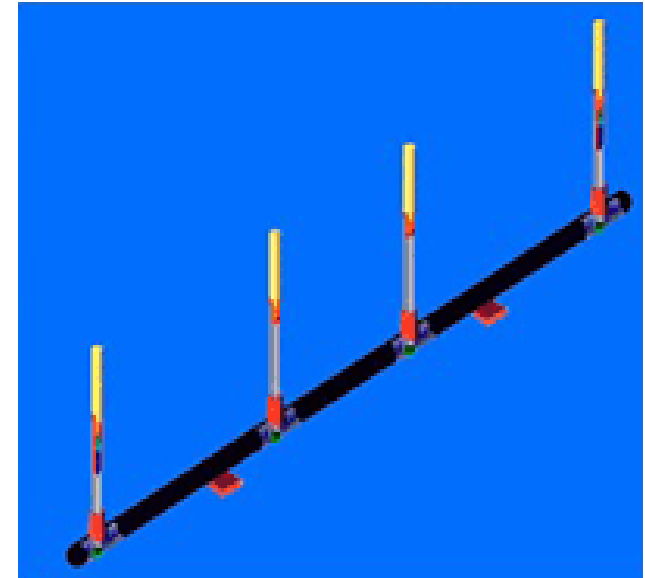


ROSETTA PLASMA CONSORTIUM MUTUAL IMPEDANCE PROBE

| | |
|-------------------------|---|
| Mass (sensor): | 0.37 kg |
| Power (average) | 2.0 W |
| Electron Density (min): | 2 cm^{-3} |
| Electron Density (max): | $1.5 \times 10^5 \text{ cm}^{-3}$ |
| (LDL max): | 280 cm^{-3} |
| (accuracy): | 5% |
| Electron Temperature: | $30 \text{ }^{\circ}\text{K} - 10^6 \text{ }^{\circ}\text{K}$ |
| (accuracy): | 10% |
| Plasma Drift Velocity: | 100-1000 m/s |
| (accuracy): | 100 m/s |
| Frequency Domain: | 7 kHz-3.5 Mhz |
| (LDL): | 7 kHz-168 kHz |
| Wave Sensitivity: | $1 \mu\text{V m}^{-1} \text{ Hz}^{-1/2}$ |
| | at 100 kHz |
| Wave Dynamic Range: | >60 dB |
| Debye Length: | 0.5-20 cm |
| (LDL): | 10-200 cm |
| Nrmal Time Resolution: | 2.5 s (burst) |
| | 8 s (normal) |
| | 32 s (survey) |



Electric Field Antenna with

2 Receivers, 1 m apart

2 Transmitters

Conductive Bar

Can use Langmuir Probe (LDL)
as an additional transmitter
(gain of 4 m in length)

RPC MIP

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 MIP Data Sets

ro-c-rpcmip-3-prl1-v2.0

ro-c-rpcmip-3-prl2-v2.0

ro-c-rpcmip-3-prl3-v2.0

ro-c-rpcmip-3-esc1-v2.0

ro-c-rpcmip-3-esc2-v2.0

ro-c-rpcmip-3-esc3-v1.0

ro-c-rpcmip-3-esc4-v1.0

ro-c-rpcmip-3-ext1-v1.0

ro-c-rpcmip-3-ext2-v1.0

ro-c-rpcmip-3-ext3-v1.0

Documentation Evaluation

ro-c-rpcmip-3-ext3-v1.0/catalog catinfo.txt

coded in the Object Description Language (ODL). Following is a list of the catalog objects contained in this subdirectory and a description of each:

| FILE | DESCRIPTION |
|--------------|---|
| ----- | ----- |
| CATINFO.TXT | This file |
| DATASET.CAT | Contains information on the RPCMIP dataset. |
| INST.CAT | Contains information for RPCMIP instrument |
| INSTHOST.CAT | Contains instrument host information (ROSETTA-Orbiter). |
| MISSION.CAT | Contains mission information (ROSETTA). |
| PERSON.CAT | Contains information about the RPCMIP personnel |
| REF.CAT | Contains reference information. |
| SOFTWARE.CAT | Contains nothing whatsoever. |
| TARGET.CAT | Contains. |



Missing File...Not in this Directory

ro-c-rpcmip-3-ext3-v1.0/catalog ref.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”.

