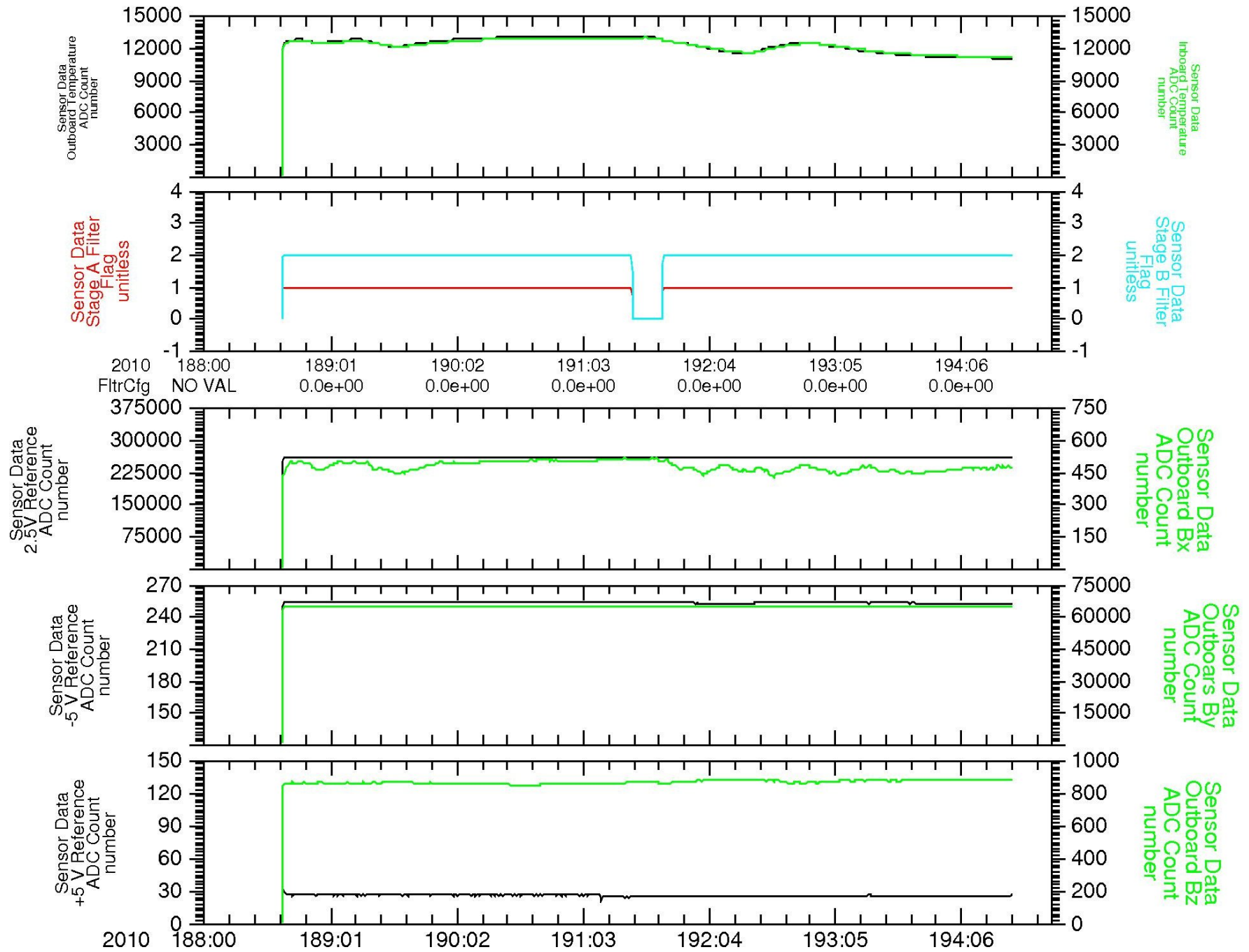
# RAW ADC Science Data

Raw and Adjusted Raw Science Data Looks  
Good

Raw Mode Data Looks Good

# ro-a-rpcmag-2-ast2-raw-v3.0/data

## Raw Housekeeping Data



# Raw ADC Housekeeping

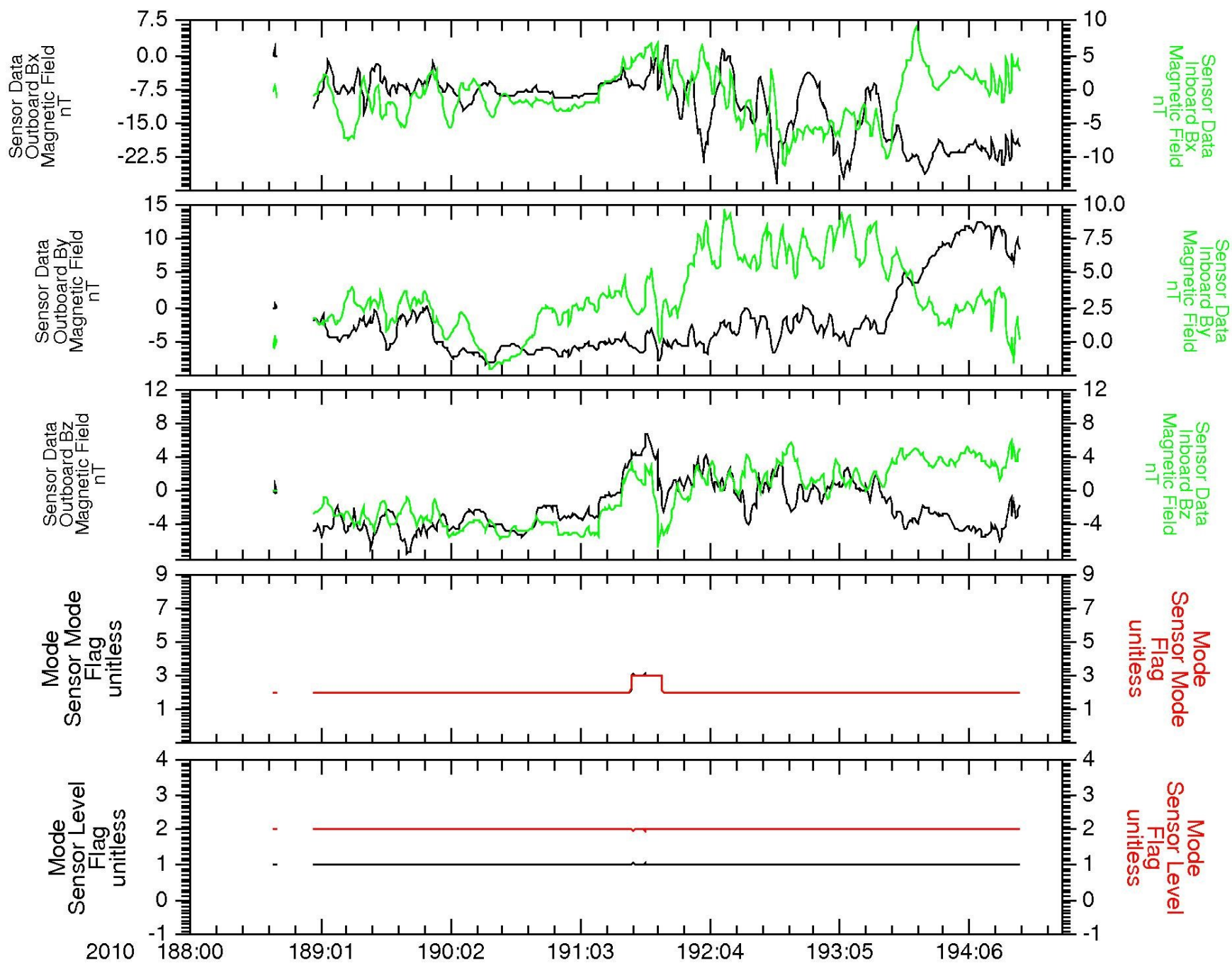
- ▶ Expected voltages in ADC Counts to be near the min (0) or max (65535) count if the conversion information is correct. Neither is the case. The range of numbers available for  $\pm 5$  volt suggest 8 bit conversion. Which voltages are converted with 8-bit and 16-bit is not clear and should be documented.
