PDS Review
Rosetta RPC-ICA

Yaxue Dong

CU-Boulder/LASP

University of Maryland, College Park, MD

May 6, 2019

Overview
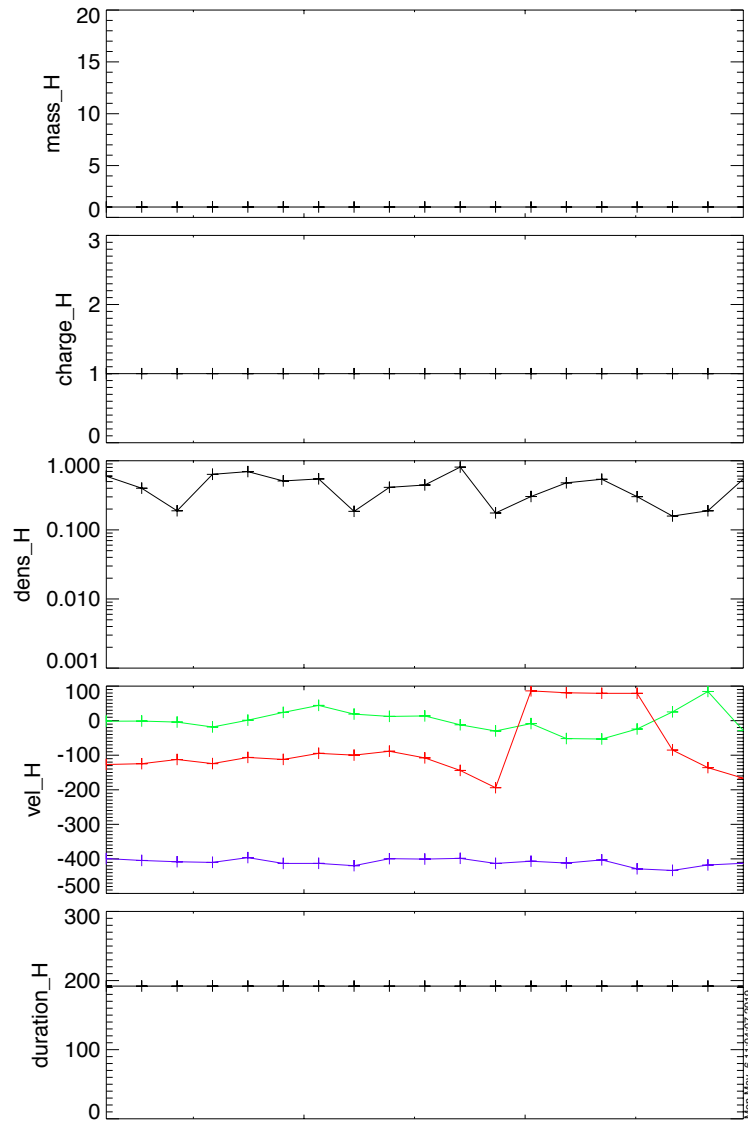
- L2 data: raw data, counts
- L3 data: calibrated, differential fluxes (cm^{-2} s^{-1} sr^{-1} eV^{-1})
- L4 data:
  - Corr_counts: differential fluxes, cross talk/background removed; temperature corrected energy steps; s/c potential; level
- L5 data: Density, velocity; species separated

- Data sets
  - Rosetta-Orbiter RPCICA Lutetia Data: l2, l3
  - Rosetta-Orbiter RPCICA Escort 1 67P: l4
  - Rosetta-Orbiter RPCICA Commissioning: l5
  - Rosetta-Orbiter RPCICA Cruise 2: l5
  - Rosetta-Orbiter RPCICA Mars Swing-by: l5
  - Rosetta-Orbiter RPCICA Earth Swing-by 2, 3: l5
  - Rosetta-Orbiter RPCICA Cruise4: l5
  - Rosetta-Orbiter RPCICA Prelanding 67P: l5
  - Rosetta-Orbiter RPCICA Escort 1, 2, 3, 4 67P: l5
  - Rosetta-Orbiter RPCICA Extension 1, 2, 3 67P: l5
- Document: ICA_user_guide

Read the data

- Tools:
    - PDS3 IDL software: working well
    - MATLAB software in the data archive (/document/software/):
        - Programs to read data work well.
        - Plotting programs don't work