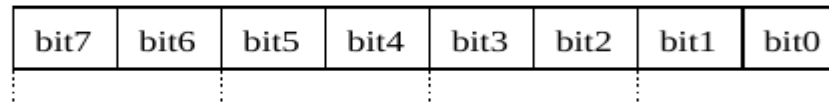
The JPL Library staff has acknowledged that the following two references to JPL Documents are not cleared for public release: ASMAR&HERRERA1993 and ASMARETAL1995. They should not be included in this reference list and should not be referenced in the public archive. Please remove these references.

ro-c-rpcmip-3-ext3-v1.0/catalog software.cat

```
SOFTWARE_DESC = "  
  Software Overview  
  =====  
  Available Support Material  
  =====  
  BINARIES  
  Programming Language  
  =====  
  Platforms Supported  
  =====  
  Support Software Required / Used  
  ===== "
```

It should be stated here that "No Software is needed for this archive" rather than leaving blank fields. Without a statement such as this, it is uncertain if these sections were just not filled in as opposed to the no software condition.

ro-c-rpcmip-3-ext3-v1.0/document mip_piu_interf_33.pdf – 1 of 2



ADC overflows

Misaligned Figure

sequence counter (modulo 4)

0 0 TM minimum rate
0 1 TM normal rate
1 0 reserved
1 1 TM burst rate

0 0 MIP science sequence
0 1 LDL science sequence
1 0 control sequence
1 1 table sequence

Table 12. Definition of the sequence data header.

The overflows of the Analog to Digital Converter are coded with the following rules :

0 : number = 0
1 : $1 \leq \text{number} < 128$
2 : $128 \leq \text{number} < 1024$
3 : number ≥ 1024

ro-c-rpcmip-3-ext3-v1.0/document mip_piu_interf_33.pdf – 2 of 2

| | | | | | | | |
|-----------------|------|------|------|-----------|------|-----------|------|
| bit7 | bit6 | bit5 | bit4 | bit3 | bit2 | bit1 | bit0 |
| Reception table | | wd2 | wd1 | RAM tests | | DSP tests | |

Misaligned Figure

00 OK
01 one error R/W
10 two errors R/W
11 three errors R/W

00 OK
01 one error Read/Write
10 two errors Read/Write
11 three errors Read/Write

0 OK
1 false

0 OK
1 false

00 table received during the Control sequence
01 time-out during the switching on procedure
10 table received during a Science sequence
11 LDL command received during a Control sequence

Table 14. Description of the test output in the Control sequence.

3.3.3.3. Configuration table

The configuration table contains all the parameters which can be modified in the onboard software. The size of 6 bytes corresponds to one link-packet between PIU and MIP. All the commands are inserted into the table. The description is done in Table 15.

| | | | | | | | | |
|-------|----------------------------|------|------|------|------|------|------|------|
| | bit7 | bit6 | bit5 | bit4 | bit3 | bit2 | bit1 | bit0 |
| byte0 | Interference frequency n°1 | | | | | | | |
| byte1 | Interference frequency n°2 | | | | | | | |

ro-c-rpcmip-3-ext3-v1.0/document rpc-mip_eaicd.pdf – 1 of 6

Missing from Section 1.7 Acronyms and Abbreviations in the EAICD used throughout the document:

PIU
SDL
SONC

ro-c-rpcmip-3-ext3-v1.0/document rpc-mip_eaicd.pdf – 2 of 6

Under section 2.3.7, rather than include a “TBD”, why not just say:

LPC2E will produce derived data from RPC-MIP data on an undetermined schedule.

ro-c-rpcmip-3-ext3-v1.0/document rpc-mip_eaicd.pdf – 3 of 6

3.1.1 Deliveries and Archive Volume Format

A data set will be delivered for each **simple mission phase**. Each data set will contain **only one level data processing**.

