ROSETTA PLASMA CONSORTIUM
Ion Composition Analyzer

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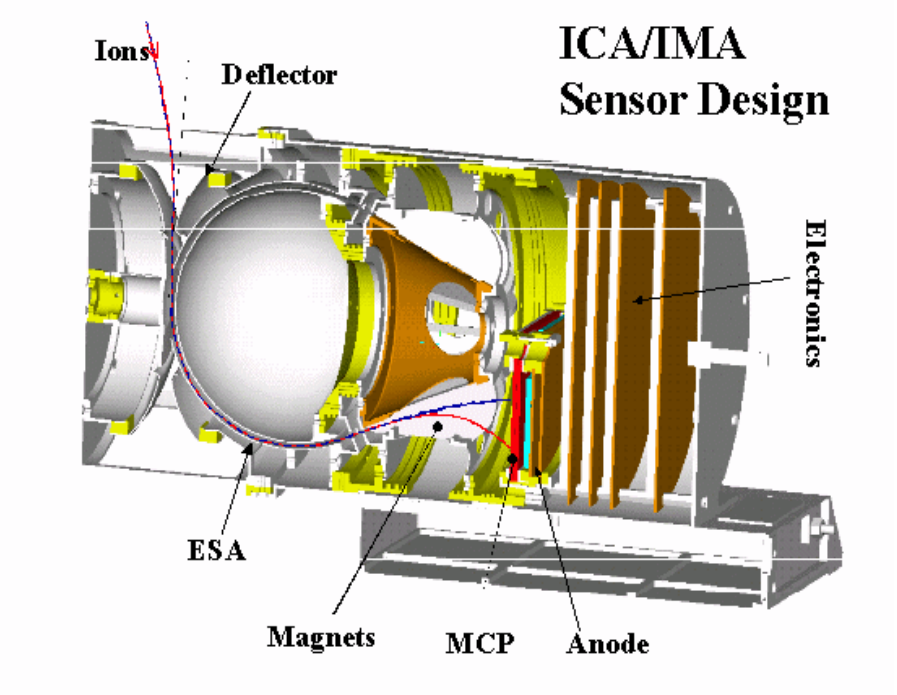
On-board S/W:	Hans Borg
EGSE S/W:	Hans Borg
Archive S/W:	Peje Nilsson
Co-Is:	S. Barabash, A. Fedorov, J.-A. Sauvaud, H. Koskinen, E. Kallio, J. L. Burch



Temporal resolution:	2D distribution 4 s (12 s full energy range)	
	3D distribution 64 s (192 s full energy range)	
Geometric factor		
per 22.5 degree sector	6 10^{{-4}} cm^2 sr	
per 360 degree sector	1 10^{{-2}} cm^2 sr	

Quantity		Range
Energy:	Range	5 eV to 40 keV
	Resolution	Delta E/E = 0.07
Scan:	32 (solar wind)	96 (otherwise)
Angle:	Range (FOV)	90 x 360 degrees
	Resolution	5.0 x 22.5 degrees (16 elevation steps x 16 sectors)

RPC IES
Data Set Evaluation Tools

Staging -
- Machine: IBM lenovo T60p ThinkPad
- Operating System: Fedora 25 Linux

Evaluation -
- Machine: Dell Precision T3400
- Operating System: fedora 19 Linux

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

RPC ICA Data Sets

ro-c-rpcica-2-prl-raw-v2.0
ro-c-rpcica-2-esc1-raw-v2.0
ro-c-rpcica-2-esc2-raw-v2.0
ro-c-rpcica-2-esc3-raw-v2.0
ro-c-rpcica-2-esc4-raw-v1.0
ro-c-rpcica-2-ext1-raw-v1.0
ro-c-rpcica-2-ext2-raw-v1.0
ro-c-rpcica-2-ext3-raw-v1.0

ro-c-rpcica-3-esc1-calib-v1.0

Documentation Evaluation

ro-c-rpcica-2-esc4-raw-v1.0
aareadme.txt

Remove the word MARS from the heading since the description is generic and
The contents apply to all of the RPC-ICA data archives.

```
MARS RPC-ICA Data Archive
=========================

a) DATA
=======

CODMAC Level/Type    Data Type    Data Content
```

ro-c-rpcica-2-esc4-raw-v1.0
ro-c-rpcica-3-esc1-calib-v1.0
voldesc.cat

GOOD

ro-c-rpcica-2-ext1-raw-v2.0
catalog/catinfo.txt

File name listed in this document as PERSON.CAT; however, file name in the directory is called pers.cat.

ro-c-rpcica-2-ext1-raw-v2.0
catalog/software.cat

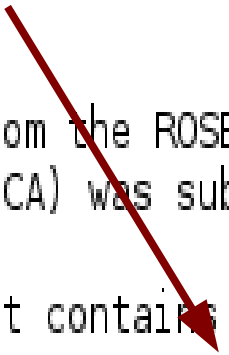
GOOD

ro-c-rpcica-2-ext1-raw-v2.0
catalog/pers.cat

GOOD

ro-c-rpcica-2-ext3-raw-v2.0
catalog/dataset.cat

Inst.cat says the minimum range is 5 eV, data plots from the browse directory show spectral data to 5 eV.



The data from the ROSETTA PLASMA CONSORTIUM (RPC) Ion Composition Analyser (ICA) was submitted by Hans Nilsson for the RPCICA team.

The data set contains data of mass resolved positively charged ions in the energy range 10 eV to 40 keV. The raw data is separated into mass channels or mass channel ranges, not actual ion mass. For most circumstances, significant counts are seen only for certain directions, mass channels and energy levels. The data is thus sparse with many zeros. The unit is COUNTS.