- ▶ It is not clear what the Temperature conversion min and max values are so that the formulas can be applied.

# Raw ADC Housekeeping – Cont. 1

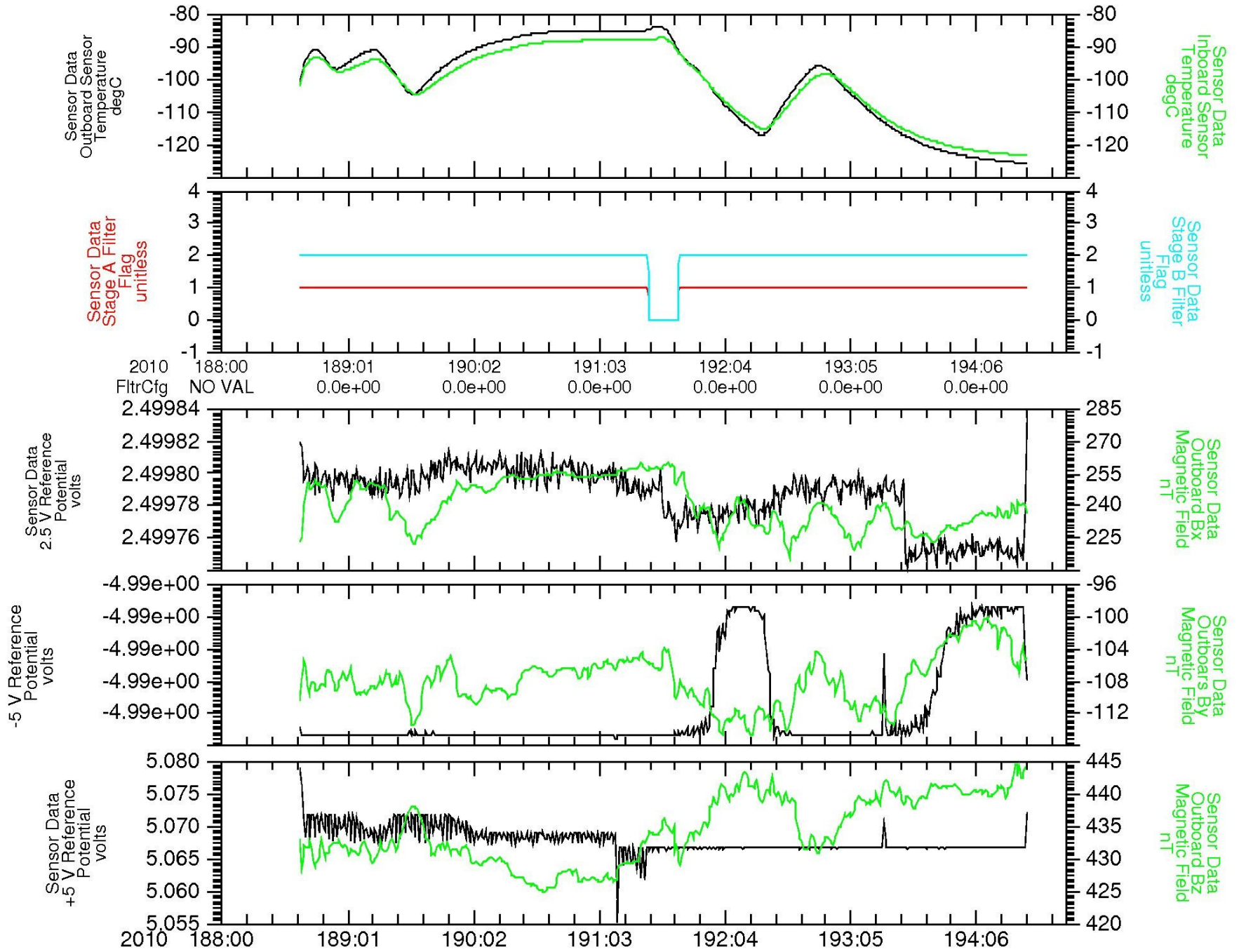
- ▶ The 2.5 V reference converted ADC counts are greater than the expected 65535 value which suggests that the resolution of the ADC is assigned incorrectly.
- ▶ It is unclear why the -5 volt reference has larger ADC Counts than the +5 volt reference:



