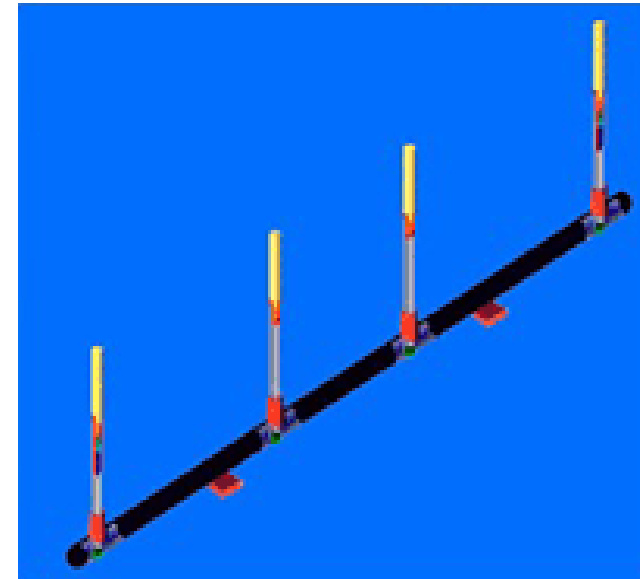


ROSETTA PLASMA CONSORTIUM MUTUAL IMPEDANCE PROBE

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-5-esc1-v1.0

ro-c-rpcmip-5-esc2-v1.0

ro-c-rpcmip-5-esc3-v1.0

ro-c-rpcmip-5-esc4-v1.0

ro-c-rpcmip-5-ext1-v1.0

ro-c-rpcmip-5-ext2-v1.0

ro-c-rpcmip-5-ext3-v1.0

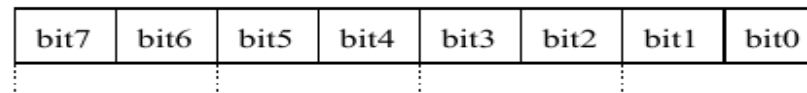
ro-c-rpcmip-5-prl-v1.0

Documentation Evaluation

ro-c-rpcmip-5-esc4-v1.0

document/board_proc_34.pdf 1 of 2

To identify the type of sequence, an **header of 1 byte** is put before any MIP sequence frame. The header definition is given in Table 12.



ADC overflows

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-5-esc4-v1.0

document/board_proc_34.pdf 2 of 2

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

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

RID: RPCMIP-US-RF-002

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							
byte2	Interference frequency n°3							

ro-c-rpcmip-5-esc4-v1.0/document rpc-mip-ug-lpc2e.pdf – 1 of 5

The electron density and associated uncertainty are then derived through:

$$n_e = \frac{f_{pe}^2}{\alpha}$$
$$\Delta n_e = \frac{2}{\alpha} \cdot f_{pe} \cdot \Delta f_{pe}$$

Where α is a constant given by: $\alpha = \frac{e^2}{4\pi \epsilon_0 m} = 80.7 \text{ kHz}^2 \cdot \text{cm}^3$



Please define e , ϵ_0 , and m

ro-c-rpcmip-5-esc4-v1.0/document rpc-mip-ug-lpc2e.pdf – 2 of 5

The **L3 calibrated** (or 'edited raw'):


- **Science data** (in **active mode**: electric field spectra modulus and phase, resonance values; in **passive mode**: electric field spectra modulus, mean passive power inside a particular frequency bandwidth) for both SDL and LDL modes. A level 3 file contains data from one RPC-MIP sub-mode. The time resolution depends on the data, on the telemetry rate and on the onboard operated RPC-MIP sequence (selected by TC) and ranges from 2.65 s to 32 s.
- **House-keeping data** (sequence counters, mean passive power, resonance values, sensor temperature and configuration table): contains HK data concerning the active and passive sweeps: RPC-MIP power in passive mode, resonance power in active mode, resonance frequency in active mode. The time resolution is 32 s.

Housekeeping data should be CODMAC Level 2

ro-c-rpcmip-5-esc4-v1.0/document rpc-mip-ug-lpc2e.pdf – 3 of 5

A sentence should be added to clarify the location of the time marker shown in each record.

Note that the times corresponding to a RPC-MIP spectrum and to the associated derived electron density are different: RPC-MIP spectra are dated at the start of acquisition while the time associated to the electron density is the time of the spectrum from which the density is extracted, corrected from half the acquisition period due to on-board processing such as transmission at different frequencies and averaging over successive spectra (which is also given in L5 datasets). The acquisition period is operational mode dependent and varies in particular with the instrumental mode and the TM rate.