ro-c-rpcies-3-ext3-raw-v1.0
catalog/reference.cat

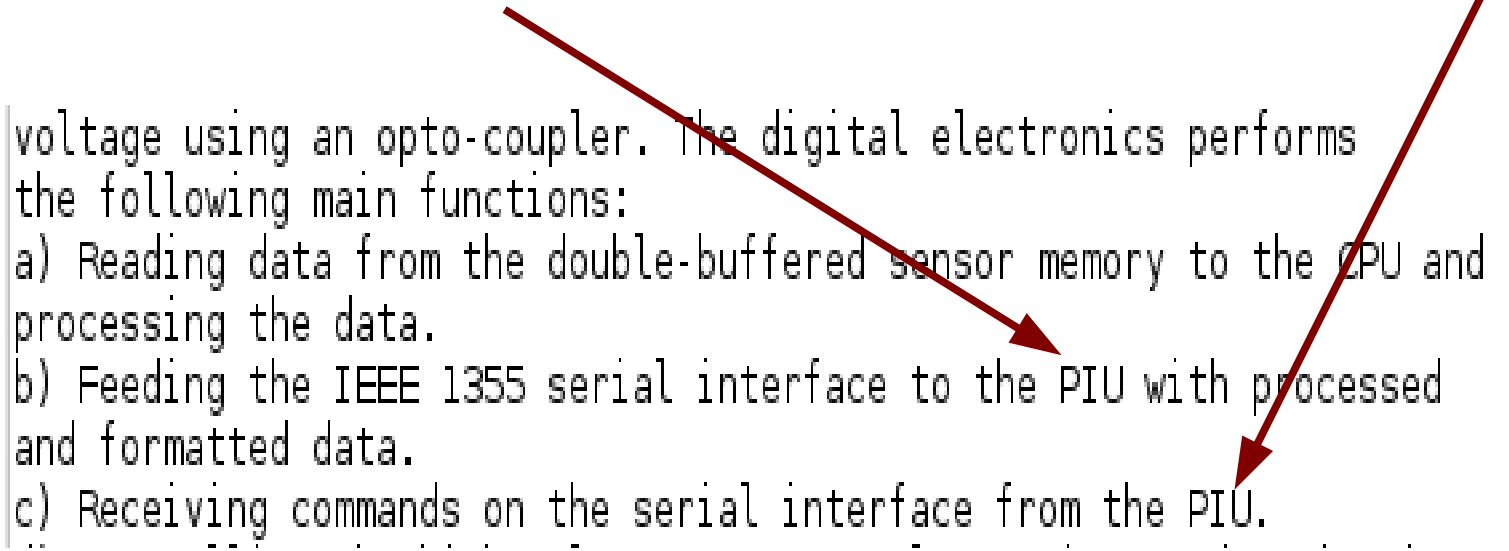
There are two references in the proposed list which are ITAR controlled documents. The SwRI Legal Department reports “Revealing the existence of an ITAR controlled document is itself a violation of ITAR”.

The JPL Library staff has acknowledged that the following two references to JPL Documents are not cleared for public release: ASMAR&HERRERA1993 and ASMARETAL1995. They should not be included in this reference list and should not be referenced in the public archive. Please remove these references.

RID004

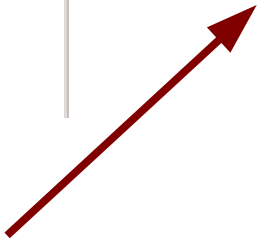
ro-c-rpcica-2-ext3-raw-v2.0
catalog/inst.cat

What is the PIU? Processing Interface Unit, Power Interface Unit, Plasma Interface Unit, Program Interface Unit, or something else?



ro-c-rpcies-3-ext3-v1.0
document/docinfo.txt

```
SOFTWARE/SOFTINFO.TXT  (Description of the contents of the SOFTWARE directory)
        *.LBL  (PDS LABEL files for software files)
        *.DAT  (Data files for the Matlab software)
        *.M    (Matlab source code files)
```