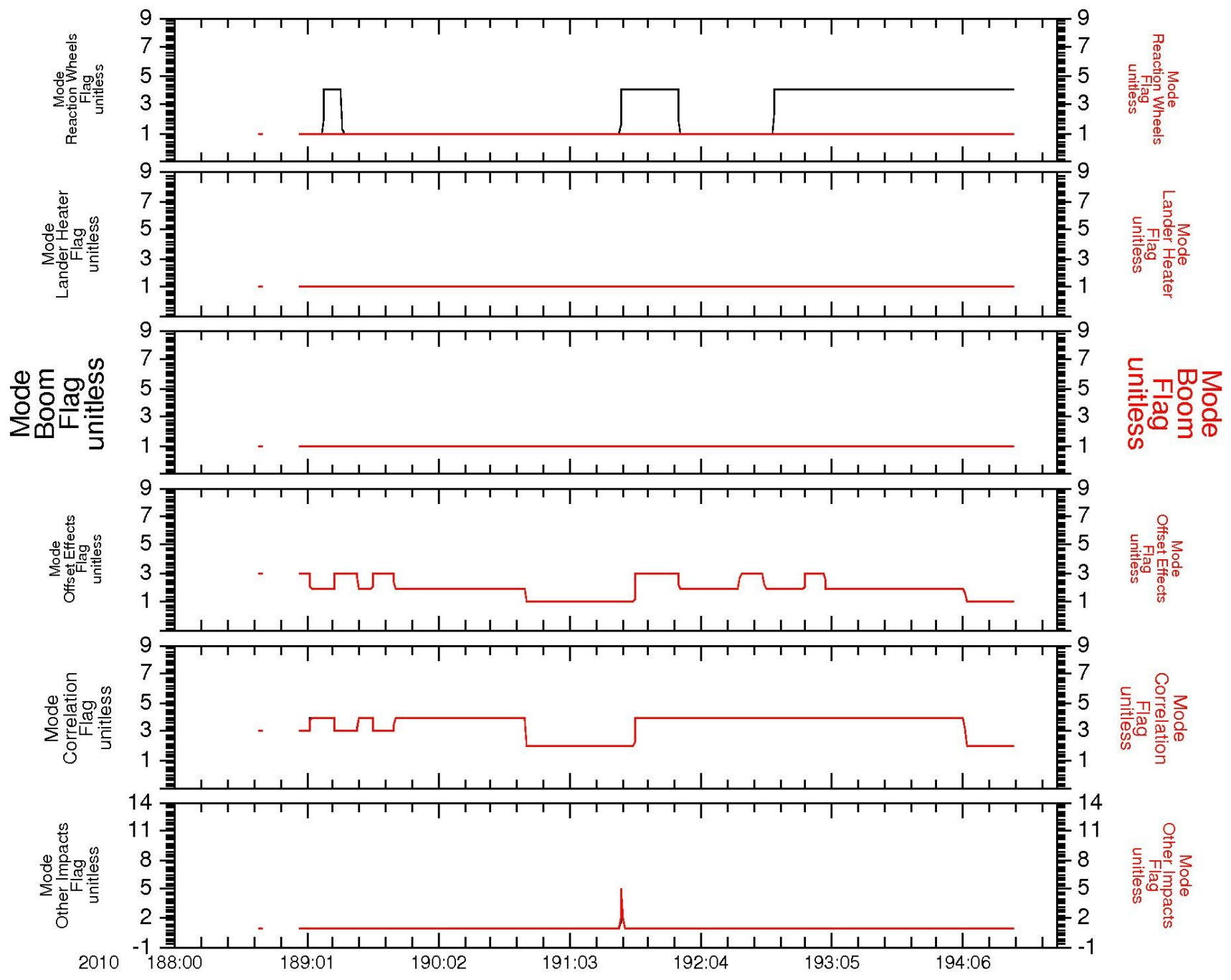
# ro-a-rpcmag-3-ast1-calibrated-v2.0/data



