Solar Wind Around Pluto
SWAP

PRINCIPAL INVESTIGATOR
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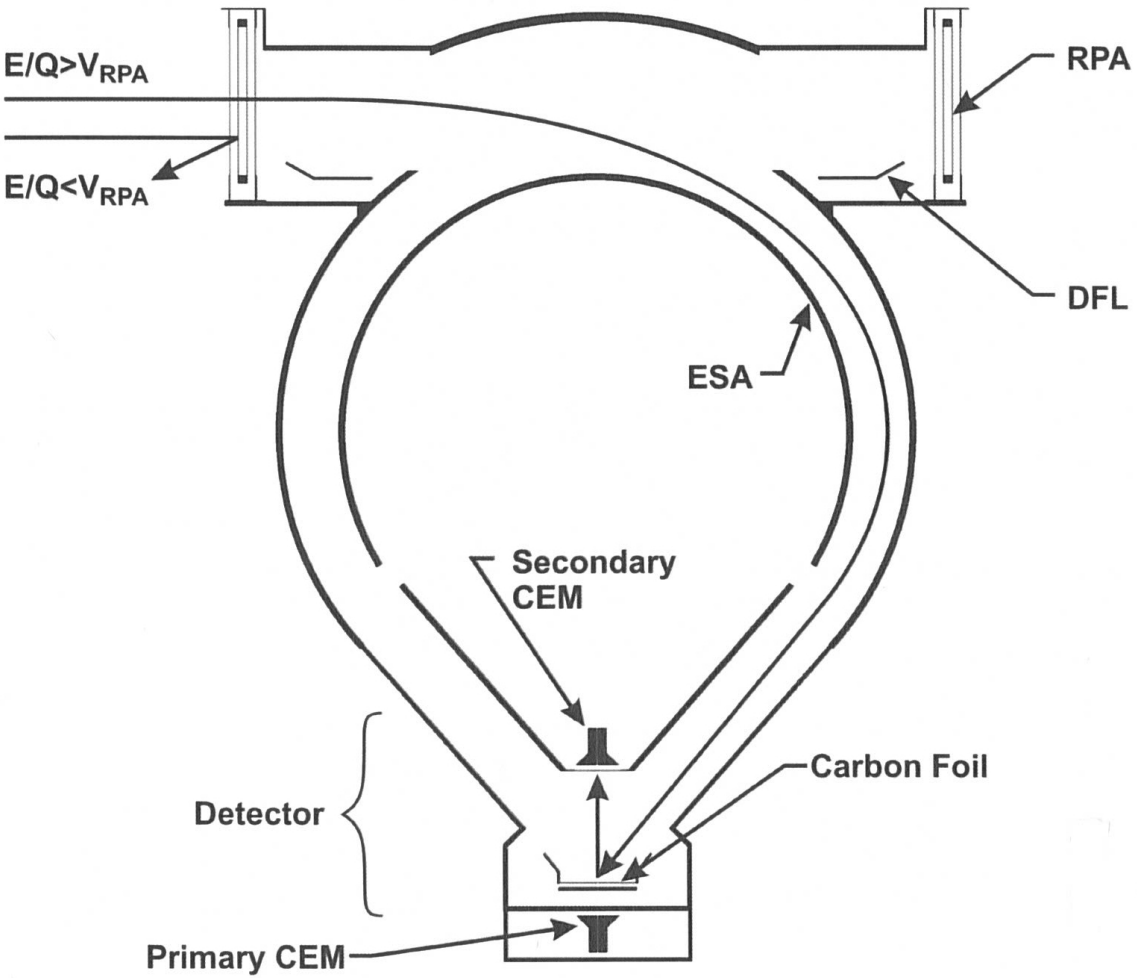
DESCRIPTION
Low Energy Plasma Instrument

ENERGY RANGE
30 eV - 7.7 keV

FIELD OF VIEW
270° x 10°
(deflection angles up to +15°)

ENERGY RESOLUTION
1 eV (< 2 keV); 9% (> 2 keV)