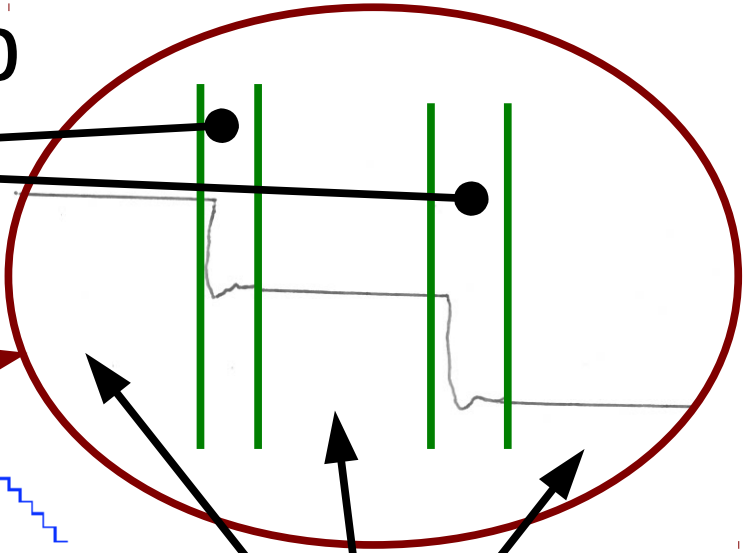
No *.DAT files found

ro-c-rpcica-2-ext3-raw-v1.0/document icma_tctm.lbl

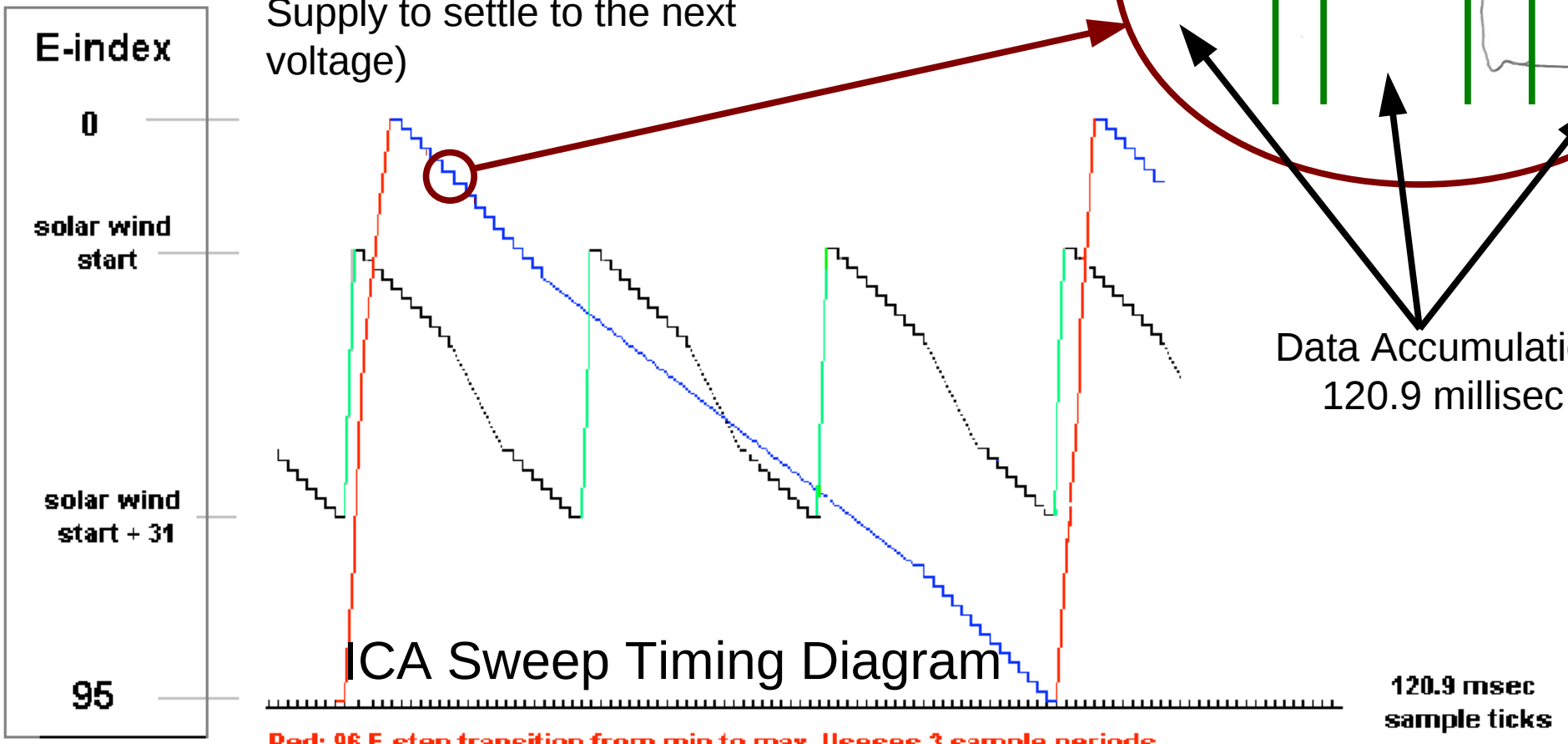
GOOD

ro-c-rpcica-2-ext3-raw-v1.0/document
icma_tctm.tab

What is the data latency?
(the dead time between energy Steps required for the power Supply to settle to the next voltage)



Data Accumulation
120.9 millisec



ro-c-rpcica-2-ext3-raw-v1.0/document icatables.lbl

GOOD

ro-c-rpcica-2-ext3-raw-v1.0/document icatables.pdf

The equation for the geometric factor references PAC voltage equation given on page 2. The PAC voltage equation disagrees with that given in the calibration report. What is correct?

$$PAC[V] = -40.088 + 0.966 \cdot PAC\_ref[mV]$$ ← From icatables.pdf

$$U_{PAC}[V] = -96.19 + 0.933 \cdot PAC_{REF}[mV]$$ ← From ica_cal.pdf

In addition, there are no units given for the geometric factor.

RID008

ro-c-rpcica-2-ext3-raw-v1.0/document
ica_cmd_brief.lbl
ica_cmd_brief.tab

GOOD

ro-c-rpcica-2-ext3-raw-v1.0/document ica_cal.lbl

GOOD

ro-c-rpcica-2-ext3-raw-v1.0/document ica_cal.pdf

The equation for the geometric factor references PAC voltage equation given toward the end of the document. The PAC voltage equation disagrees with that given in the ICA Flight Tables document. What is correct?

$$PAC[V] = -40.088 + 0.966 \cdot PAC\_ref[mV]$$ ← From icatables.pdf

$$U_{PAC}[V] = -96.19 + 0.933 \cdot PAC_{REF}[mV]$$ ← From ica_cal.pdf

In addition, there are no units given for the geometric factor.

RID008

ro-c-rpcica-2-ext3-raw-v1.0/document
ica_eaicd/ica_eaicd.lbl

GOOD

ro-c-rpcica-2-ext3-raw-v1.0/document ica_eaicd/ica_eaicd.pdf

1.4 Applicable Documents

Planetary Data System Data Preparation Workbook, February 1, 1995, Version 3.1, JPL, D-7669, Part1

Planetary Data System Standards Reference, August 1, 2003, Version 3.6, JPL, D-7669, Part 2

[Mission] Archive Generation, Validation and Transfer Plan, [month day, year], [doc number]

Unknown Document Reference

RID009

ro-c-rpcica-2-ext3-raw-v1.0/document ica_eaicd/ica_eaicd.pdf

(from Page 6, 1st paragraph)

The energy range of the instrument is 25 eV/e to 40 keV/e,

Instrument energy range differs from inst.cat

RID010

ro-c-rpcica-2-ext3-raw-v1.0/document ica_eaicd/ica_eaicd.pdf

(from Section 2.2, 3rd paragraph)

A possible strategy to automatically remove the background has been tried for Mars Express IMA data and can be used by the end user on high resolution ICA data. One uses the fact that for significant counts of a real signal, one will always get signal from several contiguous mass channels. Usually the signal will also be seen in several adjacent energy channels. Therefore one can remove all occurrences of counts in a single mass and energy channel, where there are no counts in neighboring channels. This gives a much lower background around significant real peaks in the data. It does lower the sensitivity of the instrument. For weak signals one needs to first integrate for several full measurement periods. In such a case the noise will also add up and may show up as larger groups of several adjacent mass and energy channels with non-zero counts.

Where is the background removal for ICA and its discussion?
Where is the discussion of the ICA geometric factor and its contents?

RID011

ro-c-rpcica-2-ext3-raw-v1.0/document ica_eaicd/ica_eaicd.pdf

(from Section 2.4.1, 1st paragraph)

Calibration tables from the calibration of the flight model will be stored. These include energy tables, deflection angle tables, mass channel to ion mass tables for different post-acceleration levels, and counts to flux conversion tables for a given post-acceleration and MCP bias. Different energy and elevation tables are

Where are these flux conversion tables?

RID012

ro-c-rpcica-2-ext3-raw-v1.0/document ica_eaicd/ica_eaicd.pdf

(from Section 2.4.1, last line on page 12)

Low energies come first. This does not reflect the actual measurement sequence, the analyzer voltage is stepped from high to low. It is however much more convenient for the end user to have the energy go from low to high. The fill value -1.0 corresponds to non valid energy steps, positively charged ions cannot get through the electrostatic analyzer for this setting of the voltages. However, when the instrument is cold there can be a significant offset of the zero-level of the high voltage, and for such cases there can be a significant signal for these energy steps. The best possible temperature drift correction is the subject of the ongoing ESA funded enhanced archive effort. In the L2 data, a quality flag is set when the temperature of the

Where are these Level 2 quality flags?
They are not found with the L2 data.