The list of simple mission phases is given in [AD 5] §2.1, table 3(a).

A level 3 data set contains SC and HK calibrated data.

A level 5 data set contains derived data.

In addition a data set will contain documentation(see chapter 2.3.5)



Does this mean a Section in this document, or a Chapter in AD 5?

ro-c-rpcmip-3-ext3-v1.0/document rpc-mip_eaicd.pdf – 4 of 6

3.4.3.8 Label Directory

The label directory contains include files referenced by data files on the data set, e.g. FMT files containing label definitions used in data label files. The following files are contained in the Label directory.

| File Name | File Contents |
|------------------------|---|
| MIP_SPECTRUM_SS_PO.FMT | The description of the spectrum table for the Survey/Sweep modes and Full, Window and MinMax sub-modes. |
| MIP_SPECTRUM_SS_PH.FMT | The description of the structure of the TABLE object for the Phase spectrum for the Survey/Sweep modes. |
| MIP_SPECTRUM_L_PO.FMT | The description of the power spectrum table for the LDL modes, Full/Window sub-modes |
| MIP_SPECTRUM_L_PH.FMT | The description of the phase spectrum table for the LDL modes, Full/Window sub-modes |
| MIP_SPECTRUM_P_PO.FMT | The description of the spectrum table for the Passive mode and Full, Window and Power sub-modes |
| MIP_CONFIG_TABLE.FMT | The description of the TABLE object for the MIP configuration table |
| MIP_CALIBRATED_HK.FMT | The description of the TABLE object for MIP calibrated HK data |

Files not found in this list are MIP_SPECTRUM_SS_PO.FMT, MIP_SPECTRUM_SS_PH.FMT, MIP_SPECTRUM_L_PO.FMT, MIP_SPECTRUM_L_PH.FMT, MIP_SPECTRUM_P_PO.FMT.

Files found in the label directory and missing from this list are labinfo.txt, mip_spectrum_l_po_w.fmt, mip_spectrum_p_po_w.fmt, mip_spectrum_p_po_f.fmt, mip_spectrum_p_po_p.fmt, mip_spectrum_s_ss_ph_f.fmt, mip_spectrum_s_ss_po_f.fmt, mip_spectrum_s_ss_po_m.fmt, mip_spectrum_s_ss_po_w.fmt

ro-c-rpcmip-3-ext3-v1.0/document rpc-mip_eaicd.pdf – 5 of 6

Under section 3.4,3.9, Document Directory, the files listed as RPC_UM_208.PDF and RPC_UM_208.LbL were not found. Found were files RPC_UM_218.PDF and RPC_UM_218.LbL. The files listed as RPC-MIP-UG-LPC2E_V10.PDF and RPC-MIP-UG-LPC2E_V10.LBL were also not found. Found were files RPC-MIP-UG-LPC2E_V11.PDF and RPC-MIP-UG-LPC2E_V11.LBL.

ro-c-rpcmip-3-ext3-v1.0/document rpc-mip_eaicd.pdf – 6 of 6

Page : 11

RPCMIP{data characteristics}_{begin of observation}_{duration of observation }.{ext}

- **data characteristics** (4 characters) = abcd
 - a = data type, S (science) or H (housekeeping)
 - b = data level, 3 or 5
 - c = physical parameters
 - E = electric field power spectrum (passive)
 - W = Active power spectrum (induced electric field)
 - H = active phase spectrum (induced electric field)
 - D = electron density
 - T = electron temperature
 - X = N/A (for HK and configuration tables)
 - d = working mode
 - S = SDL (MIP), Short Debye Length. MIP does the transmission and reception in Sweep and Survey modes
 - L = LDL (MIP/LAP), Long Debye Length. LAP does the transmission and MIP the reception.
 - X = N/A (for HK and configuration tables)

File name are found to have 5 characters for data characteristics. The fifth character is not explained in the EAICD.