Thus, the UTC time of the electron density value is marked at the center of the accumulation window.

ro-c-rpcmip-5-esc4-v1.0/document rpc-mip-ug-lpc2e.pdf – 4 of 5

The MIP-LAP L5 electron density data set should have the same timing and density parameters as the MIP L5 data set. The computations are the same, It is just the time base and transmitter length are different.

- UTC time of the derived electron density value (sampled on RPC-LAP timings).
- Plasma density value (in cm^{-3}).

MIP-LAP
reported
timing and
density

The MIP L5 data gives adequate timing and density information. The time stamp occurs at the center of the accumulation and the accumulation width is given. electron errors are also given.

- UTC time of the electron density value.
- Half of the on-board acquisition time.
- Plasma electron density value (in cm^{-3}).
- Estimated uncertainty of the plasma electron density (in cm^{-3}).

MIP reported timing
and density. This
information is adequate
to interpret the
density data.

ro-c-rpcmip-5-esc4-v1.0/document rpc-mip-ug-lpc2e.pdf – 5 of 5

Missing Directory

actual averaged plasma behaviour and in misleading interpretations. Temporal variations of electron density or frequency plasma line can be checked on RPC-MIP active spectrograms provided as BROWSE images to check and remove for out-of-bounds events when doing such studies. Furthermore, the instrumental lower and upper detection limits, in term of electron density, is given in the electron density dataset, for each record.

The lower and upper detections are not given in the density data set.

ro-c-rpcmip-5-esc4-v1.0/document
rpc_user_guide.pdf

Wrong File Delivered: Label File says that the pdf file is Version 1.0, but the document says that it is version 0.2. The current document file is full of editorial comments is not in a state which can be reviewed.

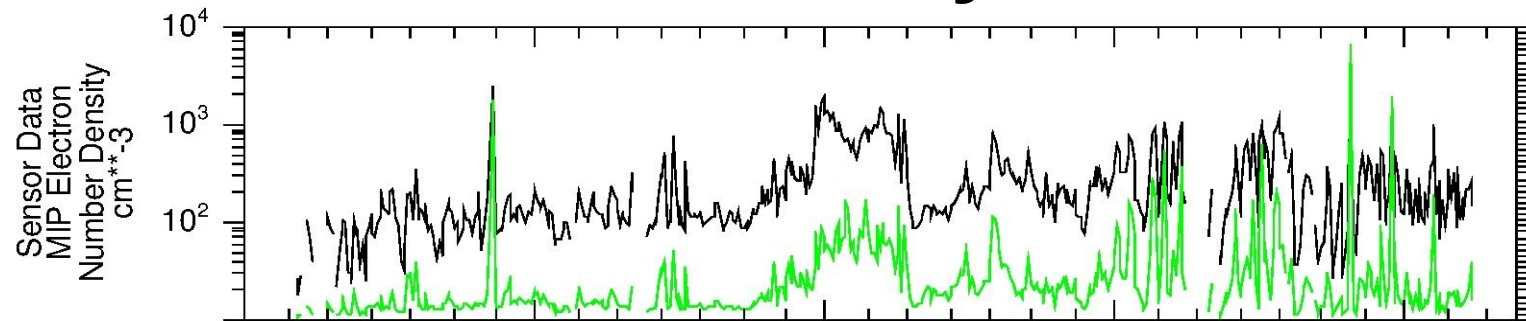
Data Evaluation

Density Data Comments

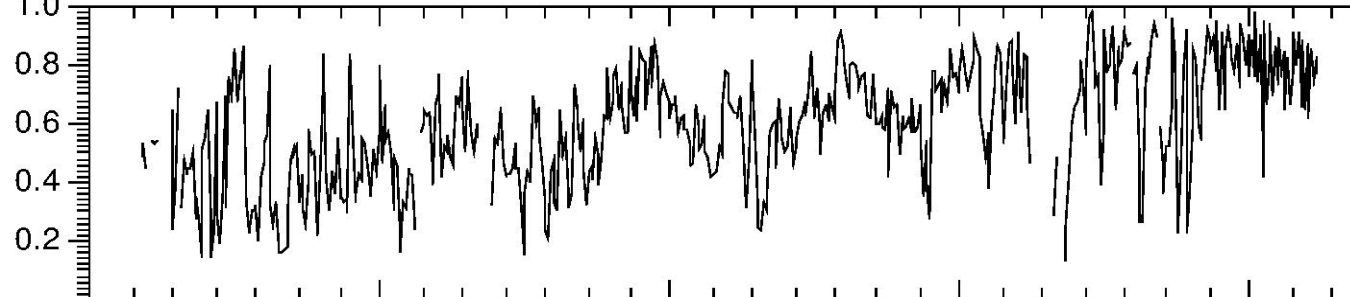
The L5 data files are well organized giving the density and uncertainty in the density allowing an error to be placed on the quantity. The L5 files give the center time for each density value and the half width of the accumulation which allows the density to be precisely correlated with other instruments.