- My operating system and software:
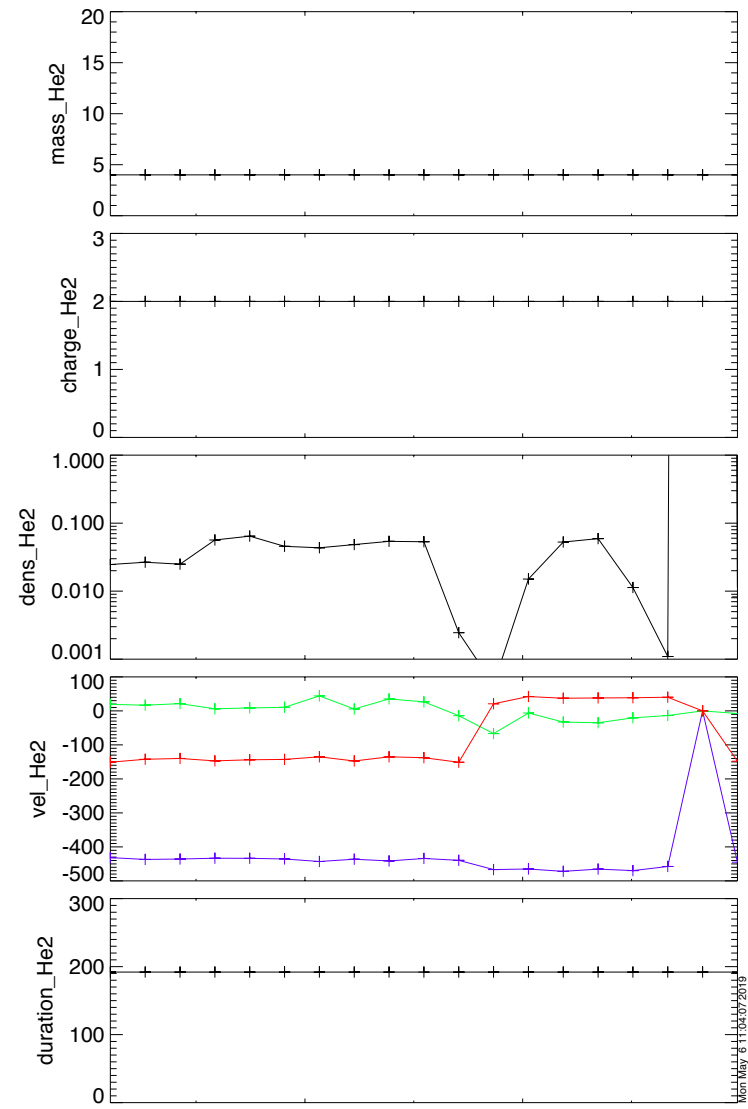   - MacOS Seirra Version 10.12.5
    - IDL 8.3.0
    - MATLAB 2017a
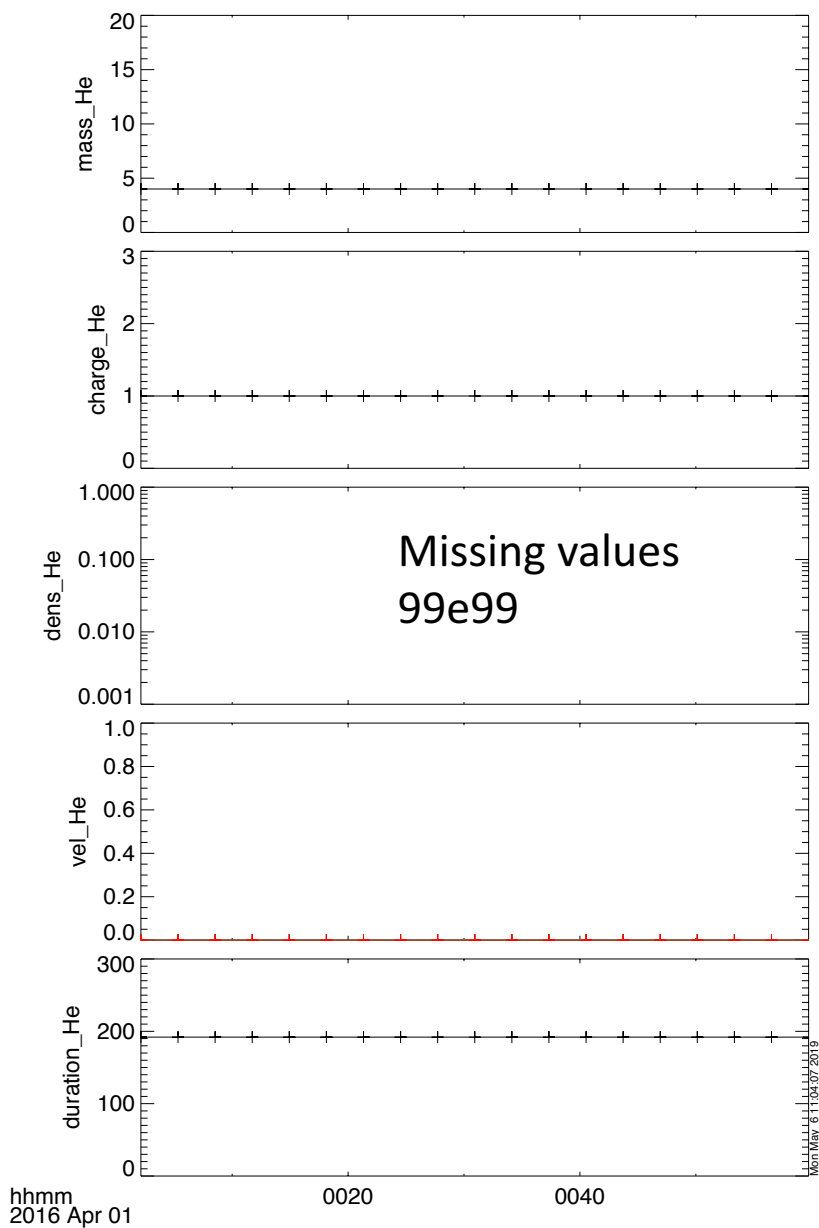
L5 data