RID013

ro-c-rpcica-2-ext3-raw-v1.0/document ica_eaicd/ica_eaicd.pdf

(from Section 2.4.1, page 14, 9th line)

row contains post-acceleration level it is valid for, the energy index and 6 different ion mass ranges (2 values, start and stop), nominally corresponding to H+, >O+, O+, He+, He++, O++. In practice this is not the actual mass range at low energy for all data, due to a discrepancy in the onboard table. The end user should therefore carefully check the mass channel ranges binned together.

These tables should have been checked prior to submission to the archive.
I am not sure the user has the ability to make this check. It should not be necessary for the user to make this check.

RID014

ro-c-rpcica-2-ext3-raw-v1.0/document ica_eaicd/ica_eaicd.pdf

(from Section 2.4.2, 1st paragraph)

2.4.2 In-Flight Data Products

The ICA instrument gives essentially only one raw data (Level 2) output, counts. The instrument obtains counts for each energy level, sector, elevation angle and mass channel (as described in section 2). One full distribution is obtained in 192 s for all modes except the solar wind mode which takes 64 s. The instrument makes measurements in the same way regardless of available telemetry rates. To reduce the data rate, the data is reduced in resolution. Elevation angles, sectors and mass channels are added together into larger bins. Data is never binned over energy and time in this way. In May 2015 two new modes were introduced, with no elevation scanning and only low energy coverage, but with a time resolution of 1s and 4s. The mode used can be determined from the PROM section used.

This needs discussion.

This is the first mention that the instrument has a mode where it can run faster than 4 sec. This should be discussed somewhere.

RID015

ro-c-rpcica-2-ext3-raw-v1.0/document ica_eaicd/ica_eaicd.pdf

(from Section 3.1.4, 1st paragraph)

3.1.4 File naming Convention

ICA will produce three types of science data files for uncalibrated data and three types for calibrated data. These are data for 96, 32 and 8 energy step modes. Furthermore an edited housekeeping data file and geometry data file will be produced.

This is the first mention that the instrument can operate in a mode different than 32 or 96 energy steps. This is not described by other documentation discussing instrument timing. This needs to be discussed in the EAICD.

RID016

ro-c-rpcica-2-ext3-raw-v1.0/document ica_eaicd/ica_eaicd.pdf

(from Section 3.2.2, 1st paragraph)

3.2.2 Time Standards

All references to time in the ICA PDS archive will be to UTC. Then time is displayed using the PDS standard CCYY-MM-DDThh:mm:ss.sss we will convert space craft time into UTC in this format (not GMT as the original PDS definition). The conversion will be done from the epoch 2000.

Data files have time resolution in microsec, not millisec as stated by the EAICD.

RID017

ro-c-rpcica-2-ext3-raw-v1.0/document ica_eaicd/ica_eaicd.pdf

(from Section 3.4, 3rd paragraph)

Low instrument temperature leads to a drift of the low energy channels of the instrument. Below about 13 °C this may happen. The effect is pronounced and a clear problem below about 0 °C. We therefore set the temperature flag to1 if more than 5 temperatures readings in an hour are below 13 °C, and to 2 for at least 5 temperature readings below 0 °C. The number 5 is arbitrary, but a number larger than 1 reduces the influence of noise and erroneous temperature readings which may occur just after startup.

Can not find this flag. Temperatures exist in the HK file, but as an uncalibrated Integer. Which value do you use? There is no conversion formula for this value to degC. There is no discussion of the parameters in the HK file and no conversions To calibrated units.

RID018

ro-c-rpcica-2-ext3-raw-v1.0/document ica_eaicd/ica_eaicd.pdf

(from Section 3.4, 4th paragraph)

Similarly, low instrument temperatures may lead to enhanced noise, as can lack of on board background subtraction and sometimes EUV light can enter the instrument. Therefore the highest energy channels are used to monitor the noise level as it is in the delivered raw data. The noise flag has, like the instrument flag, 3 levels, where 0 means no known problem, 1 is elevated levels and 2 means significantly elevated levels. The averaged background level over the 1 hour interval is used.

Can not find this flag.

RID019

ro-c-rpcica-2-ext3-raw-v1.0/document ica_eaicd/ica_eaicd.pdf

3.4.3.1 Root Directory

Table 1: Root Directory Contents

File Name	File Contents
VOLDESC.CAT	A description of the contents of this Volume in a PDS format readable by both humans and computers
CALIB/	Calibration directory
CATALOG/	Catalogue directory
DOCUMENT/	Document directory
INDEX/	Index directory
DATA/	Data directory
BROWSE/	Browse directory
GEOMETRY/	Geometry directory
LABEL/	Label directory
SOFTWARE/	Software directory

The LABEL directory does not exist, so it should either not be in this table or there should be a statement that not all of these listed directories are listed in the archive.

RID020

ro-c-rpcica-2-ext3-raw-v1.0/document ica_eaicd/ica_eaicd.pdf

Table 1: Calibration Directory Contents

File Name	File Contents
CATINFO.TXT	A description of the contents of this directory
ICA_ELEVATION_TABLE_V02.LBL, .TAB	Calibration table describing the elevation angle corresponding to each elevation index, as a function of particle energy. The angle given is the center angle.

Table 1: Calibration Directory Contents

ICA_ENERGY_TABLE_V02.LBL, .TAB	Calibration table describing the particle energy corresponding to each energy index level. The energy indicated is the center energy of the bin.
ICA_MASS_LOOKUP_TABLE*N*_V02.LBL, .TAB	Calibration tables describing the mass channels corresponding to 6 different ion mass intervals as a function of energy. *N* is 1,2 or 3 where table 1 is used in the case of no post-acceleration, table 2 when post-acceleration reference level is 1-4 and table3 when post-acceleration level is 5-7.

This table should be designated Table 2. There already exists a Table 1. In addition, there are more versions than listed here. Modify this table to include possible version number files to cover the extra files in the directory.