# ro-a-rpcmag-3-ast2-calibrated-v3.0/data



# ro-a-rpcmag-3-ast1-calibrated-v2.0/data



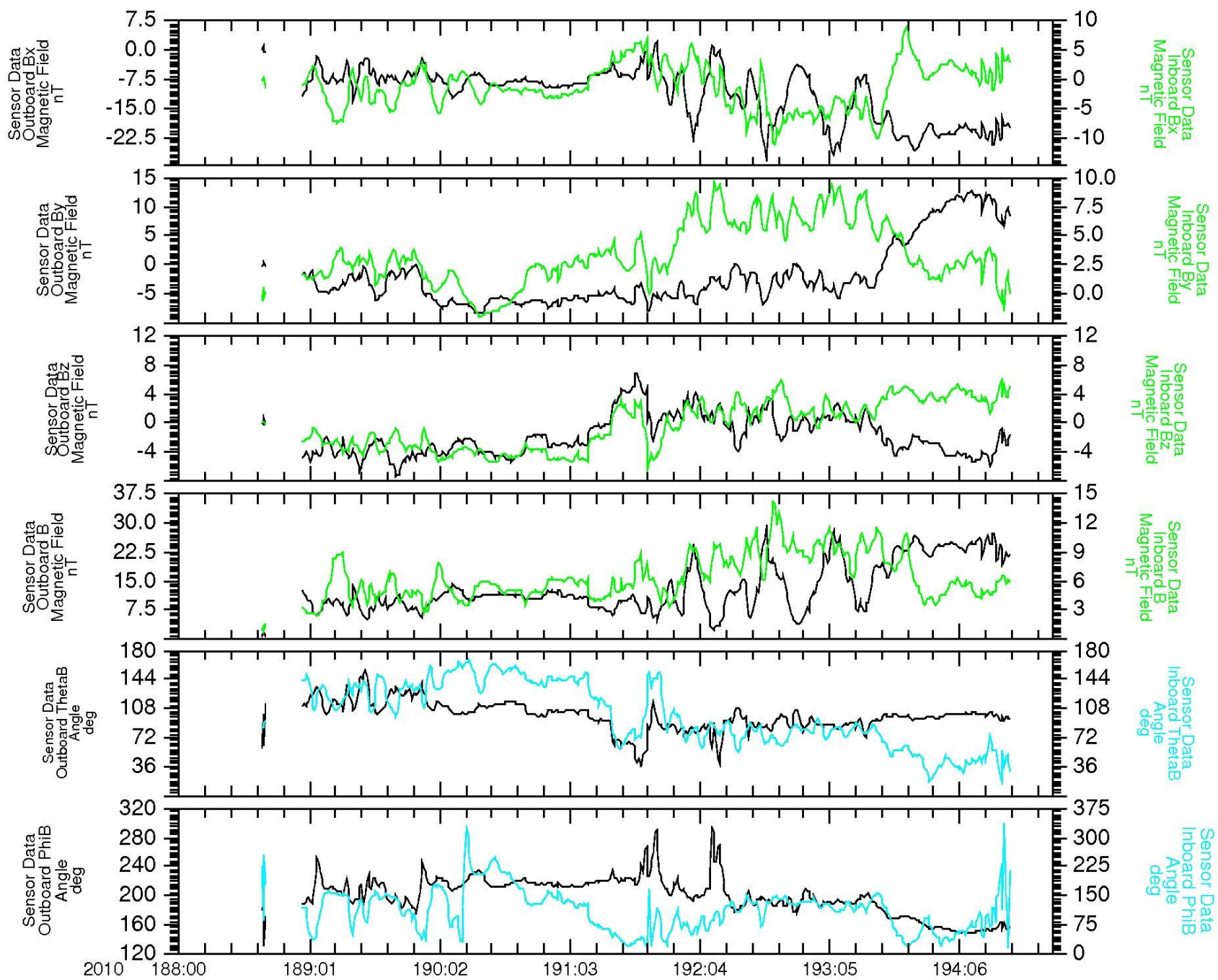
# Calibrated Level 3 Data

Science Data Good  
Temperature data Good  
Mode Data Good  