MIP Density Data

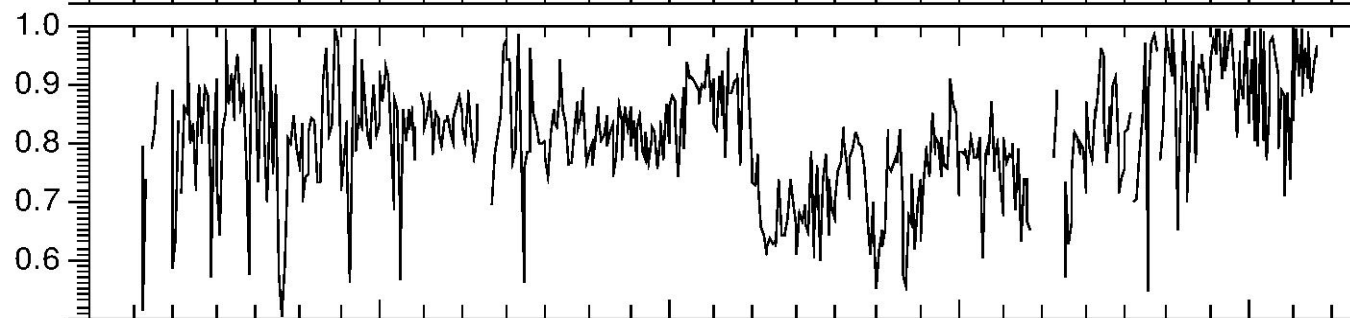
Density



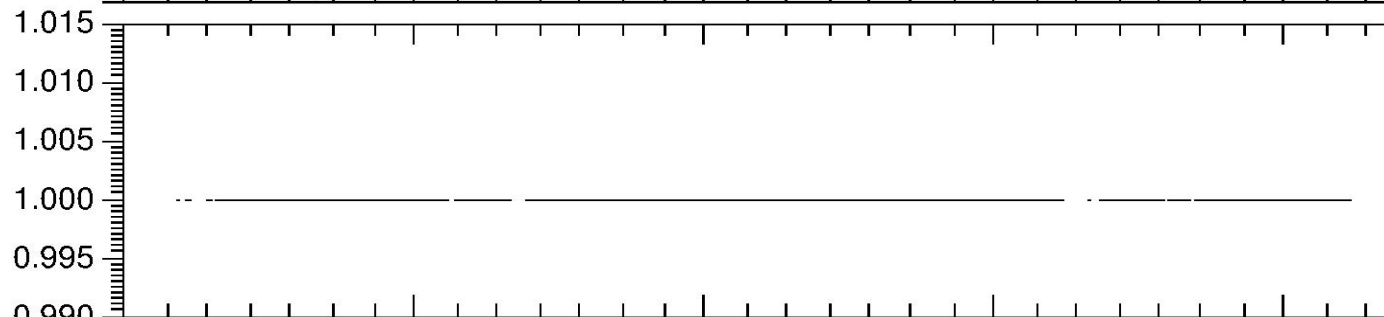
Sensor Data
Plasma Frequency
Quality
unitless



