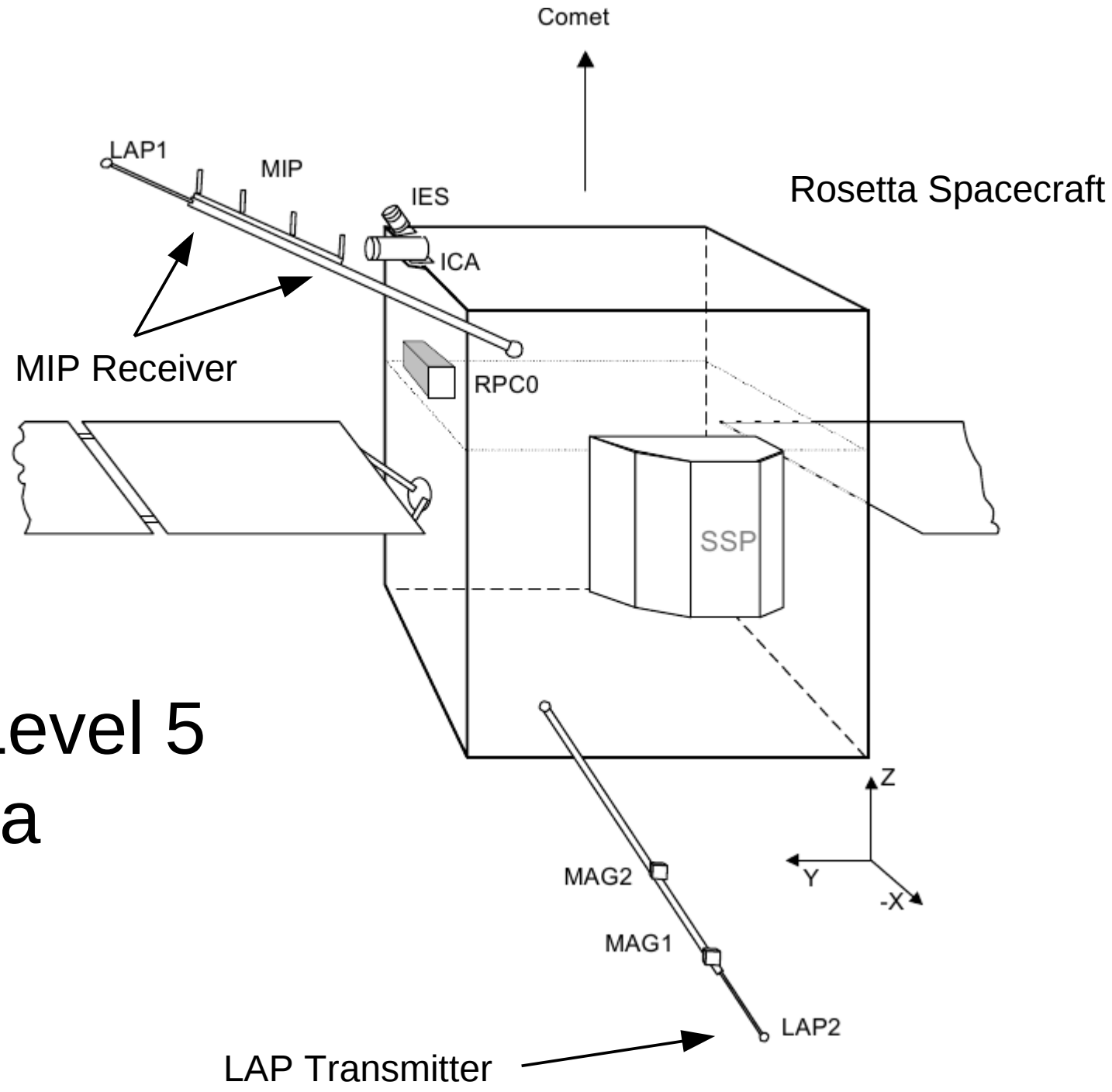
MIP-LAP
CODMAC Level 5
Density Data



RPC MIP
Data Set Evaluation Tools

Staging -

Machine: IBM Ienovo 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-LAP Data Sets

ro-c-rpcmip_rpclap-5-esc4-v1.0
ro-c-rpcmip_rpclap-5-ext3-v1.0
ro-c-rpcmip_rpclap-5-ext1-v1.0
ro-c-rpcmip_rpclap-5-prl-v1.0