RID021

ro-c-rpcica-2-ext3-raw-v1.0/document ica_eaicd/ica_eaicd.pdf

3.4.3.3 Catalog Directory

Table 3: Catalog Directory Contents

File Name	File Contents
CATINFO.TXT	A description of the contents of this directory
UNCALIBRATED_DS.CAT	PDS Data Set catalog description of all the ICA un-calibrated level 2 data files
CALIBRATED_DS.CAT	PDS Data Set catalog description of all the ICA calibrated level 3 data files
DERIVED_DS.CAT	PDS Data Set catalog description of all the ICA derived level 5 data files, if this will exist
INSTHOST.CAT	PDS instrument host (spacecraft) catalog description of the Rosetta orbiter spacecraft
INST.CAT	PDS instrument catalog description of the ICA instrument
MISSION.CAT	PDS mission catalog description of the Rosetta mission
PERSON.CAT	PDS personnel catalog description of ICA Team members and other persons involved with generation of ICA Data Products
REF.CAT	ICA-related references mentioned in other *.CAT files
SOFTWARE.CAT	PDS software catalog description of ICA software

The files UNCALIBRATED_DS.CAT, CALIBRATED_DS.CAT, and DERIVED_DS.CAT do not exist. The files PERAON.CAT and REF.CAT are really called pers.cat and reference.cat.

RID022

ro-c-rpcica-2-ext3-raw-v1.0/document ica_eaicd/ica_eaicd.pdf

3.4.3.4 Index Directory

Table 4:Index Directory Contents

File Name	File Contents
INDXINFO.TXT	Dataset Index File
BROWSE_INDEX.LBL BROWSE_INDEX.TAB	Browse index file
INDEX.LBL INDEX.TAB	Data index file
	No other index files will be used

The extra files named checksum.lbl and checksum.tab were found in this directory.

RID023

ro-c-rpcica-2-ext3-raw-v1.0/document ica_eaicd/ica_eaicd.pdf

Table 8: Document Directory Contents

File Name	File Contents
DOCINFO.TXT	A description of the contents of this directory and all subdirectories.
ICA_EAICD/	Directory containing the ICA EAICD document
ICA_EAICD/ICA_EAICD.HTM	The ICA Experiment-Archive Interface Control Document as hypertext
ICA_EAICD/ICA_EAICD.ASC	The ICA Experiment-Archive Interface Control Document in ASCII text
ICA_EAICD/ICA_EAICD.PDF	The ICA Experiment-Archive Interface Control Document in PDF format
ICA_EAICD/ICA_EAICD.DOC	The ICA Experiment-Archive Interface Control Document in MSWordXP format
ICA_EAICD/ICA_EAICD.LBL	A PDS detached label that describes ICA_EAICD.HTM, ICA_EAICD.ASC, ICA_EAICD.PDF and ICA_EAICD.DOC
ICA_INST/	Directory containing the ICA instrument paper
ICA_INST/*	Similar to ICA_EAICD/*
ICA_CALIB/	Directory containing information regarding calibration
ICA_CALIB/*	Similar to ICA_EAICD/*

The files named ICA_EAICD/ICA_EAICD.HTM, ICA_EAICD/ICA_EAICD.ASC, ICA_EAICD/ICA_EAICD.DOC, and the directory ICA_INST were not found.

RID024

ro-c-rpcica-2-ext3-raw-v1.0/document ica_eaicd/ica_eaicd.pdf

3.4.3.10 Data Directory

Table 9: Data Directory Contents

File Name	File Contents
CATINFO.TXT	A description of the contents of this directory
RPCICAYYMMDDTHH_000_96L2.LBL, .TAB	Label and table files containing ICA data
RPCICAYYMMDDTHH_000_GEOM.LBL, .TAB	Label and table files with geometry data
RPCICAYYMMDDTHH_000_HK.LBL, .TAB	Label and table files with housekeeping data

There is no CATINFO.TXT file found in this directory. More data file types than just the three types listed have been found.

RID025

ro-c-rpcica-2-ext3-raw-v1.0/document ica_eaicd/ica_eaicd.pdf

(from Section 4.3.1, 2nd paragraph)

The data files consist of 106 columns. These columns are described in words below and later a sample label file is shown. The number of rows is variable. In the sample below figures from a real file is provided.

13. – 107 contains 96 count-values for the 96 different energy steps in the energy spectrogram. The counts are the sum over all sectors, elevation angles and mass channels used to produce the data according to the previous columns. The energy levels are found in the file ICA_ENERGY_TABLE_V02.LBL in the CALIB directory.

There are 12 columns before the 96 data values, which makes a total of 12+96 = 108 columns in the 96 data value files. The 32 or 8 energy level data files should also be mentioned.

RID026

ro-c-rpcica-2-ext3-raw-v1.0/document ica_eaicd/ica_eaicd.pdf

Additional missing is a discussion of the GEOM and HK data file formats and their contents.

Calibration parameters for the HK files are missing.

Not enough information is given in this ICD to determine the flux of ions.

Missing is a discussion of detector efficiency.

Missing discussion of measurement uncertanties.

RID027

ro-c-rpcica-2-ext3-raw-v1.0/calib
calinfo.txt

GOOD

ro-c-rpcica-2-ext3-raw-v1.0/calib
energy/energyinfo.txt

GOOD

ro-c-rpcica-2-ext3-raw-v1.0/calib energy/ica_energy_table_*

ica_energy_table_v02.lbl	ica_energy_table_v02.tab
ica_energy_table_v03.lbl	ica_energy_table_v03.tab
ica_energy_table_v04.lbl	ica_energy_table_v04.tab
ica_energy_table_v05.lbl	ica_energy_table_v05.tab
ica_energy_table_v06.lbl	ica_energy_table_v06.tab
ica_energy_table_v07.lbl	ica_energy_table_v07.tab
ica_energy_table_v08.lbl	ica_energy_table_v08.tab
ica_energy_table_v09.lbl	ica_energy_table_v09.tab
ica_energy_table_v10.lbl	ica_energy_table_v10.tab
All GOOD	All GOOD

ro-c-rpcica-2-ext3-raw-v1.0/calib elevation/elevationinfo.txt

GOOD

ro-c-rpcica-2-ext3-raw-v1.0/calib elevation/ica_elevation_table_*

ica_elevation_table_v02.lbl
ica_elevation_table_v03.lbl
ica_elevation_table_v04.lbl
ica_elevation_table_v05.lbl
ica_elevation_table_v06.lbl
ica_elevation_table_v07.lbl
ica_elevation_table_v08.lbl
ica_elevation_table_v09.lbl
ica_elevation_table_v10.lbl

All GOOD

ica_elevation_table_v02.tab
ica_elevation_table_v03.tab
ica_elevation_table_v04.tab
ica_elevation_table_v05.tab
ica_elevation_table_v06.tab
ica_elevation_table_v07.tab
ica_elevation_table_v08.tab
ica_elevation_table_v09.tab
ica_elevation_table_v10.tab

