

PDS Review

Rosetta/Cosima

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Summary

- CODMAC Level 2 data
- COSIMA In-Flight and 67P Data thru March 2015
 - data includes calibration data
- some data products are not compliant with the PDS format
- finding data of interest is unnecessarily complicated

Major Issues

- LABEL_RECORDS, FILE_RECORDS, and POINTER TO DATA OBJECT are often not correct:

```
4  /* FILE FORMAT */
5  RECORD_TYPE           = FIXED_LENGTH
6  RECORD_BYTES         = 148
7  FILE_RECORDS         = 138
8  LABEL_RECORDS        = 19
9  /* POINTER TO DATA OBJECT */
10 ^HISTORY_TABLE       = 20
11
12 /* GENERAL DATA DESCRIPTION PARAMETERS */
13 FILE_NAME             = "CS_3D8_SUBSTRATE_HIST.TAB"
14 DATA_SET_ID          = "RO-C-COSIMA-3-V2.0"
15 DATA_SET_NAME        = "ROSETTA-ORBITER 67P COSIMA 3 V2.0"
16 PRODUCT_ID           = "CS_3D8_SUBSTRATE_HIST"
17 PRODUCT_CREATION_TIME = 2015-09-08T19:03:17
18 PRODUCT_TYPE          = "ANCDR"
19 PROCESSING_LEVEL_ID   = "6"
20 MISSION_ID           = "ROSETTA"
21 MISSION_NAME          = "INTERNATIONAL ROSETTA MISSION"
22 MISSION_PHASE_NAME    = "N/A"
23 INSTRUMENT_HOST_ID   = "RO"
24 INSTRUMENT_HOST_NAME  = "ROSETTA-ORBITER"
25 INSTRUMENT_ID         = "COSIMA"
26 INSTRUMENT_NAME       = "COMETARY SECONDARY ION MASS ANALYZER"
27 INSTRUMENT_TYPE       = "MASS SPECTROMETER"
28 INSTRUMENT_MODE_ID    = "N/A"
29 INSTRUMENT_MODE_DESC  = "N/A"
30 TARGET_NAME          = "CALIBRATION"
31 TARGET_TYPE           = "CALIBRATION"
32 START_TIME            = 2002-05-29T00:00:00
33 STOP_TIME             = 2015-03-10T23:59:59
34 SPACECRAFT_CLOCK_START_COUNT = "N/A"
35 SPACECRAFT_CLOCK_STOP_COUNT = "1/0384652724.32445"
36 SC_SUN_POSITION_VECTOR = "N/A"
37 SC_TARGET_POSITION_VECTOR = "N/A"
38 SC_TARGET_VELOCITY_VECTOR = "N/A"
39 SPACECRAFT_ALTITUDE   = "N/A"
40 SUB_SPACECRAFT_LATITUDE = "N/A"
41 SUB_SPACECRAFT_LONGITUDE = "N/A"
42 PRODUCER_ID           = "FMI"
43 PRODUCER_FULL_NAME    = "JOHAN SILEN"
44 PRODUCER_INSTITUTION_NAME = "FINNISH METEOROLOGICAL INSTITUTE"
45 DATA_QUALITY_ID      = "-1"
```

cs_d38_substrate_hist.tab

Major Issues

- Files identified in <xxx_substrate_hist tables> are sometimes missing:
 - e.g. cs_1d0_20141005t043347_sp_p.tab listed in cs_1d0_substrate_hist.tab

Minor Issues

- Many spelling errors in the SIS:

- Onboard calculated peak list and relevant housekeeping data. The spectrum is given as counts per integer mass lines, separated to organic and inorganic massed.
- Scan over substrate position or some measurement control parameter and relevant housekeeping data. The data is total counts of the events from the time-of-flight spectra for

and in tables (even the PI's name is sometimes misspelled (e.g. in dataset.cat))

Minor Issues

- Peak table should be explained better:

For the peak lists, the separation between organic and inorganic peaks is done according to the following formula:

Starting from the integer mass (M), the bin interval for the

- inorganic ions: $M \cdot 1.0003 - \Delta m \dots M \cdot 1.0003$
- organic ions: $M \cdot 1.0003 \dots M \cdot 1.0003 + \Delta m$