Documentation Evaluation

ro-c-rpcmip_rpclap-5-ext3-v1.0/document rpc-mip-ug-lpc2e.pdf – 1 of 5

The electron density and associated uncertainty are then derived trough:

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

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

Where α is a constant given by: $\alpha = \frac{e^2}{4\pi \varepsilon_0 m} = 80.7 \ kHz^2 . cm^3$

Please define *e*, ε_o, and *m*

Page 15, Section 6.1

RID: RPCMIP-US-RF-003

ro-c-rpcmip_rpclap-5-ext3-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

Page 17, Section 7.

RID: RPCMIP-US-RF-004

ro-c-rpcmip_rpclap-5-ext3-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.

Page 29, Section 8.7.1.

RID: RPCMIP-US-RF-005

ro-c-rpcmip_rpclap-5-ext3-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.

Page 30, Section 8.7.2.

RID: RPCMIP-US-RF-006

ro-c-rpcmip_rpclap-5-ext3-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.

Page 37, Section 9.7.

RID: RPCMIP-US-RF-007

ro-c-rpcmip_rpclap-5-ext3-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.

RID: RPCMIP-US-RF-008

ro-c-rpcmip_rpclap-5-ext3-v1.0 document/rpc_miplap_crosscal_report.pdf

This File is basically a frame to be populated with text. The content which exists does not describe the cross-calibration and does little more then describe the instrumentation. Currently this document does not contain enough information so that it can be reviewed.

RID: RPCMIP-US-RF-009

Data Evaluation

MIP-LAP Density Data Timing

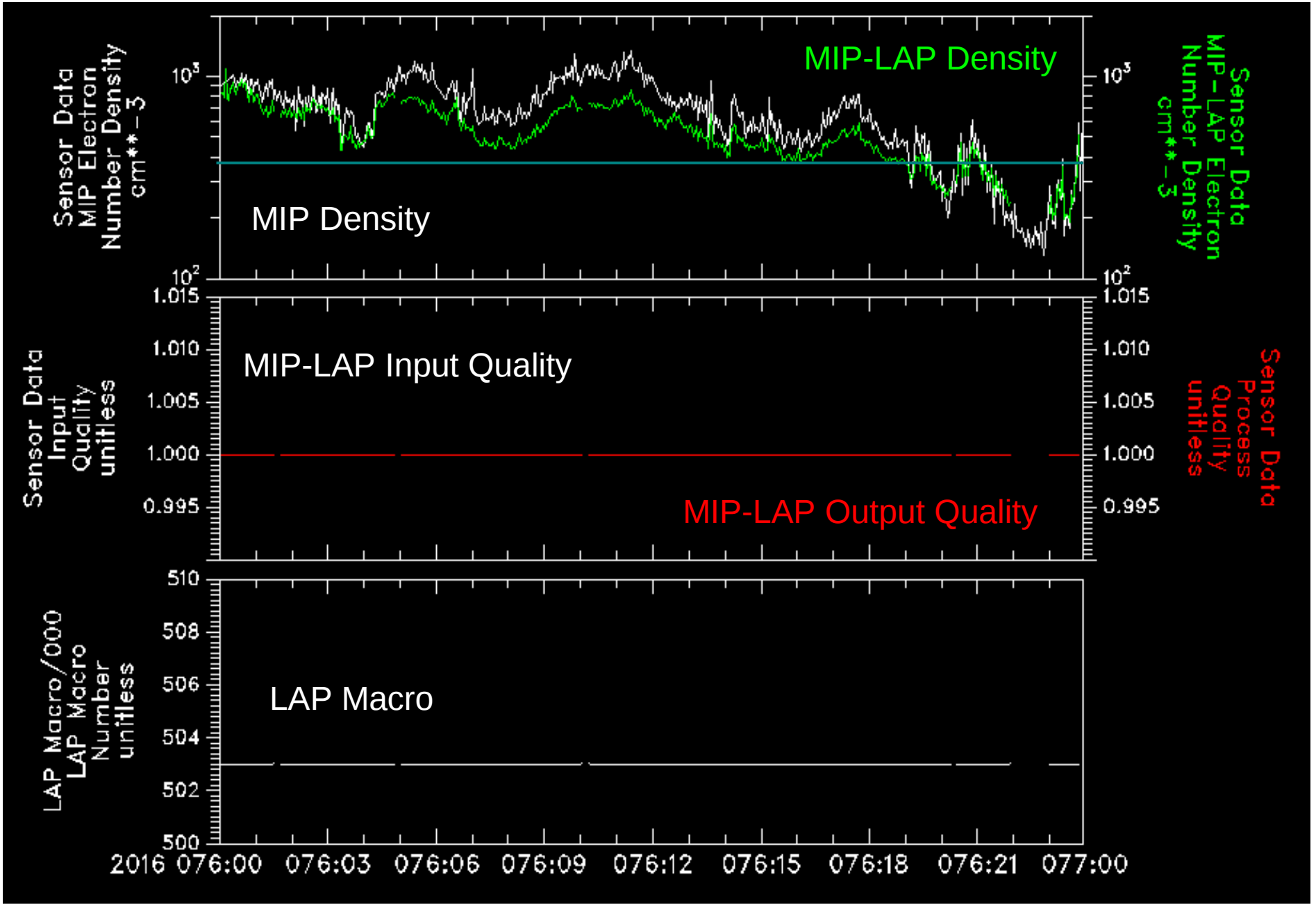
Not enough timing information was provided in the Density files to describe the time location of the MIP-LAP cross-calibration density data. The following assumptions were made in order to visualize the Level 5 cross-calibration data.