SPECIES
All Ions



New Horizons SWAP Collections

1) Mission Documents v3.0
   PDS4 ID: urn:nasa:pds:nh_documents:mission::3.0
2) Spacecraft Trajectory
   PDS4 ID: urn:nasa:pds:nh_swap:trajectory::2.0
3) Documents for the SWAP Instrument v2.0
   PDS4 ID: urn:nasa:pds:nh_documents:swap::2.0
4) SWAP KEM1 Encounter Raw Data v2.0
   PDS4 ID: urn:nasa:pds:nh_swap:kem1_raw::2.0
5) SWAP KEM2 Encounter Raw Data v1.0
   PDS4 ID: urn:nasa:pds:nh_swap:kem2_raw::1.0
6) SWAP Reference Files Used in Calibrating Data v2.0
   PDS4 ID: urn:nasa:pds:nh_swap:calibration_files::2.0
7) SWAP KEM1 Encounter Calibrated Data v2.0
   PDS4 ID: urn:nasa:pds:nh_swap:kem1_cal::2.0
8) SWAP KEM2 Encounter Calibrated Data v1.0
   PDS4 ID: urn:nasa:pds:nh_swap:kem2_cal::1.0

New Horizons SWAP Data Set Evaluation Tools

Machine: Dell Precision Tower 5810
Operating System: Rocky-8 linux

1) Mission Documents v3.0

collection.lblx

NASA PDS Validate v3.6.3: PASS

inventory.csv

GOOD

nh_mission_trajectory.lblx

```
<Field_Character>
  <name>UTC_CAL</name>
  <field_number>2</field_number>
  <field_location unit="byte">18</field_location>
  <data_type>ASCII_Date_Time_YMD</data_type>
  <field_length unit="byte">19</field_length>
  <field_format>%-19s</field_format>
  <description>UTC in ISO Calendar format; conversion from ET uses NAIF/SPICE LEAPSECOND kernel naif0010.tls</description>
</Field_Character>
<Field_Character>
  <name>UTC_DOY</name>
  <field_number>3</field_number>
  <field_location unit="byte">38</field_location>
  <data_type>ASCII_Date_Time_DOY</data_type>
  <field_length unit="byte">17</field_length>
  <field_format>%-17s</field_format>
  <description>UTC in ISO Day Of Year (DOY) format; conversion from ET uses NAIF/SPICE LEAPSECOND kernel naif0010.tls</description>
</Field_Character>
```

```
<geom:SPICE_Kernel_Files>
  <geom:SPICE_Kernel_Identification>
    <geom:spice_kernel_file_name>naif0012.tls</geom:spice_kernel_file_name>
  </geom:SPICE_Kernel_Identification>
```

