

ROSETTA SCIENCE ARCHIVE REVIEW  
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*Polarimetry*

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## Instructions

1. Confirm the completeness and scientific integrity of the Rosetta data sets in the PSA.
2. Confirm that the datasets contain the instrument science, instrument housekeeping, spacecraft housekeeping and science operations information necessary to execute instrument, cross instrument and cross-mission data analysis.
3. Confirm the long-term scientific usability of the data, e.g. against already existing planetary archives.
4. Confirm the usefulness of the provided data sets for analysis by the science community e.g. by attempting to read/manipulate the data (without team provided software) to produce or reproduce scientifically published results (if feasible).
5. Shortcomings - including detailed recommendations and their implementation period - shall be given for each major finding.

## EARTH\_BASED Rosetta Science Archive Review: polarimetry

EAR-C-MULTI-2-67P-POL-V1.0

EAR-C-MULTI-3-67P-POL-V1.0

Datasets comprise observations from five facilities:

- BNAO (Bulgarian National Observatory) – only raw data
- HST (NASA/ESA) – ACS imaging polarimetry
- SAO RAS (Russia) – Imaging polarization
- VLT (ESO) – Imaging and spectropolarimetry
- WHT (UK) – Imaging polarimetry

Expect Level 2 (raw) and 3 (reduced) data; no high level products such as polarization maps

## REVIEW ITEM DISCREPANCIES (RIDs) - Sparks

### 1. Software issues reading data

**Severity:** Major, as lbl files may be incorrect

**Description:**

- *readpds* on SAO RAS data – 32768 different from *readfits* from astro library; overwrites filename extension lbl->fit
- Couldn't get *readpds* to work on HST data.

```
Error: missing required LINE_SAMPLES keyword from label
** Structure <27206990>, 2 tags, length=4, data length=4, refs=1:
  OBJECTS          INT          2
  HEADER_ERRIMAGE INT          -1
```

whereas *readfits* works with `exten_no=0,1,2,3`. There is a null image, science image, error and DQ image along with the four associated headers.

- VLT: *readpds* returns "Error: no viable PDS object found in file"
- WHT: *readpds* reads data OK; overwrites input file extension from .lbl to .fit

whereas *readfits* works with `exten_no=0,1,2,3`. There is a null image, science image, error and DQ image, and headers for each in the fits file.

**Consequences:** can't use *readpds* to access data, need to use alternative software

**Solution:** Ensure compatibility between lbl files and software, fix bugs, improve documentation if its the reviewers misuse of the software !

## REVIEW ITEM DISCREPANCIES (RIDs) - Sparks

### 2. Absence of scientific information in lbl files

**Severity:** Major

**Description:** None of the lbl files contain any information about the instrument configuration, and very little to indicate the type of polarization observation.

```
DATA_SET_NAME = "COMET 67P GROUND BASED L2 POLARIMETRY FOR ROSETTA V1.0"
```

The FITS headers for the actual datafile typically contain vastly more information, including multiple headers and image extensions. The lbl file structure information does point to the fact that these fits headers exist, but doesn't derive much information from them. (The directory structure helps to determine if its spectroscopic or imaging, but that is fairly deeply rooted.)

**Consequences:** it will be necessary to essentially download all data rather than be selective.

**Solution:** provide at least minimal instrumental mode description: imaging/spectroscopy, filter/spectral range, polarimetry mode etc. to enable more effective location of the data

## REVIEW ITEM DISCREPANCIES (RIDs) - Sparks

### 3. BNAO L2 raw data has minimal FITS header

**Severity:** Major

**Description:** Only raw data are available for BNAO. The FITS headers (and lbl files) for these data do not appear to contain any information about the instrument configuration regarding polarimetry.

**Consequences:** it is unlikely that (even with detailed instrument manuals) any useful scientific information could be derived from these data as they stand.

**Solution:** provide filter/Wollaston/waveplate and relevant angles to enable a basic understanding of what the observations are.

## REVIEW ITEM DISCREPANCIES (RIDs) - Sparks

### 4. BNAO data missing L3

**Severity:** Major

**Description:** There are no calibrated data files for the BNAO observations

**Solution:** provide when available

## REVIEW ITEM DISCREPANCIES (RIDs) - Sparks

### 5. START TIME in HST lbl files incorrect

**Severity:** Major

**Description:** The observation START\_TIME in the lbl file should be DATE-OBS + TIME-OBS (from fits header) but instead it is PRODUCT\_CREATION\_DATE+TIME-OBS

**Consequences:** could lead to incorrect ephemeris values and unpredictable results

**Solution:** fix bug



## REVIEW ITEM DISCREPANCIES (RIDs) - Sparks

### 6. VLT spectroscopic observations missing L3

**Severity:** Major

**Description:** Only the ACQ images are provided at L3 for the pmos spectroscopic data. A spot check (2016\_03\_04) did not appear to include the ACQ images in the L2 raw data directory.

**Solution:** provide ACQ and PMOS data at both L2, L3

## REVIEW ITEM DISCREPANCIES (RIDs) - Sparks

### 7. HST isn't ground-based

**Severity:** Minor

**Description:** The umbrella program is described variously as Earth-based or ground-based:

```
MISSION_ID      = "ROSETTA_GND_OBS_CAMPAIGN"  
DATA_SET_NAME   = "COMET 67P GROUND BASED L2 POLARIMETRY FOR ROSETTA V1.0"
```

HST however is not a ground based facility, and researchers might not think to look here for supporting HST data

**Solution:** could a more generic umbrella title be included such as  
"ROSETTA ASTRONOMICAL SUPPORT CAMPAIGN"