Data Evaluation

Data Timing

The timing of MIP spectra was found not to be the values of 2.5, 8, or 32 sec as started by the instrument paper (document called `mep_exp_overview.pdf`), so timing was set to the time width between successive records or 32 sec which ever was shorter. The timing of data samples should be included within the EAICD for each data file type. Spectra were achieved by setting collection to parallel with a data accumulation of zero sec and the above time width. Data were drawn across the time width.

ro-c-rpcmip-3-ext3-v1.0/data rpcmips3esf1507010000_01445.tab

The start time of this data set was found to be incorrect. For example, the first 7 records have time stamps as follows:

```
2015-07-01T00:00:03.630 "1/394329523.15681" "PASSIVE" "FULL " "POWER"  
2015-07-01T00:00:03.630 "1/394329523.15681" "PASSIVE" "FULL " "POWER"  
2015-07-01T00:00:08.010 "1/394329523.15681" "PASSIVE" "FULL " "POWER"  
2015-07-01T00:00:08.010 "1/394329523.15681" "PASSIVE" "FULL " "POWER"  
2015-07-01T00:00:12.390 "1/394329523.15681" "PASSIVE" "FULL " "POWER"  
2015-07-01T00:00:12.390 "1/394329523.15681" "PASSIVE" "FULL " "POWER"  
2015-07-01T00:00:16.770 "1/394329523.15681" "PASSIVE" "FULL " "POWER"
```

The instrument paper gives time resolutions of 2.5, 8, or 32 sec; however, this appears to be none of these. I have not been able to find a document which lists spectral resolutions other than these values. Accumulation times should be documented in the EAI CD. Additional duplicate times found in some processed files are included as a note. In order to draw data, duplicate time records were excluded.

ro-c-rpcmip-3-ext3-v1.0/data rpcmips3wsf1510151358_01447.tab

The timing has been found to run backward in some data. For example:

WS File to process: ../MIPData/rpcmips3wsf1510151358_01447.tab

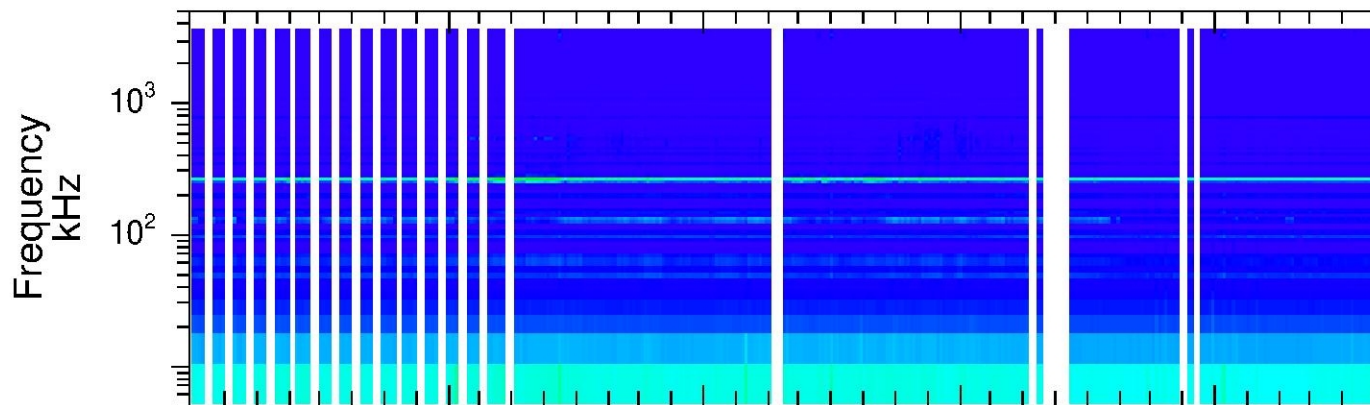
Record 17864 skipped because of time runs backward: 2015-10-16T12:39:43.000. Sequential time stamps are:

```
2015-10-16T12:39:39.520 "1/403619883.15681" "SURVEY" "FULL " "POWER"  
2015-10-16T12:39:43.900 "1/403619883.15681" "SURVEY" "FULL " "POWER"  
2015-10-16T12:39:43.000 "1/403619915.15681" "SURVEY" "FULL " "POWER"  
2015-10-16T12:39:47.380 "1/403619915.15681" "SURVEY" "FULL " "POWER"
```