All GOOD

ro-c-rpcica-2-ext3-raw-v1.0/calib
mass_lookup/mass_lookupinfo.txt

GOOD

ro-c-rpcica-2-ext3-raw-v1.0/calib mass_lookup/ica_mass_lookup_table1_*

ica_mass_lookup_table1_v02.lbl	ica_mass_lookup_table1_v02.tab
ica_mass_lookup_table1_v03.lbl	ica_mass_lookup_table1_v03.tab
ica_mass_lookup_table1_v04.lbl	ica_mass_lookup_table1_v04.tab
ica_mass_lookup_table1_v05.lbl	ica_mass_lookup_table1_v05.tab
ica_mass_lookup_table1_v06.lbl	ica_mass_lookup_table1_v06.tab
ica_mass_lookup_table1_v07.lbl	ica_mass_lookup_table1_v07.tab
ica_mass_lookup_table1_v08.lbl	ica_mass_lookup_table1_v08.tab
ica_mass_lookup_table1_v09.lbl	ica_mass_lookup_table1_v09.tab
ica_mass_lookup_table1_v10.lbl	ica_mass_lookup_table1_v10.tab
All GOOD	All GOOD

ro-c-rpcica-2-ext3-raw-v1.0/calib mass_lookup/ica_mass_lookup_table2_*

ica_mass_lookup_table2_v02.lbl	ica_mass_lookup_table2_v02.tab
ica_mass_lookup_table2_v03.lbl	ica_mass_lookup_table2_v03.tab
ica_mass_lookup_table2_v04.lbl	ica_mass_lookup_table2_v04.tab
ica_mass_lookup_table2_v05.lbl	ica_mass_lookup_table2_v05.tab
ica_mass_lookup_table2_v06.lbl	ica_mass_lookup_table2_v06.tab
ica_mass_lookup_table2_v07.lbl	ica_mass_lookup_table2_v07.tab
ica_mass_lookup_table2_v08.lbl	ica_mass_lookup_table2_v08.tab
ica_mass_lookup_table2_v09.lbl	ica_mass_lookup_table2_v09.tab
ica_mass_lookup_table2_v10.lbl	ica_mass_lookup_table2_v10.tab
All GOOD	All GOOD

ro-c-rpcica-2-ext3-raw-v1.0/calib mass_lookup/ica_mass_lookup_table3_*

ica_mass_lookup_table3_v02.lbl	ica_mass_lookup_table3_v02.tab
ica_mass_lookup_table3_v03.lbl	ica_mass_lookup_table3_v03.tab
ica_mass_lookup_table3_v04.lbl	ica_mass_lookup_table3_v04.tab
ica_mass_lookup_table3_v05.lbl	ica_mass_lookup_table3_v05.tab
ica_mass_lookup_table3_v06.lbl	ica_mass_lookup_table3_v06.tab
ica_mass_lookup_table3_v07.lbl	ica_mass_lookup_table3_v07.tab
ica_mass_lookup_table3_v08.lbl	ica_mass_lookup_table3_v08.tab
ica_mass_lookup_table3_v09.lbl	ica_mass_lookup_table3_v09.tab
ica_mass_lookup_table3_v10.lbl	ica_mass_lookup_table3_v10.tab
All GOOD	All GOOD

ro-c-rpcica-3-esc1-calib-v1.0
aareadme.txt

Not MARS data

Not Level 2 data

Not EDITED data

```
MARS RPC-ICA Data Archive
=========================

a) DATA
=======

CODMAC Level/Type    Data Type    Data Content

  2 / EDITED Data    table        RAW data of ICA, HK data and GEOMETRY data

The data can be found in directories of this type:
DATA/EDITED/2004/SEP/D23

DATA/EDITED/year/month/Dday/*.TAB (ICA, HK and GEOMETRY data files)
                            *.LBL (PDS LABEL files for the data files)
All data files are in ASCII text format.
```

RID028

ro-c-rpcica-3-esc1-calib-v1.0
aareadme.txt

```
b) Supporting files
==================
Supporting files for the Archive user include PDS descriptions, documents,
and searchable indices. These have been organized into five directories one
level below the root: BROWSE, CALIB, CATALOG, DOCUMENT, GEOMETRY & INDEX.

                                    Structure of the Volume
                                    ======================

AAREADME.TXT  (PDS required introduction to the data set)
VOLDESC.CAT   (PDS required volume description of the data only)

BROWSE/BROWINFO.TXT  (Description of the contents of the BROWSE directory)
     /year/month/Dday/*YYMMDD.PNG     (24 hour plot of the ICA data)
                      *YYMMDDTxx.PNG  (1 hour plots of the ICA data)
                      *.LBL           (PDS LABEL files for the ICA plots)
```

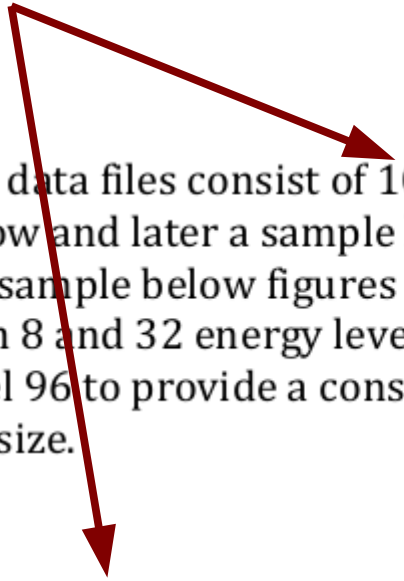
No BROWSE directory

No BROWSE directory

ro-c-rpcica-3-esc1-calib-v1.0/document ica_eaicd/ica_l2_to_l3_eaicd.pdf

This document should be included within the EAICD for ICA!!

There are 9 columns of support data before 96 columns of instrument data. file columns start at 1, so the last column is 9+96 = 105. So the last column is 105.



The data files consist of 106 columns. These columns are described in words below and later a sample label file is shown. The number of rows is variable. In the sample below figures from a real file is provided. There are also data sets with 8 and 32 energy levels, these have been padded with fill value up to energy level 96 to provide a consistent data set which is easy to read, at the expense of file size.

10. – 106 contains 96 flux-values for the 96 different energy steps in the energy spectrogram. The energy levels are found in the file ICA_ENERGY_TABLE_V01.LBL in the CALIB directory. The unit is [/eV/cm^2/sr/s].