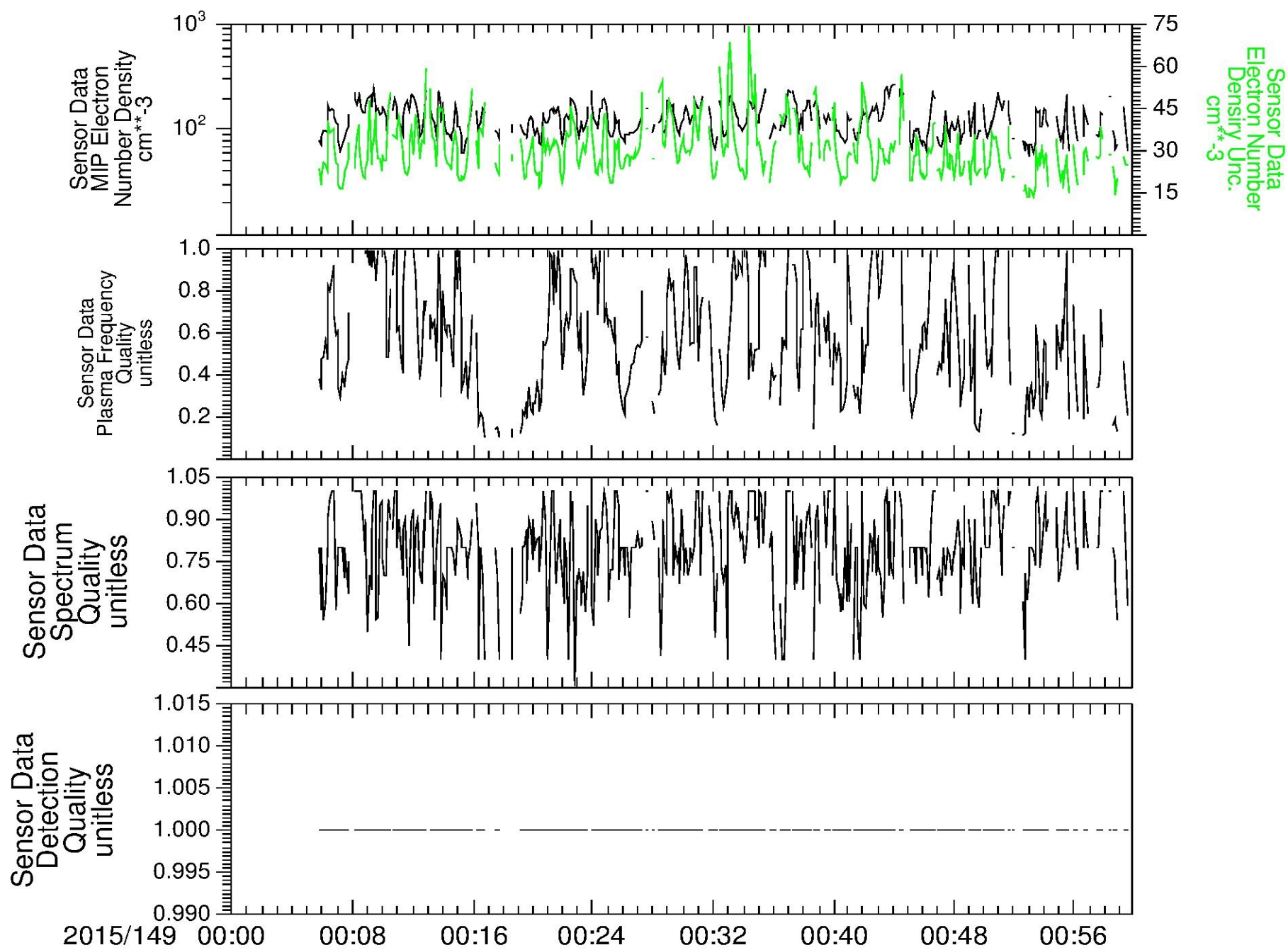
Sensor Data
Spectrum
Quality
unitless



Sensor Data
Detection
Quality
unitless



1 hour of data



Certification

The data is useful in its current format, but the User Guide suggests that the format is supposed to include additional information. I would suggest cleaning up the documentation to describe this delivered MIP Density data set and then releasing the data “as is”, e.g. Certified. Then the experimenters submit additional data sets as they deem necessary.

Backup Slides

ro-c-rpcmip-5-esc4-v1.0
aareadme.txt

GOOD

ro-c-rpcmip-5-esc4-v1.0
voldesc.cat

GOOD

ro-c-rpcmip-5-esc4-v1.0
label/labinfo.txt

GOOD

ro-c-rpcmip-5-esc4-v1.0
label/mip_density.fmt

GOOD

ro-c-rpcmip-5-esc4-v1.0
index/indxinfo.txt

GOOD

ro-c-rpcmip-5-esc4-v1.0

index/index.lbl

index/index.tab

GOOD

ro-c-rpcmip-5-esc4-v1.0
index/checksum.lbl
index/checksum.tab

GOOD

ro-c-rpcmip-5-esc4-v1.0
catalog/catinfo.txt

GOOD

ro-c-rpcmip-5-esc4-v1.0
catalog/dataset.cat

GOOD

ro-c-rpcmip-5-esc4-v1.0
catalog/ref.cat

GOOD

ro-c-rpcmip-5-esc4-v1.0
catalog/software.cat

GOOD

ro-c-rpcmip-5-esc4-v1.0
catalog/person.cat

GOOD

ro-c-rpcmip-5-esc4-v1.0
catalog/inst.cat

GOOD

ro-c-rpcmip-5-esc4-v1.0
catalog/inst.cat

GOOD

ro-c-rpcmip-5-esc4-v1.0
document/board_proc_34.tbl

GOOD

ro-c-rpcmip-5-esc4-v1.0
document/mip_piu_interf_33.lbl
document/mip_piu_interf_33.pdf

GOOD

ro-c-rpcmip-5-esc4-v1.0
document/rpc-mip-ug-lpc2e.lbl

GOOD

ro-c-rpcmip-5-esc4-v1.0/document
rpc_user_guide.lbl

GOOD

ro-c-rpcmip-5-esc4-v1.0/document
trotignon2007.lbl
trotignon2007.pdf

GOOD