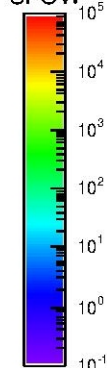
Time jumps backward from 2015-10-16T12:39:43.900 to 2015-10-16T12:39:43.000. In order to draw data, backward time records were excluded. Backward and duplicate time records should not exist in the data.

S3esf, s3elw, s3esp

MIP Power



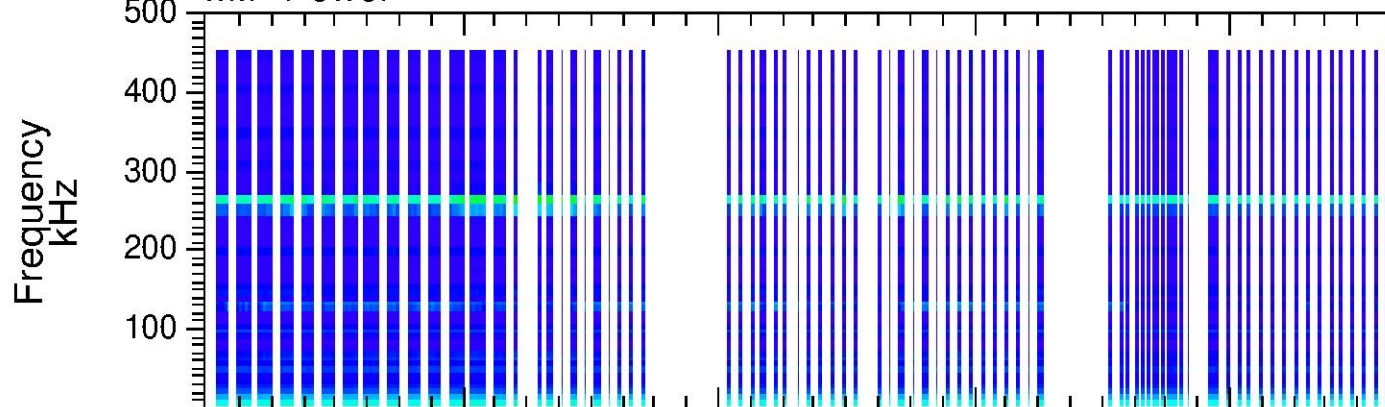
SPOW



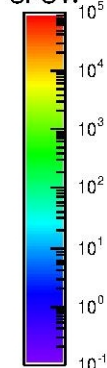
microV/sqrt(Hz)