Jet Propulsion Laboratory
California Institute of Technology

+ View the NASA Portal

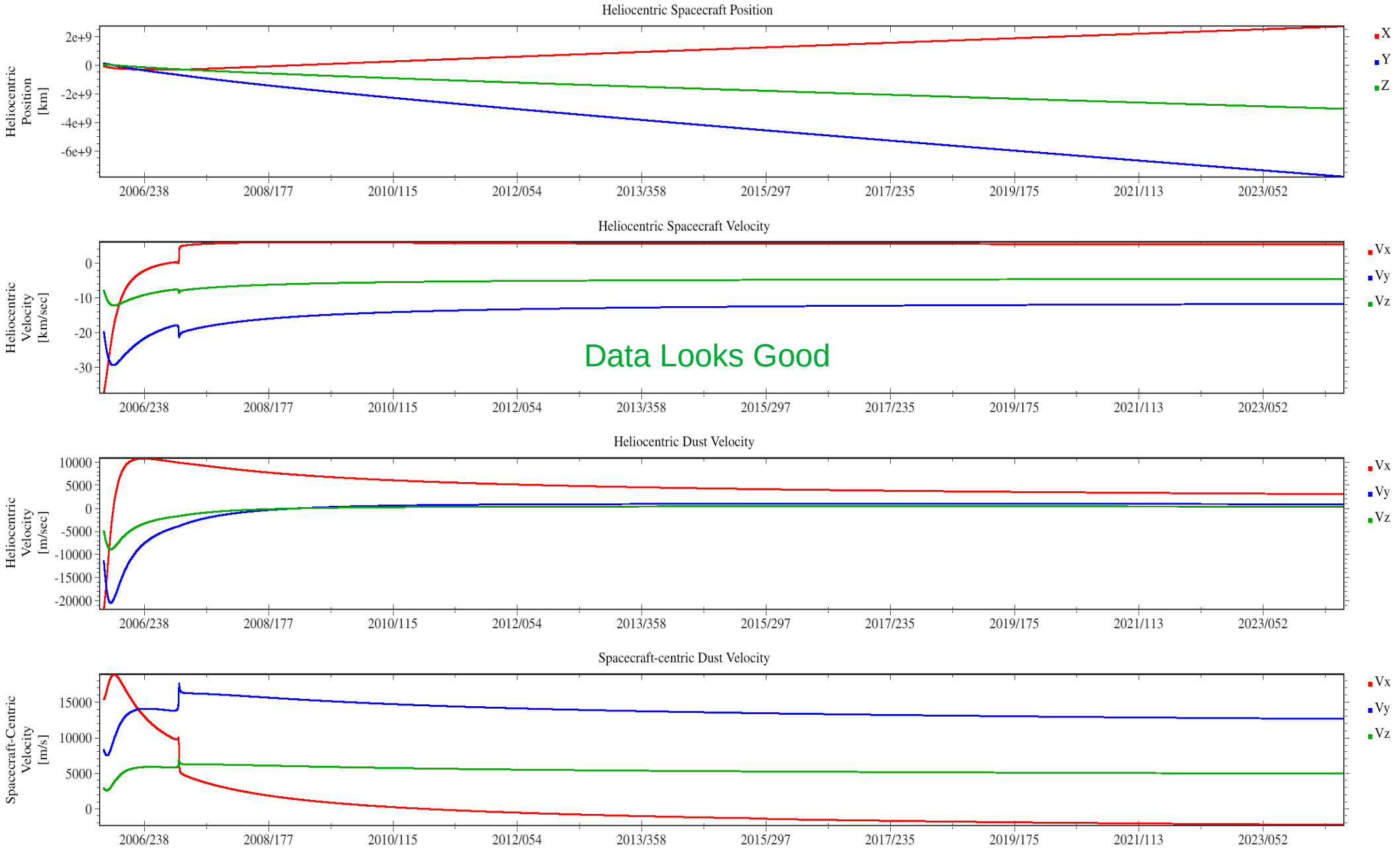
NAIF Planetary Data System Navigation Node

- Home
- Announcements
- About SPICE
- About NAIF
- For New Projects
- For the Public
- Data
- Toolkit
- Utilities
- WebGeocalc
- Cosmographia
- Documentation
- Tutorials
- Lessons
- Training
- Support

Name	Last modified	Size
Parent Directory		-
lskinfo.txt	2021-03-03 17:28	4.6K
naif0009.lbl	2009-02-26 13:43	1.3K
naif0009.tls	2009-01-09 17:10	6.0K
naif0010.lbl	2014-11-04 20:45	2.6K
naif0010.tls	2014-11-04 20:45	6.1K
naif0011.lbl	2016-05-02 13:15	2.6K
naif0011.tls	2016-05-02 13:15	6.3K
naif0012.lbl	2017-04-04 15:14	2.6K
naif0012.tls	2017-04-04 15:14	6.5K

Why is the v12 leap sec kernel referenced, yet the comments say v10 is used? NAIF says New Horizons had v10 published in 2014, but v12 was published by New Horizons in 2017?

nh_mission_trajectory.tab



Plot created by SDDAS/gPlot - J. Mukherjee, et al. Generated on Thu Jan 23 18:31:12 2025.

soc_inst_icd.lblx

NASA PDS Validate v3.6.3: PASS

soc_inst_icd.pdf

SWAP Section: GOOD

PREVIOUSLY_RELEASED_FOR_REFERENCE

Remove this directory for PDS4 submission.

However, note that the Previously Released version of pluto_ao.lblx failed under NASA PDS Validate v3.6.3:

```
Product Level Validation Results

  FAIL: file:/mnt/usb/PDS/Reviews/NH/SWAP_2024/2nd/mission/PREVIOUSLY_RELEASED_FOR_REFERENCE/pluto_ao.lblx
      ERROR  [error.pdf.file.not_pdfa_compliant]   Validation failed for flavour PDF/A-1b in file pluto_ao_original.pdf.
        1 product validation(s) completed
```

Collection Certification for Mission Documents v3.0

The documented in this release had a minor issue that the SPICE Leap Second kernel was specified differently in various places in the text. Although for SWAP, the leap second will not make a difference, the project should determine which was actually used to produce the trajectory data and make them consistent.