Quality Data Good



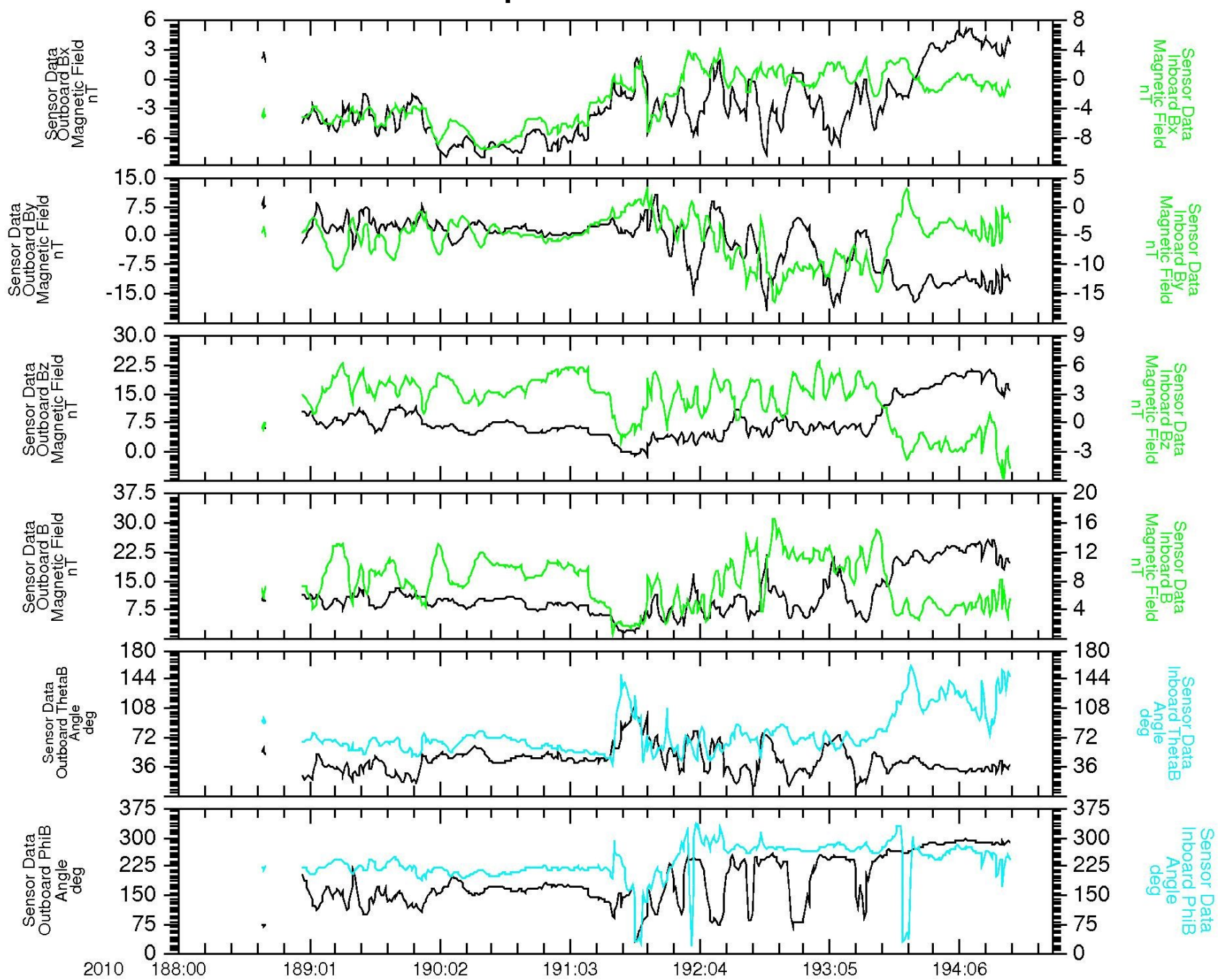
# ro-a-rpcmag-3-ast2-calibrated-v3.0/data

## Level A: Instrument Coordinates



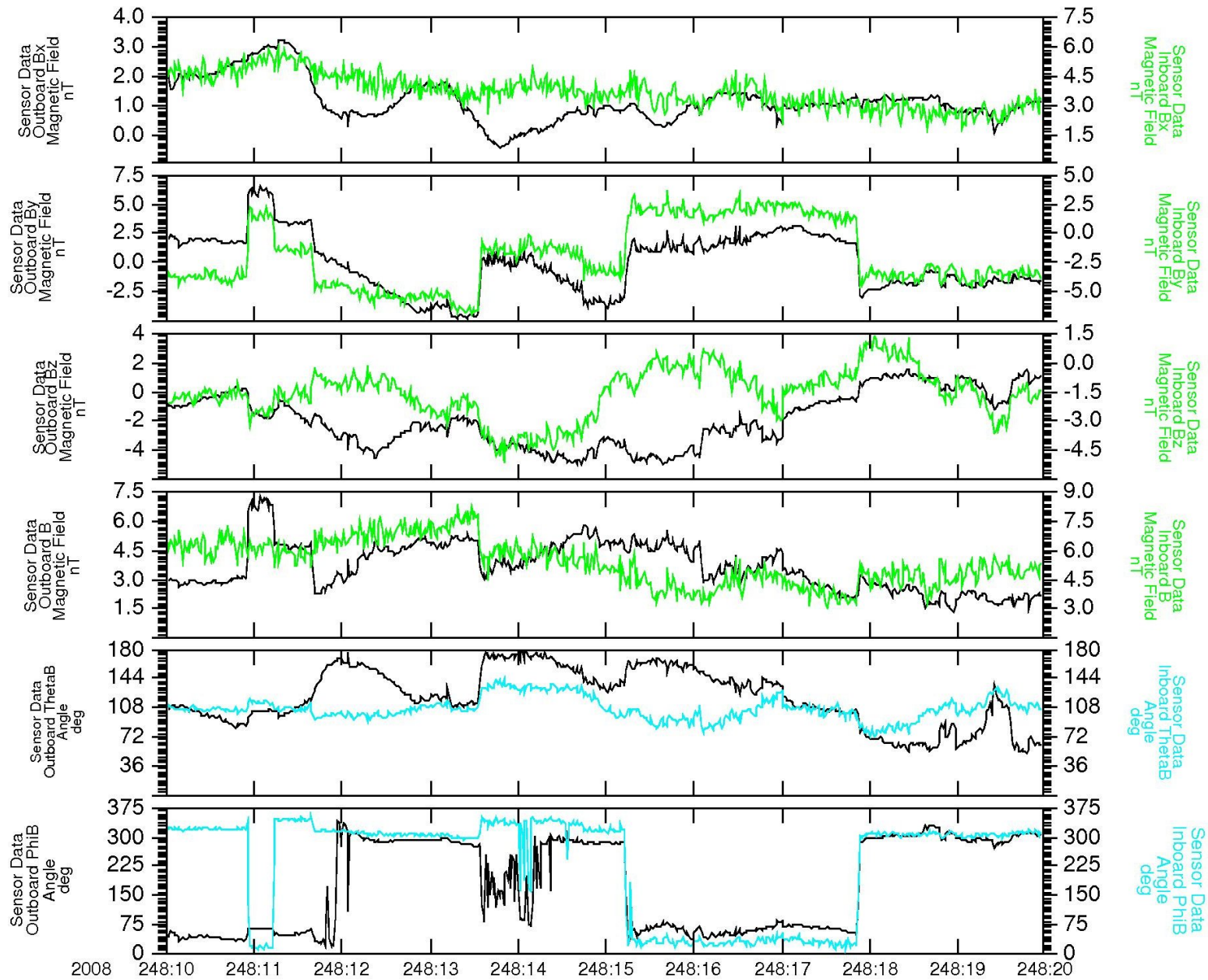
# ro-a-rpcmag-3-ast2-calibrated-v3.0/data