RID030

ro-c-rpcica-3-esc1-calib-v1.0/document ica_eaicd/ica_l2_to_l3_eaicd.pdf

for each energy level t0 is 120.9 ms. If the total number of counts during the acquisition (for all sectors and mass channels) is N then the corrected counts C_{corr} is given from the measured counts C by the following formula:

$$C_{corr} = C * (1 + N * Tdead / t0)$$

Mass separation

Is not the value of “N” and the value of “C” the same for this instrument? From what I can tell, there is nothing in this instrument counting system which discards counts to make “N” different from “C”. Either way, this should be clarified.

RID031

ro-c-rpcica-3-esc1-calib-v1.0/document ica_eaicd/ica_l2_to_l3_eaicd.pdf

Calculating flux using the geometric factor

In order to calculate the differential flux of particles /eV/sr/cm2/s from the count values C

Differential flux = C / (G * tau * E)

Where G is for the appropriate mass range, tau in s and energy E in eV. For RPC-ICA, tau is 120.9 ms. Count values should be corrected for the deadtime of the instrument as described earlier, though for the vast majority of ICA data this will not make a significant difference. G and E are given by the appropriate tables as described above.

```
OBJECT     = COLUMN
NAME       = GEOMETRIC_FACTOR_P2
DATA_TYPE  = ASCII_REAL
START_BYTE = 19
BYTES      = 14
FORMAT     = "E14.8"
UNIT       = "N/A"
DESCRIPTION="GEOMETRIC FACTOR FOR POST-ACCELERATION 1-2"
```

The formula given for the flux may or may not be correct, it depends on what is hidden in the geometric factor (G). ICA may consider G as a combination of the detector efficiency (typically unitless), viewing geometry (typically cm**2 sr or m**2 sr), and energy width (typically unitless expressed as DELTA E/E). Unfortunately the units of G are not given. There is also no information on what is included within the G factor. So whether this is right or wrong can not be judged.