Recommendation: Certified after the project corrects the documentation

2) Spacecraft Trajectory

collection.lblx – 1 or 2

Error Message from Browser:

This XML file does not appear to have any style information associated with it.

```
<Discipline_Area>
<!--
 Errors appear to be because nh:Operation_Parameters is not present (change requested).
        can only have one phase (change requested) while this file covers the full mission
        In nh:mission_phase_name, SBN has been using the "Full MISSION_PHASE_NAME" from
        https://pdssbn.astro.umd.edu/holdings/pds4-nh_documents:mission-v2.0/documents/nhkem1_mission_overview.pdf
        Also schema only allows KEM1 Cruise, KEM1 Encounter, and KEM2 Cruise
-->
<!--
  When NH dictionary is updated, this can be uncommented, checked, and updated - also
            UPDATE dictionary info at beginning of file

        <nh:Mission_Parameters>
           <nh:mission_phase_name>Post-Launch Checkout</nh:mission_phase_name>
           <nh:mission_phase_name>Jupiter Encounter</nh:mission_phase_name>
           <nh:mission_phase_name>Pluto Cruise</nh:mission_phase_name>
           <nh:mission_phase_name>Pluto Encounter</nh:mission_phase_name>
           <nh:mission_phase_name>Cruise to First KBO Encounter</nh:mission_phase_name>
           <nh:mission_phase_name>KEM1 Encounter</nh:mission_phase_name>
        </nh:Mission_Parameters>
-->
</Discipline_Area>
```

collection.lblx – 2 or 2

Error Message from NASA PDS Validate v3.6.3:

Product Level Validation Results

FAIL: file:collection.lblx
ERROR [error.label.schema] line 23, 18: cvc-pattern-valid: Value '[TBD]' is not facet-valid with respect to pattern '10\.\S+/\S+' for type 'doi'.
ERROR [error.label.schema] line 23, 18: cvc-type.3.1.3: The value '[TBD]' of element 'doi' is not valid.
ERROR [error.label.missing_file] URI reference does not exist: file:inventory.csv
WARNING [warning.label.context_ref_mismatch] line 106: Context reference type mismatch. Value: 'Equipment' Expected one of: '[Spacecraft]'
ERROR [error.validation.internal_error] Uncaught exception while validating: inventory.csv (No such file or directory)
1 product validation(s) completed

```
<File_Area_Inventory>
    <File>
        <file_name>inventory.csv</file_name>
    </File>
```

File Missing: No list of files in the collection.

trajinfo.txt

This looks like a PDS3 file. The information included in this file shows the directory structure and its contents. PDS4 does not require this information. This file should not be included in a PDS4 archive.