He+

H2O+ <60eV
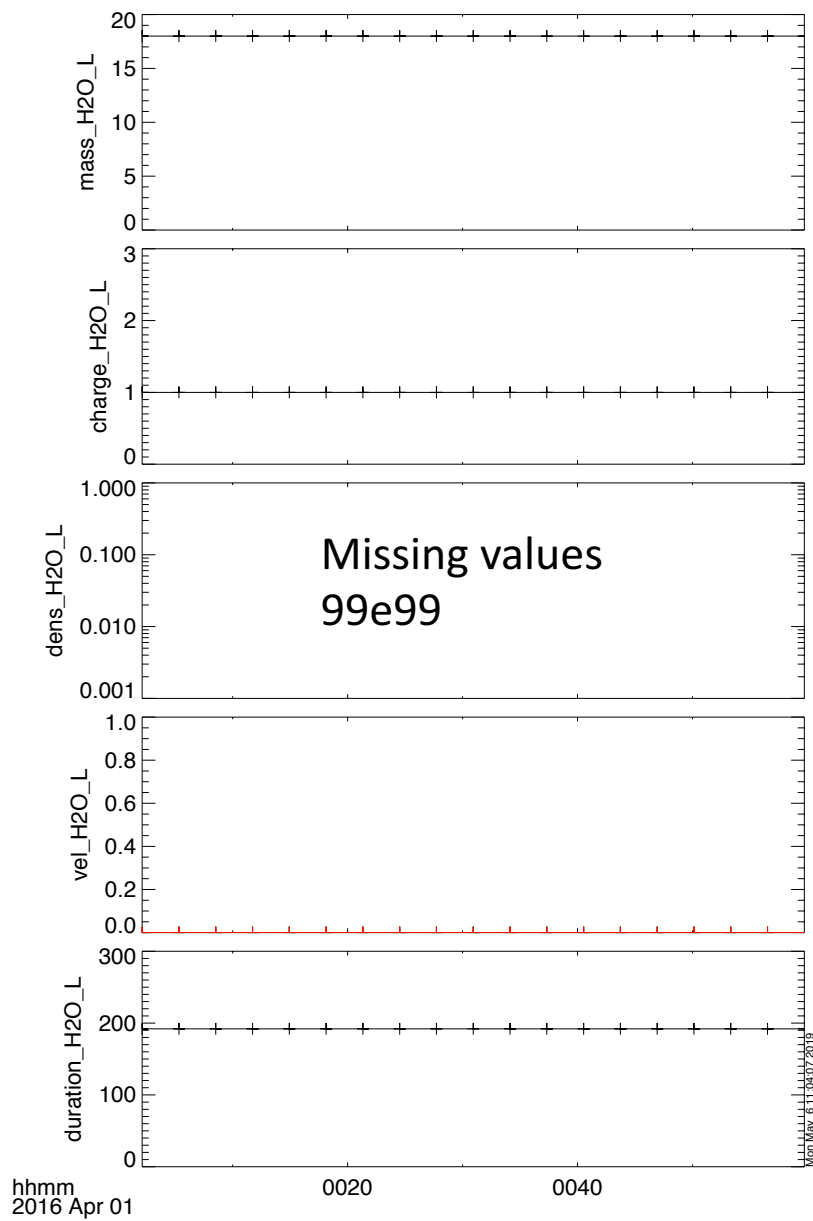
mass_He
charge_He
dens_He
vel_He
duration_He