## Level B: Spacecraft Coordinates



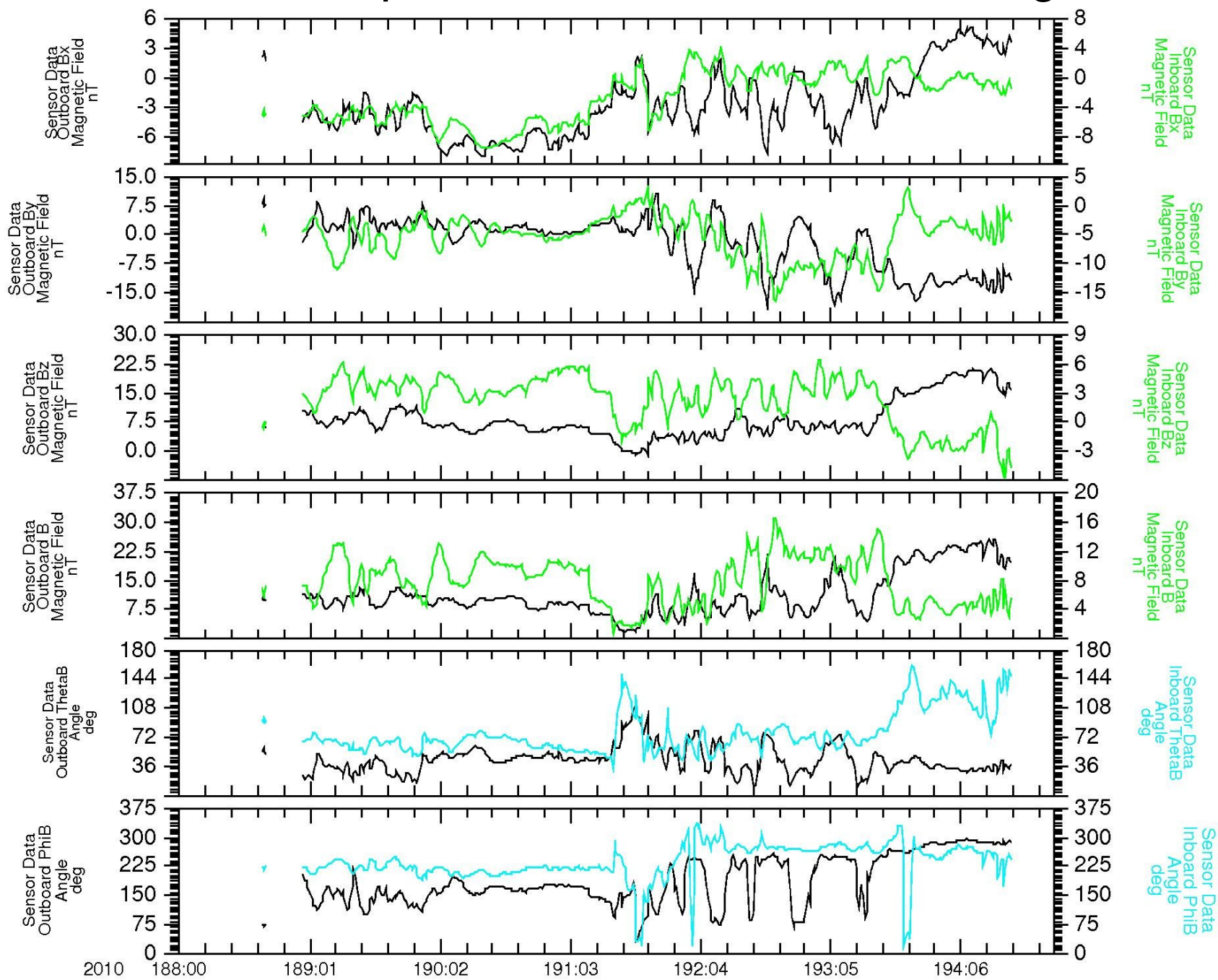
# ro-a-rpcmag-3-ast2-calibrated-v3.0/data