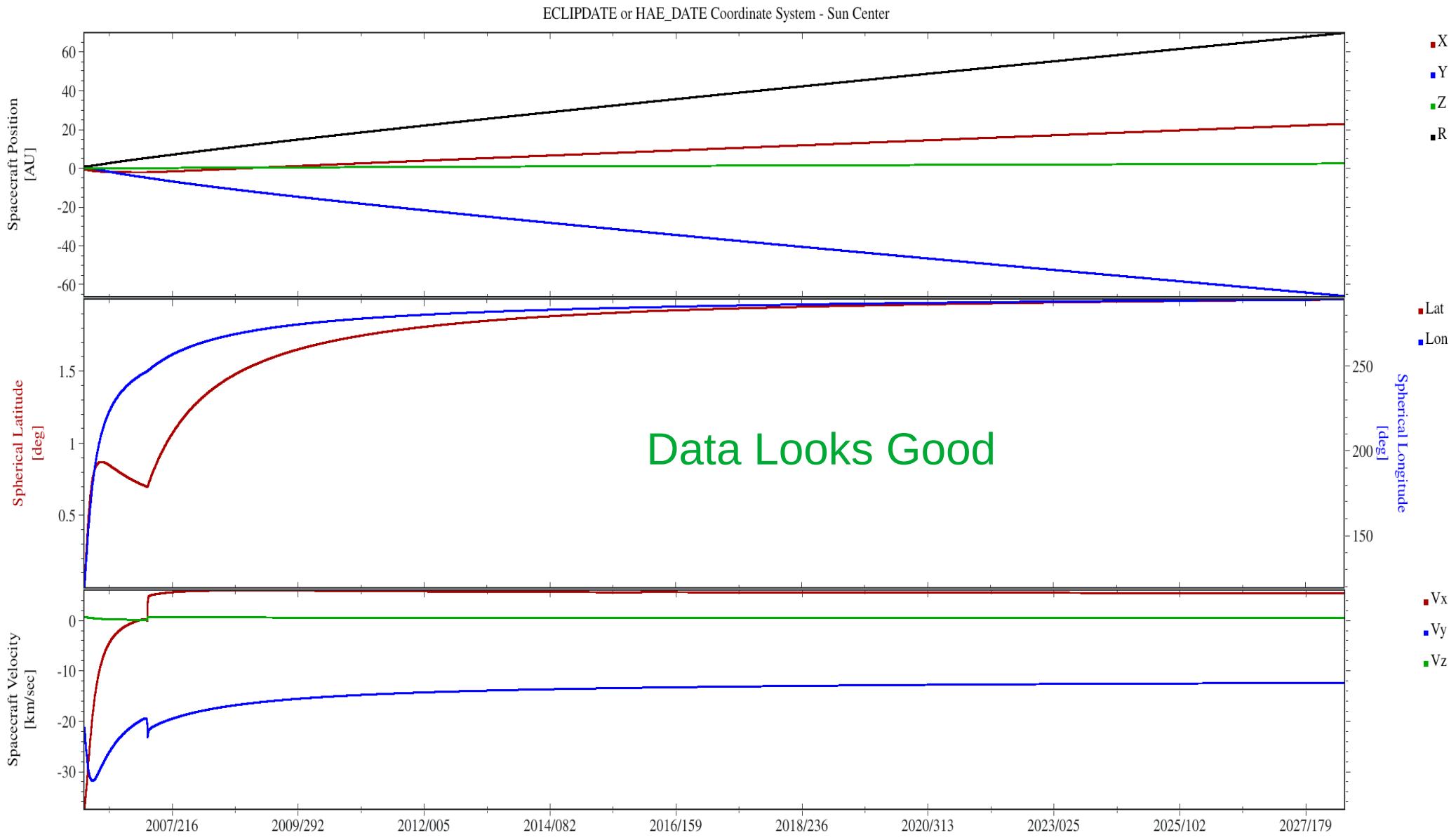
traj.fmt

This looks like a PDS3 file. The information included in this file should be included in the PDS4 xml file. This file should not be included in a PDS4 archive.

traj_hae_date.xml

NASA PDS Validate v3.6.3: PASS

traj_hae_date.tab



Sun Centered

HAE = Heliocentric Aries Ecliptic of Date

Plot created by SDDAS/gPlot - J. Mukherjee, et al. Generated on Wed Dec 18 18:04:11 2024.

traj_hae_date.lbl

This looks like a PDS3 file. The information included in this file should be included in the PDS4 xml file. This file should not be included in a PDS4 archive.

traj_hae_j2000.xml

NASA PDS Validate v3.6.3: PASS

traj_hae_j2000.tab

Sun Centered

HAE = Heliocentric Aries Ecliptic of J2000

Plot created by SDDAS/gPlot - J. Mukherjee, et al. Generated on Wed Dec 18 18:15:25 2024.