Passive
Full
Power

MIP Power



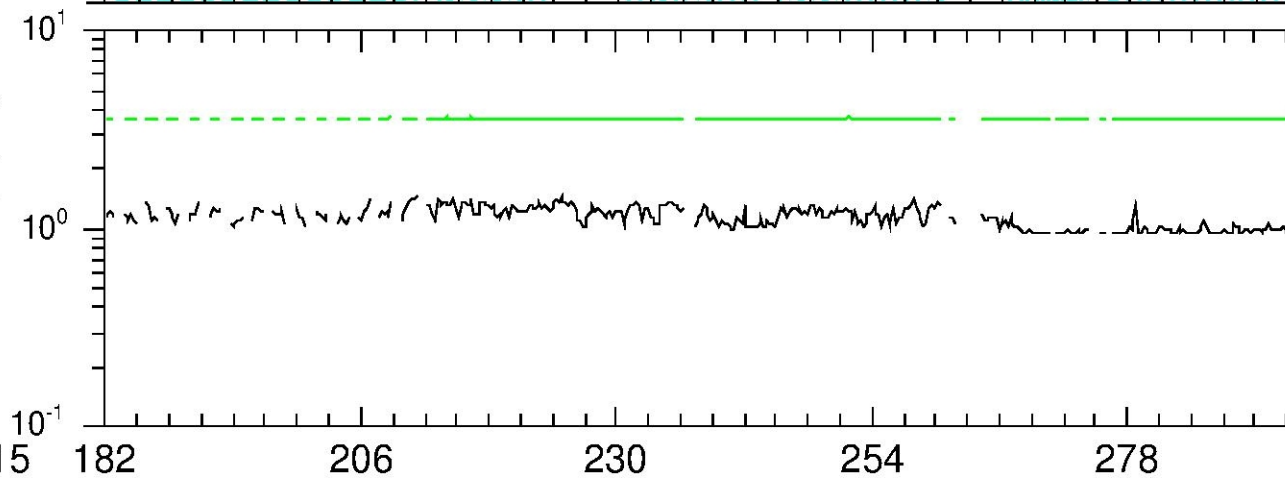
SPOW



microV/sqrt(Hz)

Passive
Window
Power

Sensor Data
Integrated LR
Spectral Power
microV/sqrt(Hz)



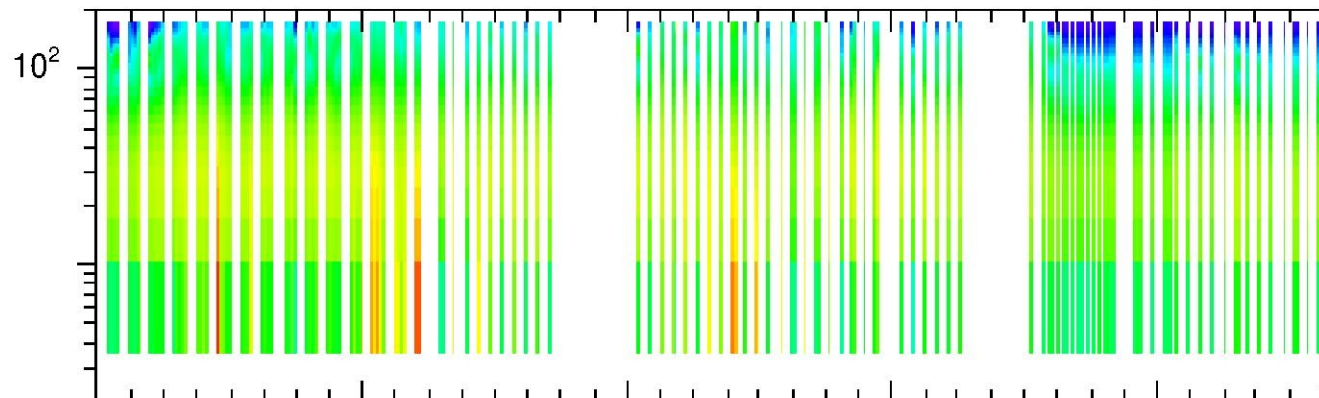
10^0

Sensor Data
Integrated LR
Spectral Power
microV/sqrt(Hz)