where $\Delta m = 0.2$

Minor Issues

- Column names are sometimes confusing

cosima_spectrum_peaks.fmt

cosima_spectrum_data.fmt

```
OBJECT                = COLUMN
COLUMN_NUMBER        = 1
NAME                 = INDEX
DATA_TYPE            = ASCII_INTEGER
START_BYTE          = 1
BYTES               = 5
FORMAT              = "I5"
DESCRIPTION          = "INTEGER MASS. IF HIGHER THAN 300, THEN THE
                       INTERVAL FROM PREVIOUS VALUE TO CURRENT
                       VALUE"
END_OBJECT           = COLUMN
OBJECT               = COLUMN
COLUMN_NUMBER        = 2
NAME                 = INORGANIC_COUNT
DATA_TYPE            = ASCII_INTEGER
START_BYTE          = 7
BYTES               = 10
FORMAT              = "I10"
DESCRIPTION          = "INORGANIC PEAK HEIGHT COUNT. IF MASS INDEX
                       IS HIGHER THAN 300, THEN THE SUM OF
                       ORGANIC AND INORGANIC COUNTS FOR THE
                       INTERVAL FROM PREVIOUS INDEX"
END_OBJECT           = COLUMN
OBJECT               = COLUMN
COLUMN_NUMBER        = 3
NAME                 = ORGANIC_COUNT
DATA_TYPE            = ASCII_INTEGER
START_BYTE          = 18
BYTES               = 10
FORMAT              = "I10"
DESCRIPTION          = "ORGANIC PEAK HEIGHT COUNT. IF MASS INDEX
                       IS HIGHER THAN 300, THEN THE SUM OF
                       INORGANIC AND ORGANIC COUNTS FOR THE
                       INTERVAL FROM PREVIOUS INDEX"
END_OBJECT           = COLUMN
```

```
OBJECT                = COLUMN
COLUMN_NUMBER        = 1
NAME                 = INDEX
DATA_TYPE            = ASCII_INTEGER
START_BYTE          = 1
BYTES               = 6
FORMAT              = "I6"
DESCRIPTION          = "TIME OF FLIGHT TIME STEP INDEX.
                       TIME STEP IS 0.000000001953125 SECONDS"
END_OBJECT           = COLUMN
OBJECT               = COLUMN
COLUMN_NUMBER        = 2
NAME                 = MASS_COUNT
DATA_TYPE            = ASCII_INTEGER
START_BYTE          = 8
BYTES               = 10
FORMAT              = "I10"
DESCRIPTION          = "TIME INTEGRATED MASS COUNT AT THE TIME STEP"
END_OBJECT           = COLUMN
OBJECT               = COLUMN
COLUMN_NUMBER        = 3
NAME                 = MASS_NUMBER
DATA_TYPE            = ASCII_REAL
START_BYTE          = 19
BYTES               = 10
FORMAT              = "F10.5"
DESCRIPTION          = "CALIBRATED MASS NUMBER AT THE TIME STEP"
END_OBJECT           = COLUMN
```

Usability

- User will be mostly interested in mass spectra of dust particles but there is no “central hub”
- To find such data the user needs to scan each target directory individually
- ...and even this is challenging

How to find genuine dust spectra

- Scan the xxx_substrate_hist.tab for <GRAINS> rows
- Extract from the corresponding <GRAINS> tables the scanning time and the location on the substrate
- Scan the xxx_substrate_hist.tab for <SPECTRUM> rows obtained after the scanning time obtained within the geometric boundaries of the identified particle
- Extract the spectrum from the corresponding spectrum table

How to find genuine dust spectra

```
2014-278/06:54:53...2014-278/06:55:18 x: 1752... 1752 y: 6942... 6942 # of Spectra: 0
2014-278/06:54:53...2014-278/06:55:18 x: 1428... 1442 y: 6168... 6140 # of Spectra: 0
2014-278/06:54:53...2014-278/06:55:18 x: 1470... 1470 y: 6223... 6223 # of Spectra: 0
2014-278/06:54:53...2014-278/06:55:18 x: 1675... 1675 y: 5681... 5681 # of Spectra: 0
2014-278/06:54:53...2014-278/06:55:18 x: 1758... 1758 y: 5681... 5681 # of Spectra: 0
2014-278/06:54:53...2014-278/06:55:18 x: 1445... 1445 y: 4449... 4449 # of Spectra: 0
2014-278/06:54:53...2014-278/06:55:18 x: 1722... 1722 y: 4434... 4434 # of Spectra: 0
2014-278/06:54:53...2014-278/06:55:18 x: 1690... 1690 y: 3685... 3685 # of Spectra: 0
2014-278/06:54:53...2014-278/06:55:18 x: 1801... 1801 y: 3740... 3740 # of Spectra: 0
2014-278/06:54:53...2014-278/06:55:18 x: 1382... 1382 y: 3258... 3258 # of Spectra: 0
2014-278/06:54:53...2014-278/06:55:18 x: 1631... 1631 y: 3090... 3090 # of Spectra: 0
2014-278/06:54:53...2014-278/06:55:18 x: 1785... 1785 y: 3449... 3449 # of Spectra: 0
2014-278/06:54:53...2014-278/06:55:18 x: 1473... 1473 y: 2190... 2190 # of Spectra: 0
2014-278/06:54:53...2014-278/06:55:18 x: 1667... 1681 y: 2216... 2203 # of Spectra: 0
2014-278/06:54:53...2014-278/06:55:18 x: 1693... 1805 y: 2188... 1925 # of Spectra: 28
```

Just out of interest: The spectra look weird