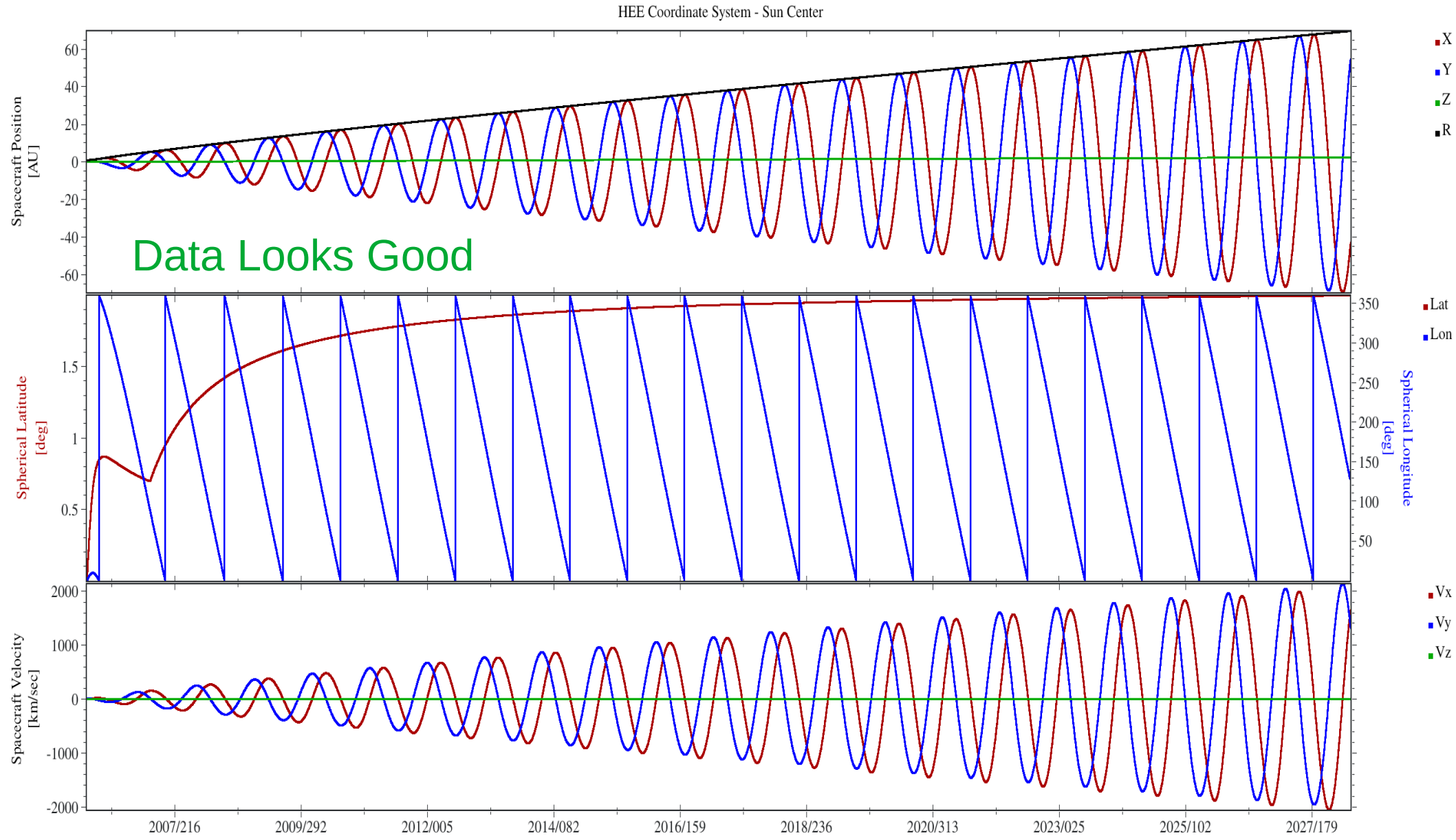
traj_hae_j2000.lbl

This looks like a PDS3 file. The information included in this file should be included in the PDS4 xml file. This file should not be included in a PDS4 archive.

traj_hee.xml

NASA PDS Validate v3.6.3: PASS

traj_hee.tab



Sun Centered

HEE = Heliocentric Earth Ecliptic

Plot created by SDDAS/gPlot - J. Mukherjee, et al. Generated on Wed Dec 18 18:28:45 2024.