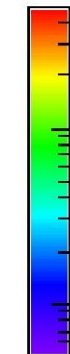
Passive
Power
XXXXX

s3wsf, s3wlf, and s3wlv

MIP Power



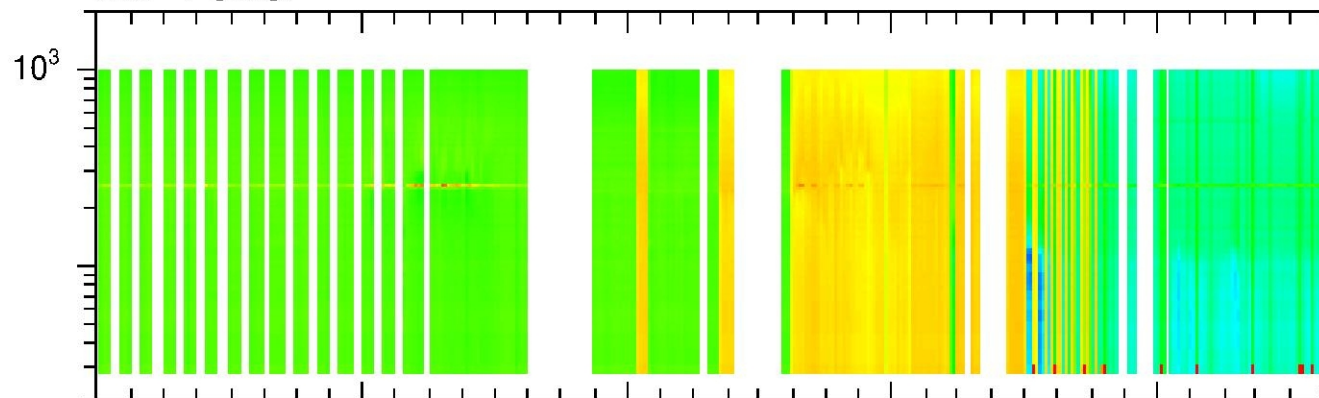
SPOW



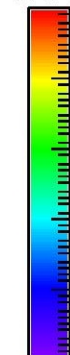
microV/sqrt(Hz)

LDL
Full
Power

MIP Power



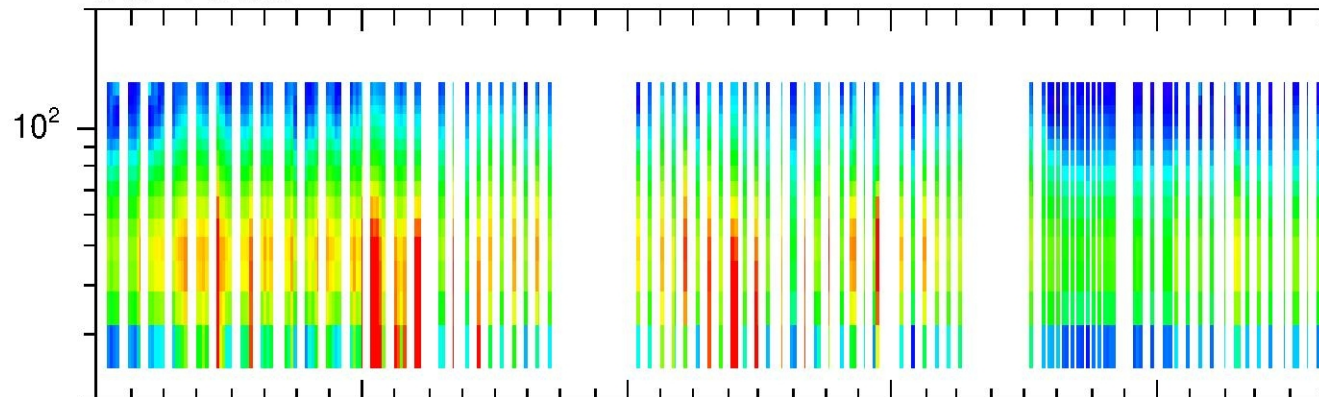
SPOW



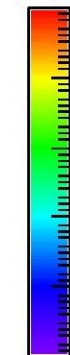
microV/sqrt(Hz)

Survey
Full
Power

MIP Power



SPOW



microV/sqrt(Hz)

LDL
Window
Power

2015 182 206 230 254 278

Backup Slides

ro-c-rpcmip-3-ext3-v1.0
aareadme.txt

GOOD

ro-c-rpcmip-3-ext3-v1.0
dataset.cat

GOOD

ro-c-rpcmip-3-ext3-v1.0/catalog
dataset.cat

GOOD

ro-c-rpcmip-3-ext3-v1.0/catalog
inst.cat

GOOD

ro-c-rpcmip-3-ext3-v1.0/catalog
person.cat

GOOD