1) The L5 data files contain only a time stamp at each record; however, it is not known when this time stamp occurs. It is assumed that the time stamp occurs at the start of acquiring data.
2) The accumulation time was assumed to be 10 ms. This value was set based on an examination of the ASCII data which allows the timing of the density points not to overlap.

RID: RPCMIP-US-RF-010

RID: RPCMIP-US-RF-010

MIP-LAP Density Data



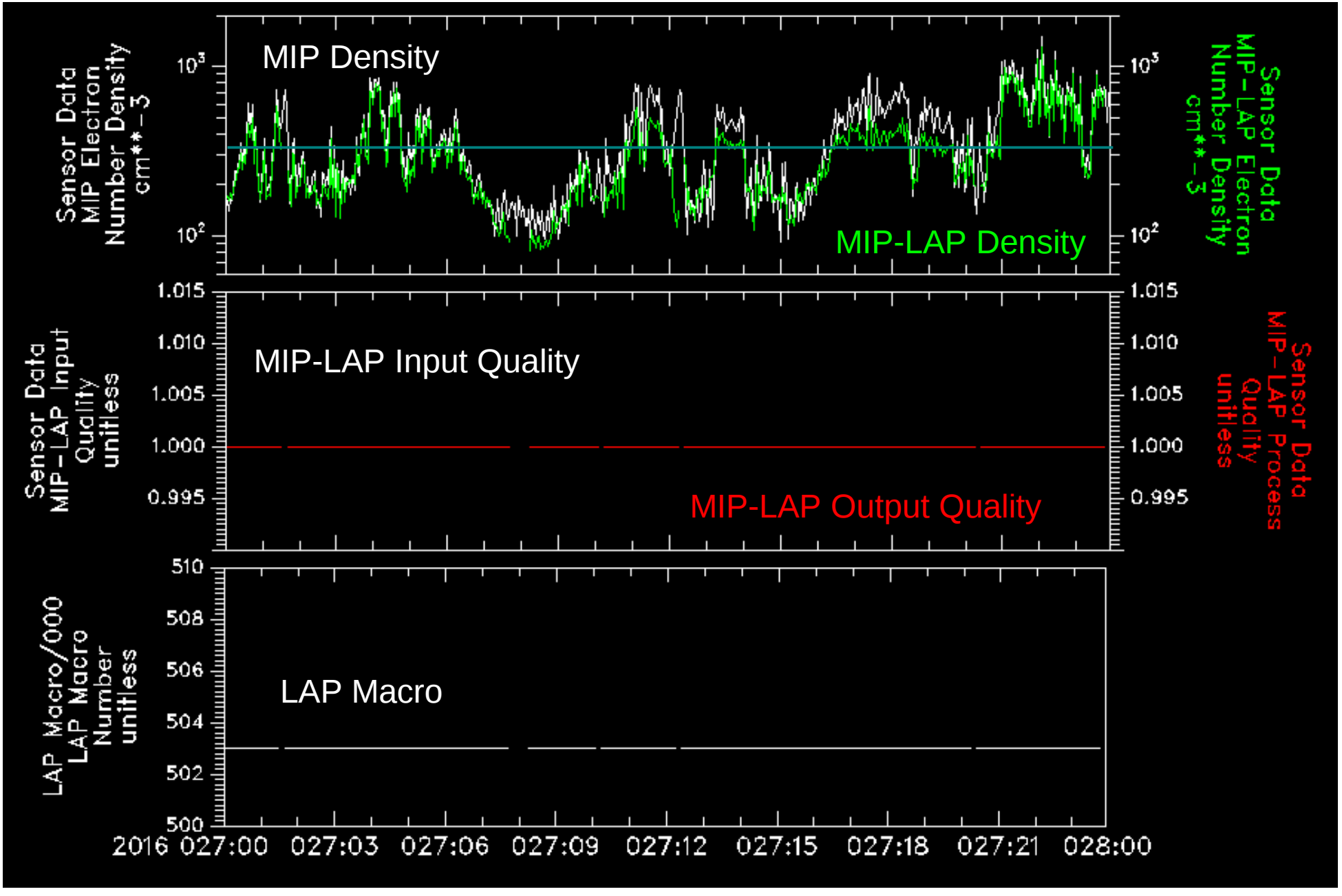
16 March (76) 2016 Comparison

The density level at 350 cm^{-3} is shown in Blue. The MIP and MIP-LAP densities seem to agree toward the beginning and end of the day, when the density is high and below the 350 cm^{-3} line; however, the MIP-LAP density is below the MIP density during the midday. There is nothing unusual shown in the quality parameters. I am not sure why the density seems to agree at the high level at the start of the day.

RID: RPCMIP-US-RF-010

RID: RPCMIP-US-RF-010

MIP-LAP Density Data



27 January (27) 2016 Comparison

The density level at 350 cm^{-3} is shown in Blue. The MIP and MIP-LAP densities again agree toward the beginning and end of the day (before 07 hr and after 21 hr), even when the density is high and above the 350 cm^{-3} line; however, there are times during the day when the MIP density is below the 350 cm^{-3} line when MIP-LAP density is below the MIP density (e.g. 08-11 hr). There is nothing unusual shown in the quality parameters. I am not sure why the density seems to agree at the low density level.

RID: RPCMIP-US-RF-010

27 January (27) 2016 Comparison

Notes: At about 12 hr, density increases in MIP above the 350 cm^{-3} line, but the MIP-LAP density decreases in the opposite direction. No explanation is seen in the quality data. In the 13-14 hr and 17-21 hr time periods, when the MIP data is above the 350 cm^{-3} line, the MIP-LAP density is lower than the MIP density. It is assumed these issues will be discussed in the unwritten sections of the cross calibration report.

RID: RPCMIP-US-RF-010

General Failures of Supplied MIP-LAP density data

The MIP-LAP Density contains no uncertainty values. Density uncertainty values should be included within the data files of the MIP-LAP cross-calibrated set of data.

It is also unclear why any MIP-LAP data is reported when the density is above 350 cm^{-3}. According to to the rpc-mip-ug-lpc2e.pdf document, RPC-MIP can not retrieve plasma densities above 350 cm^{-3} when in LDL mode, e.g., when LAP drives transmission for MIP.