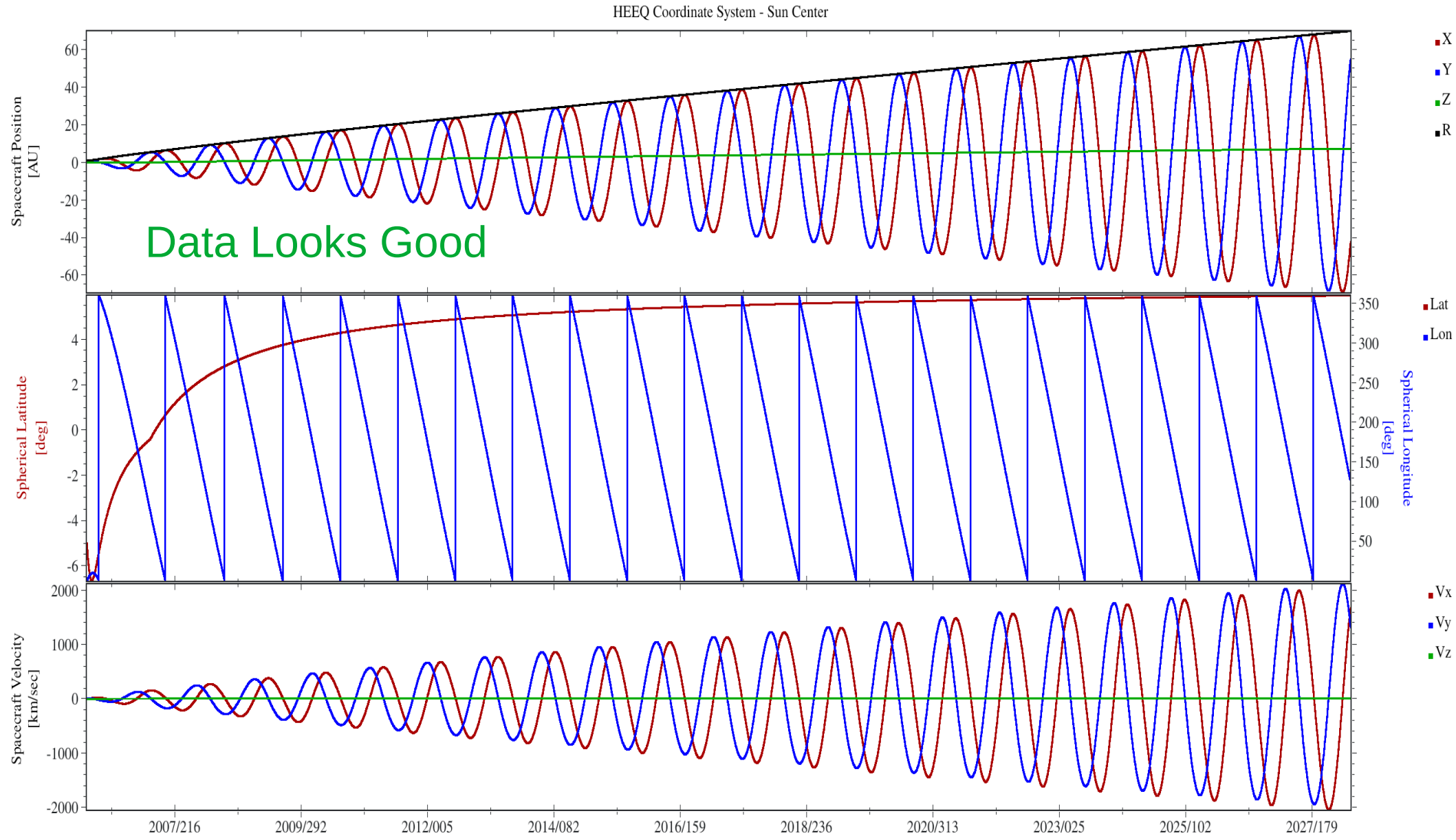
traj_hee.lbl

This looks like a PDS3 file. The information included in this file should be included in the PDS4 xml file. This file should not be included in a PDS4 archive.

traj_heeq.xml

NASA PDS Validate v3.6.3: PASS

traj_heeq.tab



Sun Centered

HEEQ = Heliocentric Earth Equitorial

Plot created by SDDAS/gPlot - J. Mukherjee, et al. Generated on Wed Dec 18 18:26:28 2024.

traj_heeq.lbl

This looks like a PDS3 file. The information included in this file should be included in the PDS4 xml file. This file should not be included in a PDS4 archive.

traj_hgi.xml

NASA PDS Validate v3.6.3: PASS

traj_hgi.tab

Sun Centered

HGI = Heliographic Inertial

HCI = Heliocentric Inertial

Plot created by SDDAS/gPlot - J. Mukherjee, et al. Generated on Wed Dec 18 18:23:27 2024.