## Level C: Ecliptic (Celestial) Coordinates





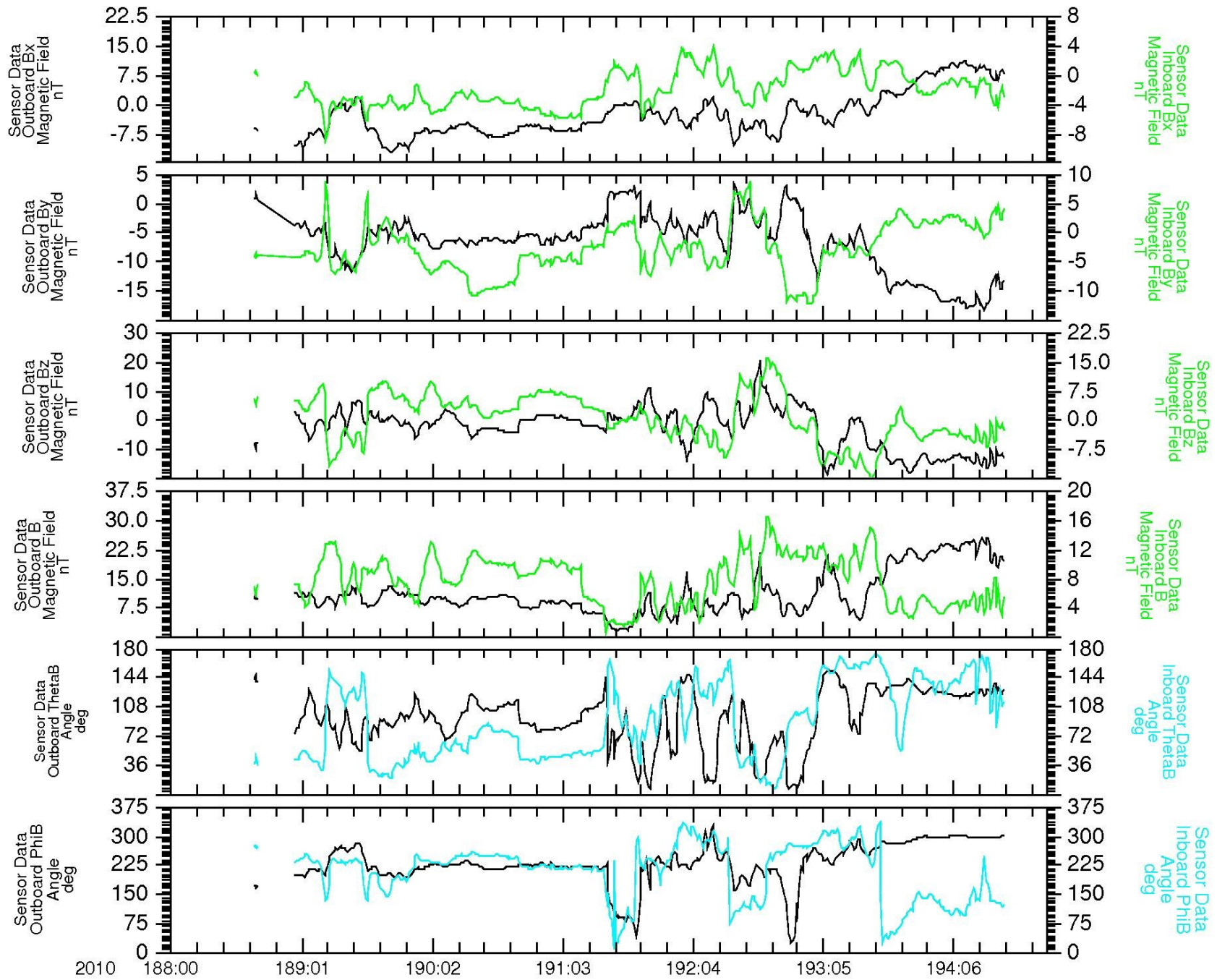
# ro-a-rpcmag-3-ast2-resampled-v3.0/data Level F: Spacecraft Coordinates, Averaged