RID: RPCMIP-US-RF-010

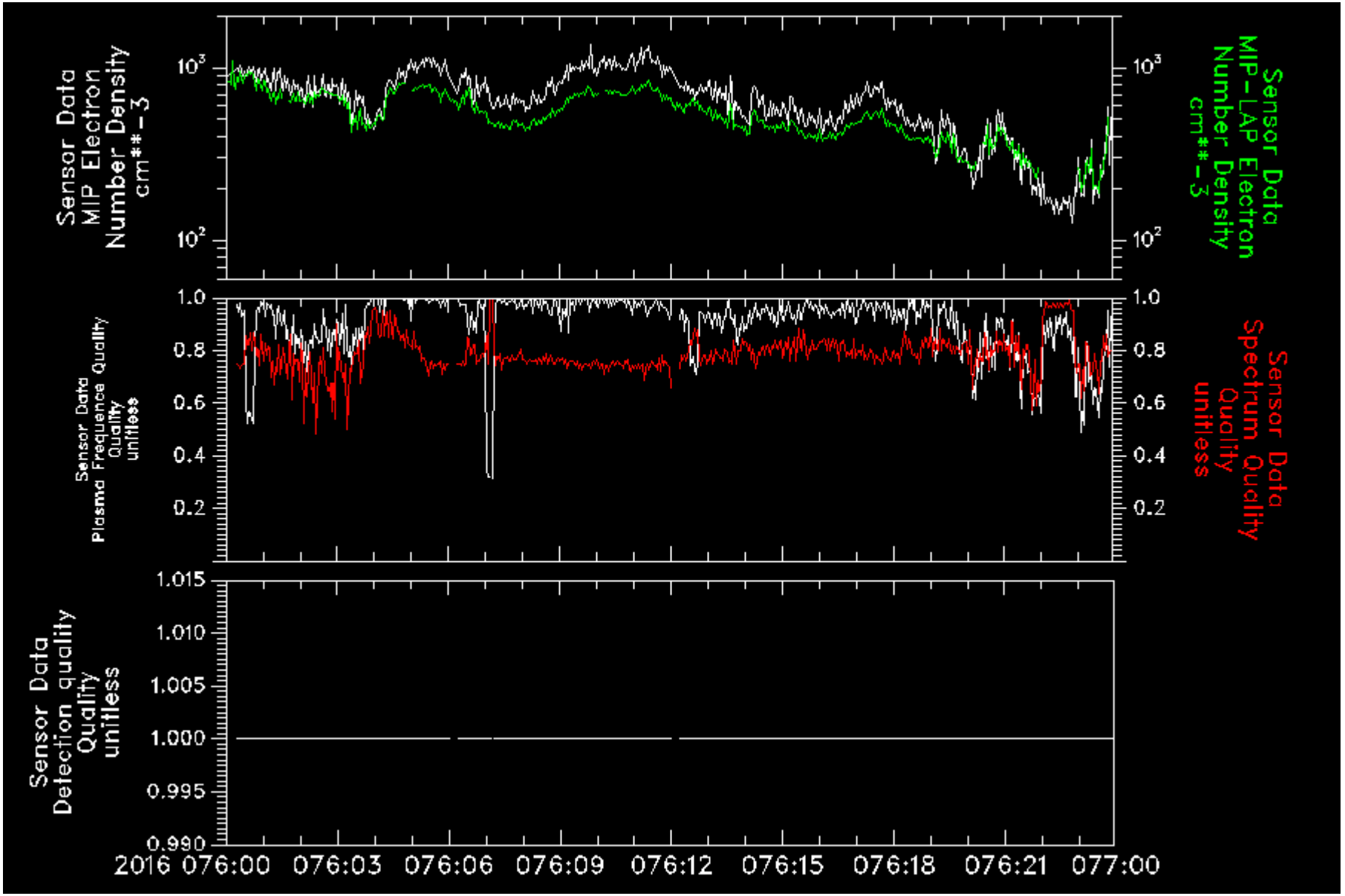
Certification

The data format does not allow accurate timing if the MIP-LAP Density data to be correctly aligned with other instruments. Density uncertainty is missing. Quality values showing 1.0 at all times seems odd. Density values sometimes agree and sometimes disagree with the MIP Density values. There are MIP densities above its limit of 350 cm-3 and it is not clear how this effects the MIP-LAP densities. No pertinent information is supplied in the Cross Calibration Report. So I recommend a total re-review of this data.