mass_H2O_L
charge_H2O_L
dens_H2O_L
vel_H2O_L
duration_H2O_L

Missing values
99e99

Missing values
99e99

hhmm
2016 Apr 01

0020

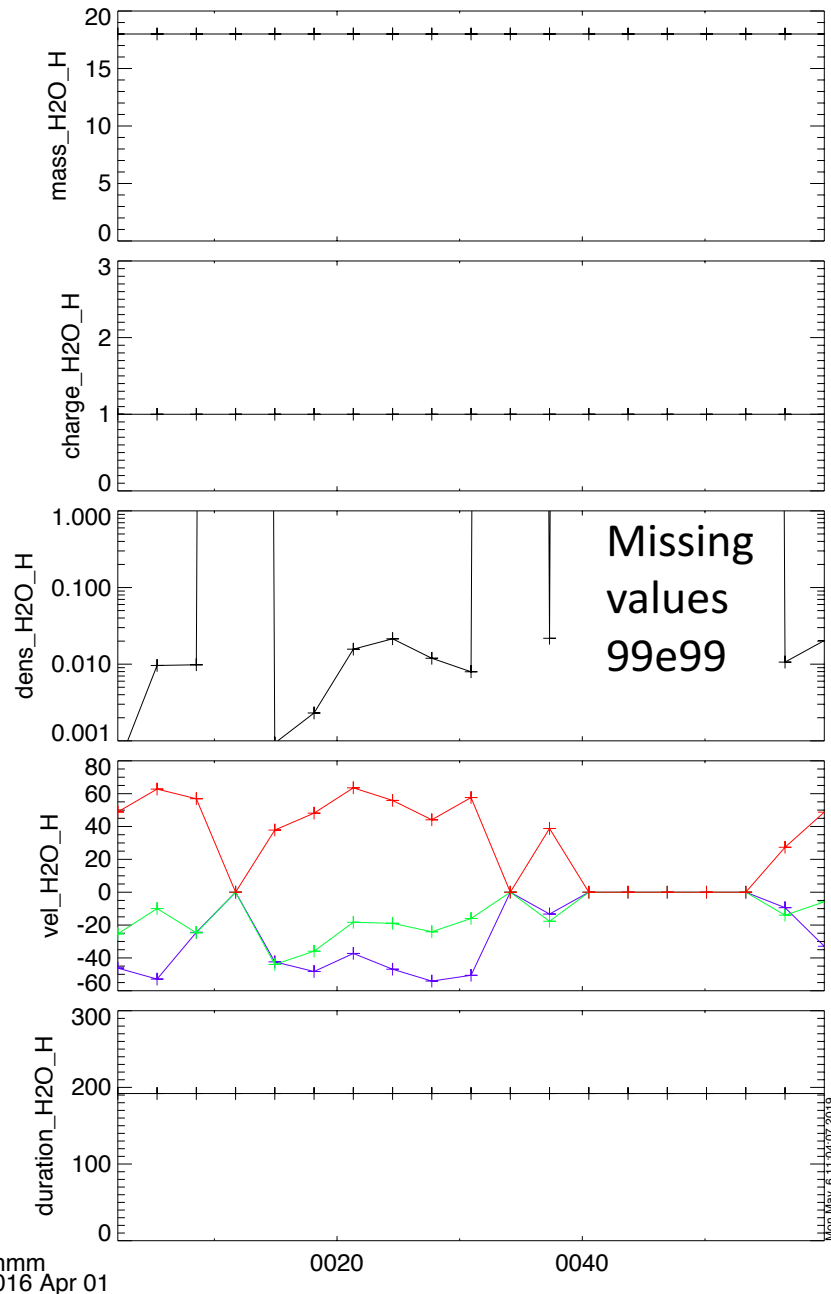0040

Mon May 6 11:04:07 2019
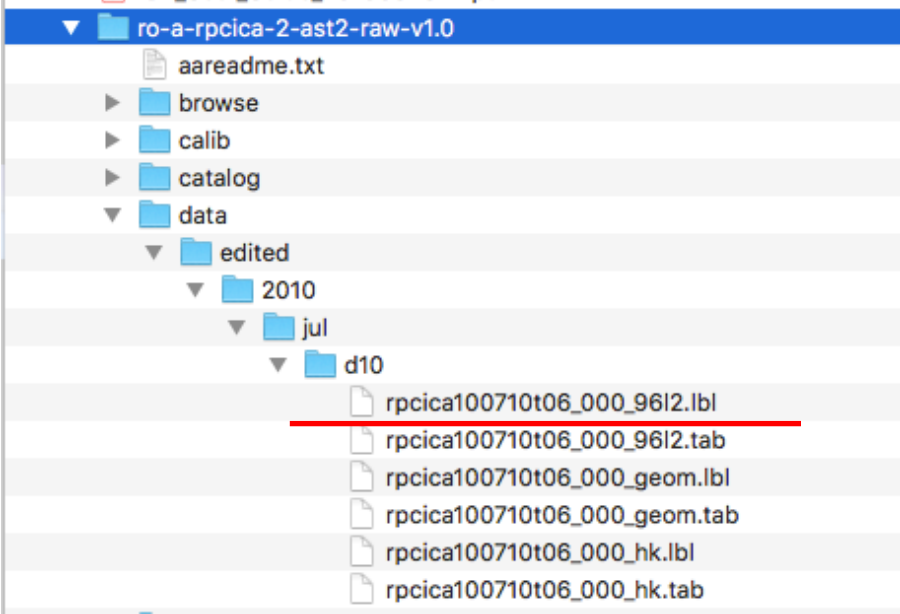
H2O+ >60eV

Missing values 99e99

- L5 data looks reasonable

- Quality flags in this data set are all "x000x00x"

  - Missing values are not noted in the quality flags

  - These two quality flags (FOV blockage, cross talk removal) implemented in L4 data, why not in L5?

ICA user guide

Table 11: Data Directory Contents

Data set	File Name	File Contents
L2	RPCICAYYMMDDTHH_000_L2.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

ro-a-rpcica-2-ast2-raw-v1.0
- aareadme.txt
- browse
- calib
- catalog
- data
  - edited
    - 2010
      - jul
        - d10
          - rpcica100710t06_000_96l2.lbl
          - rpcica100710t06_000_96l2.tab
          - rpcica100710t06_000_geom.lbl
          - rpcica100710t06_000_geom.tab
          - rpcica100710t06_000_hk.lbl
          - rpcica100710t06_000_hk.tab

L2 data name inconsistent

4.3.1 Data Product "Uncalibrated data" Design
The labels below follow the RPC and PDS conventions.

The L2, L3 and L4 CORR and CORR_CTS data files consist of 10 columns with information and then 8, 32 or 96 columns with an energy spectra depending on the number of energy steps in the data. The data file 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. Our sample is for the most common case of 96 energy steps and L2 data.

Column
1. Start time of the observations in Universal Time
2. Delta T, duration of the observation in seconds