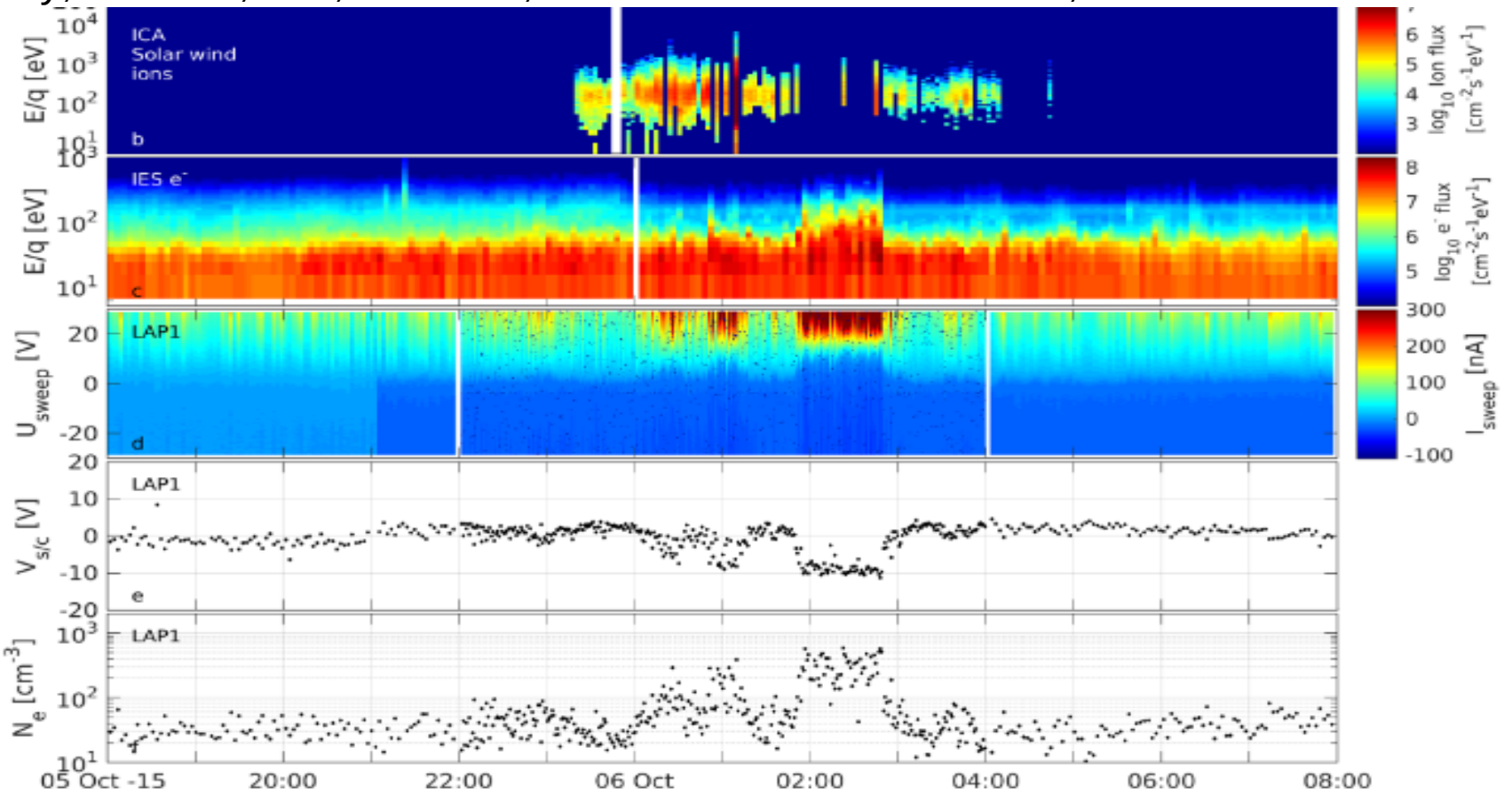
Data Evaluation

Calibration Data

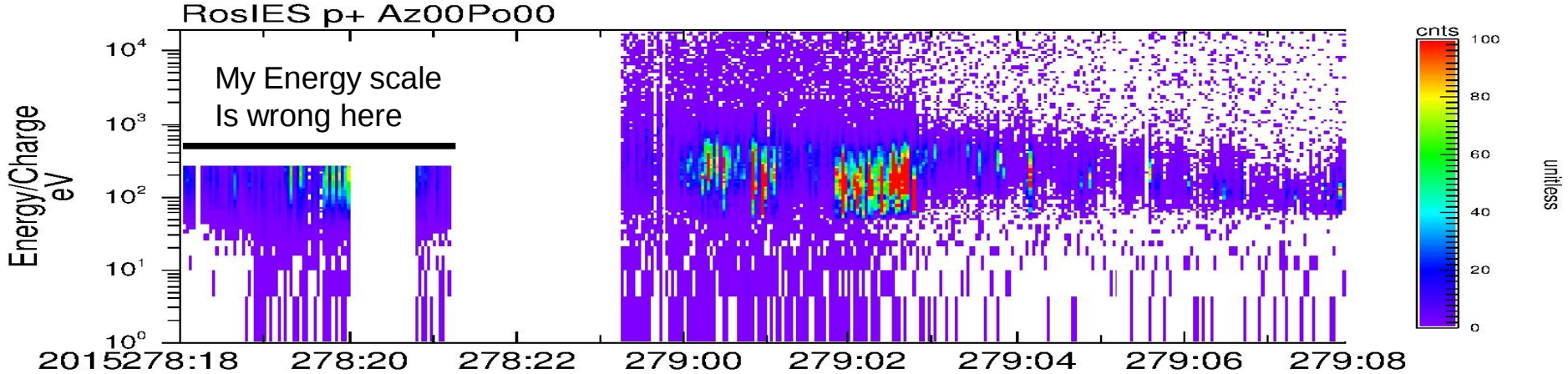
Only one day of calibrated data is available in the data set ro-c-rpcica-3-esc1-calib-v1.0. This data was examined and found to contain all zero values. The available data was for November 28, 2014. So it is not possible to determine if the calibrated data is correct.

A calibrated data time was found to have been published. Since calibrated data was not available for the time of the published data, raw data was examined. The next slide shows this comparison.

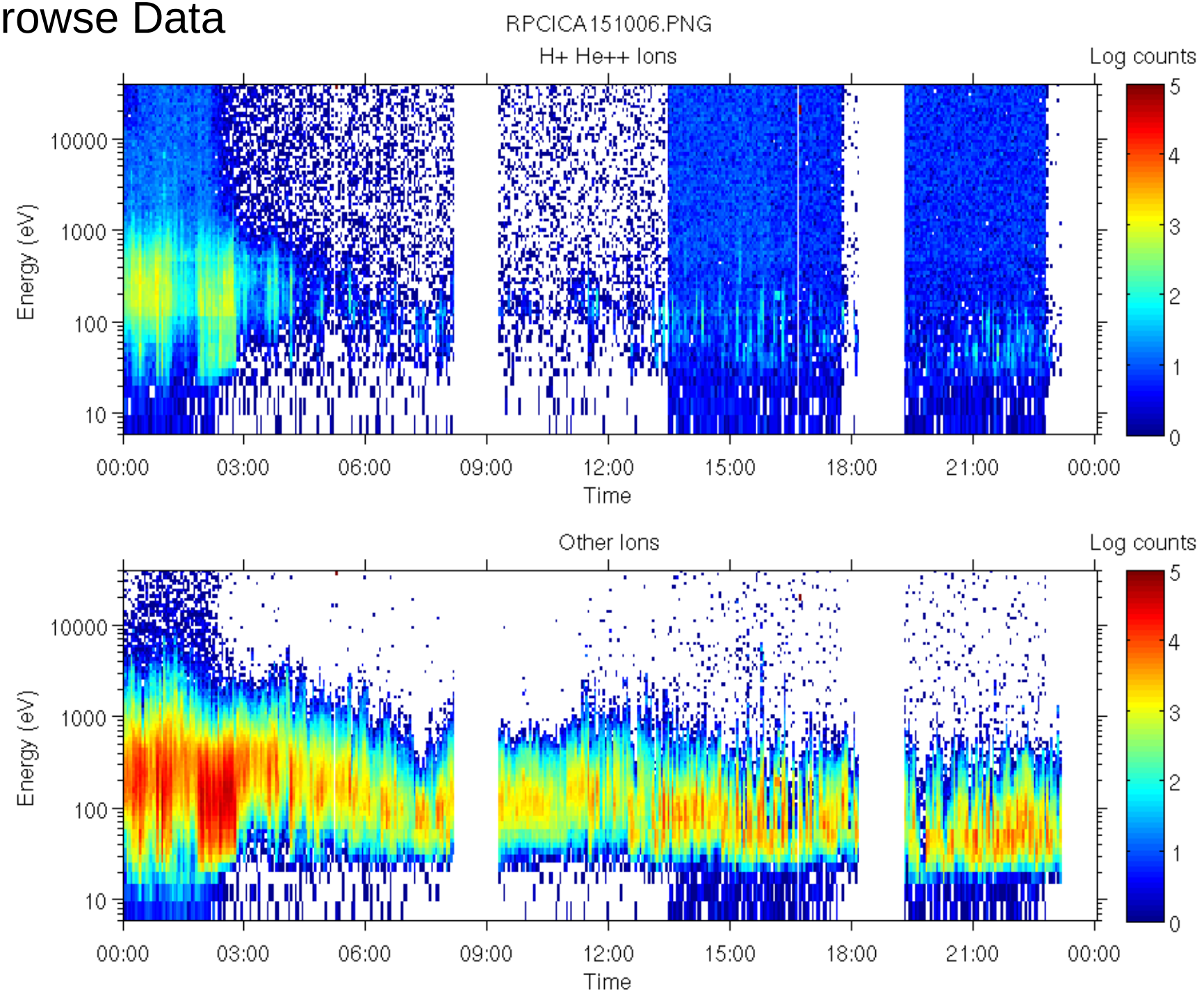
Edberg et al., ,CME impact on comet 67P/Churyumov-Gerasimenko, Royal Astronomical Society, *MNRAS*, **462**, S45-S56, doi:10.1093/nmras/stw2112, 2016.



No level 3 data available to compare, below is Level 2 data



Browse Data


RPCICA151006.PNG
H+ He++ Ions
Log counts
Energy (eV)
10000
1000
100
10
00:00
03:00
06:00
09:00
12:00
15:00
18:00
21:00
00:00
Time
0
1
2
3
4
5
Other Ions
Log counts
Energy (eV)
10000
1000
100
10
00:00
03:00
06:00
09:00
12:00
15:00
18:00
21:00
00:00
Time
0
1
2
3
4
5

Conclusion

The IES electrons and the LAP both show an enhanced signature between 2 and 3 hr on 2014 October 6 (day 279). The ICA raw also shows this signature in the ions, but the ICA published calibrated data does not. The publication notes the solar wind disappears from ICA during this time, but there is no explanation why the ICA data was removed during calibration.

So it is not possible to judge the ICA calibrated data procedure.

Backup Slides