Backup Slides

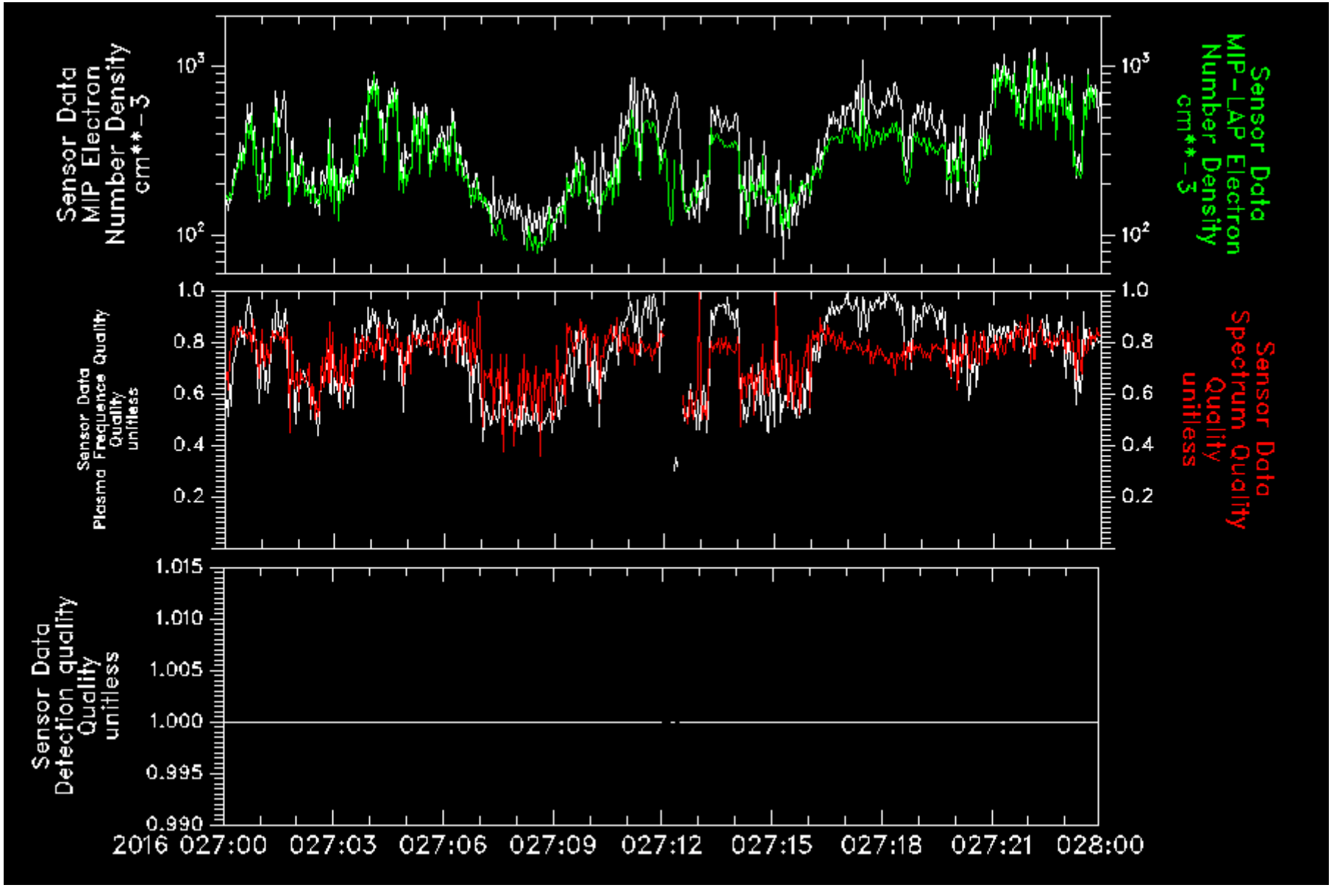
RID: RPCMIP-US-RF-010

Day 76 with MIP Quality

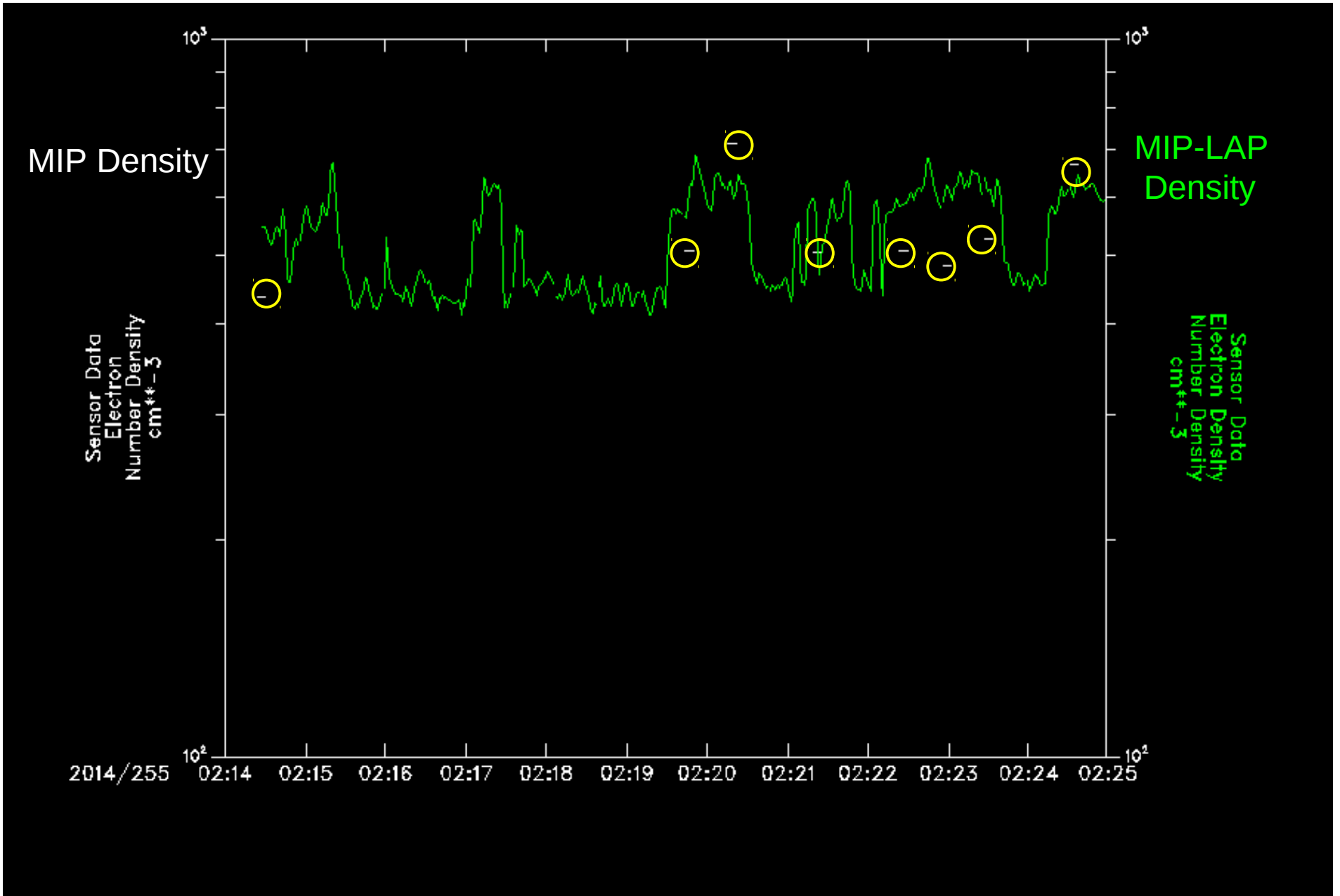


RID: RPCMIP-US-RF-010

Day 27 with MIP Quality



Comparison of MIP Density to MIP-LAP Density



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