3. Quality flags, 8 positions where 0 means no known problem, x means not implemented for this data set. The flags are described in section 3.3.
4. Instrument mode, gives the instrument binning mode as a number between 8 and 31. See instrument paper or User Guide for interpretation.
5. Noise reduction. The number of counts subtracted on board from each data point (after binning).
6. Mass table used. ICA may use mass look-up tables on board to bin data into certain physical mass ranges (see section 2.4.3). This column describes which of three on-board tables was used. 0 indicates that no mass look-up table was used, 1 indicates the table for no post-acceleration (reference value 0), 2 low post acceleration (reference value 1 to4) and 3 high post-acceleration (reference value 5 – 7)..
7. Post-acceleration reference level (0-7). Necessary to know in order to interpret the mass channels correctly in terms of physical mass of measured particles (see point 6 above).
8. Azimuth index (0-15). See sections 2, 2.4.3 and figures 2 and 3.
9. Elevation index (0-15) See sections 2, 2.4.3 and figures 2 and 3.

L2 data different format from L3 and L4

Summary

- The data and documents generally look good with minor issues

- Submitted RIDs:
  - The fill values (9e99) in the data are not noted in the quality flags. Especially for L5 data, maybe they should be excluded from higher level of data.
  - The 1st and 5th flags in L5 data are always "x". These flags are already implemented in L4 data, why not in L5 data?
- Others:
  - Still cannot use Matlab software to read the data on my computer
  - ICA user guide: L2 data description not consistent with data products