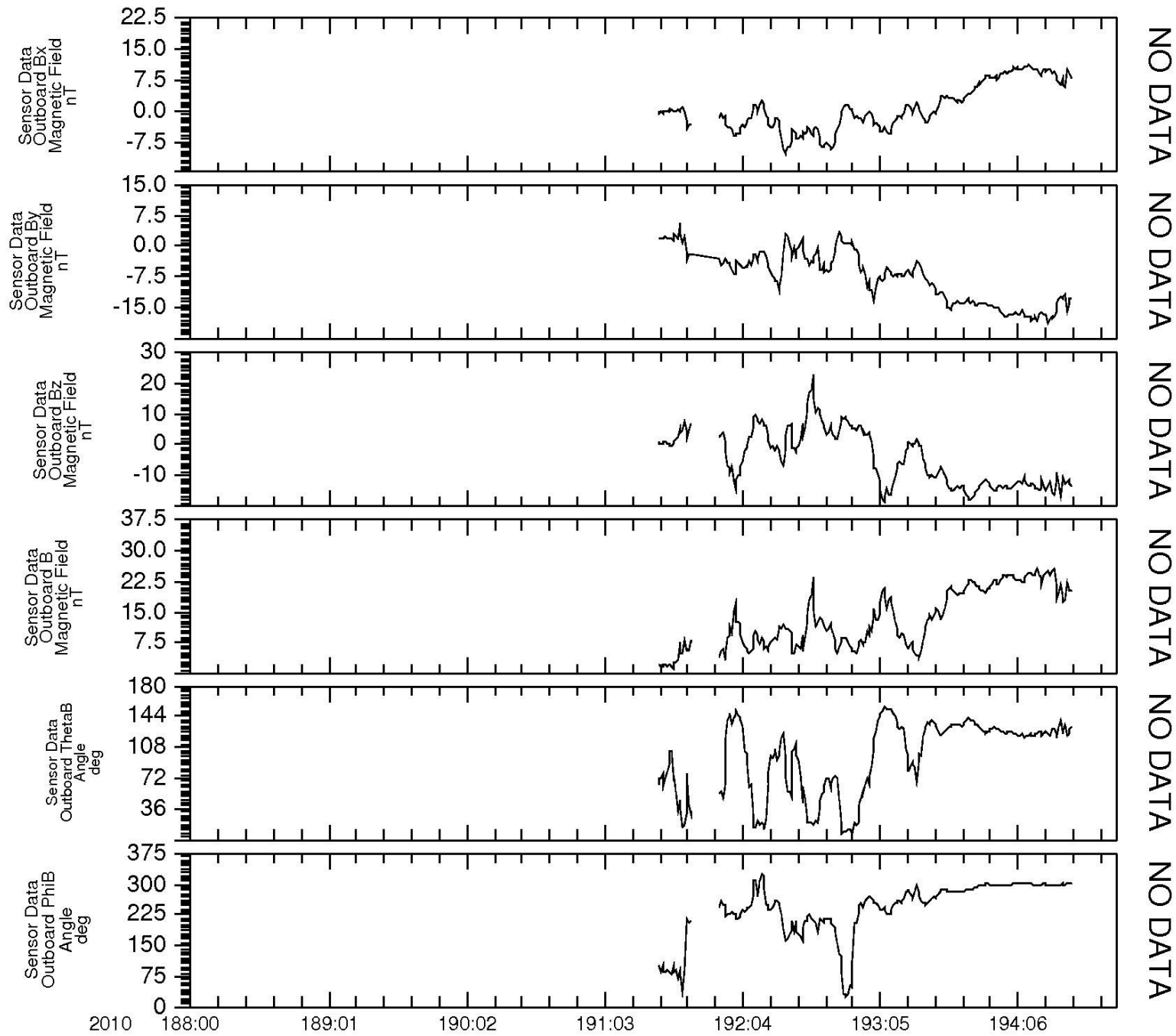


# ro-a-rpcmag-3-ast2-resampled-v3.0/data

## Level G: Ecliptic (Celestial) Coordinates, Averaged



# ro-a-rpcmag-3-ast2-resampled-v3.0/data Level H: Ecliptic (Celestial) Coordinates, Reaction Wheel Corrected and Averaged



# RPC MAG Level 3 Data

Both the Calibrated and Resampled Data are  
Good

# Backup Slides

ro-a-rpcmag-2-ast2-raw-v3.0  
ro-a-rpcmag-3-ast2-calibrated-v3.0  
ro-a-rpcmag-4-ast2-resampled-v3.0  
AAREADME.TXT

GOOD

ro-a-rpcmag-2-ast2-raw-v3.0  
ro-a-rpcmag-3-ast2-calibrated-v3.0  
ro-a-rpcmag-4-ast2-resampled-v3.0  
ERRATA.TXT

GOOD

ro-a-rpcmag-2-ast2-raw-v3.0  
ro-a-rpcmag-3-ast2-calibrated-v3.0  
ro-a-rpcmag-4-ast2-resampled-v3.0  
VOLDESC.CAT

Minor correction sent to PDS.

ro-a-rpcmag-2-ast2-raw-v3.0/INDEX  
ro-a-rpcmag-3-ast2-calibrated-v3.0/INDEX  
ro-a-rpcmag-4-ast2-resampled-v3.0/INDEX  
INDEX.LBL

GOOD



ro-a-rpcmag-2-ast2-raw-v3.0/INDEX  
ro-a-rpcmag-3-ast2-calibrated-v3.0/INDEX  
ro-a-rpcmag-4-ast2-resampled-v3.0/INDEX  
INDEX.TBL

GOOD

ro-a-rpcmag-2-ast2-raw-v3.0/INDEX  
ro-a-rpcmag-3-ast2-calibrated-v3.0/INDEX  
ro-a-rpcmag-4-ast2-resampled-v3.0/INDEX  
INDXINFO.TXT

GOOD

ro-a-rpcmag-2-ast2-raw-v3.0/CATALOG  
ro-a-rpcmag-3-ast2-calibrated-v3.0/CATALOG  
DATASET.CAT

Minor corrections sent to PDS.

ro-a-rpcmag-2-ast2-raw-v3.0/CATALOG  
ro-a-rpcmag-3-ast2-calibrated-v3.0/CATALOG  
ro-a-rpcmag-4-ast2-resampled-v3.0/CATALOG  
RPCMAG\_PERS.CAT

GOOD

ro-a-rpcmag-2-ast2-raw-v3.0/CATALOG  
ro-a-rpcmag-3-ast2-calibrated-v3.0/CATALOG  
ro-a-rpcmag-4-ast2-resampled-v3.0/CATALOG  
ROSETTA\_INSTHOST.CAT

GOOD

ro-a-rpcmag-2-ast2-raw-v3.0/CATALOG  
ro-a-rpcmag-3-ast2-calibrated-v3.0/CATALOG  
ro-a-rpcmag-4-ast2-resampled-v3.0/CATALOG  
ROSETTA\_MISSION.CAT

Minor corrections sent to PDS

ro-a-rpcmag-2-ast2-raw-v3.0/DOCUMENT  
ro-a-rpcmag-3-ast2-calibrated-v3.0/DOCUMENT  
ro-a-rpcmag-4-ast2-resampled-v3.0/DOCUMENT  
CALIBRATION/RO\_IGEP\_TR0028.LBL

GOOD