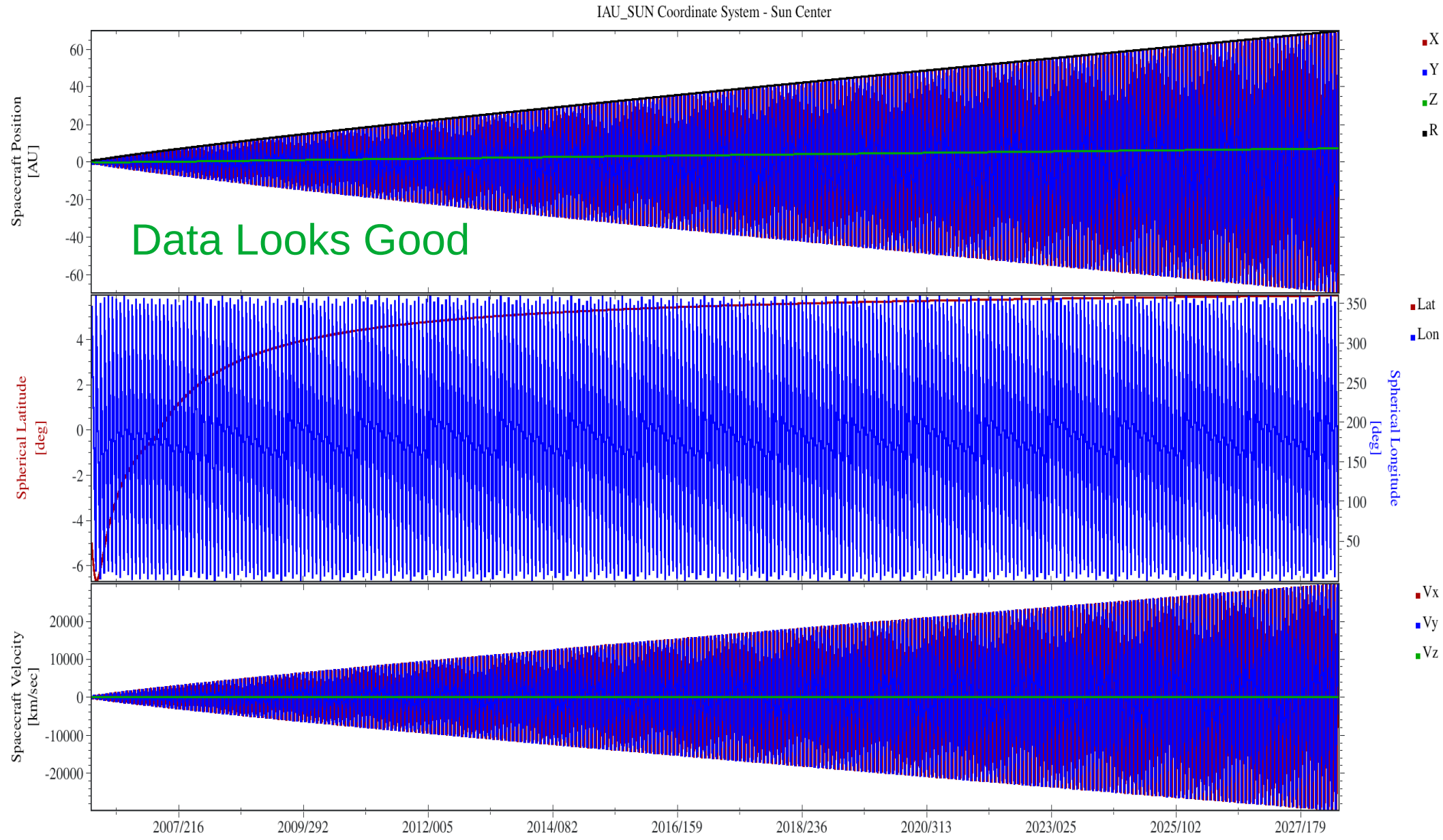
traj_hgi.lbl

This looks like a PDS3 file. The information included in this file should be included in the PDS4 xml file. This file should not be included in a PDS4 archive.

traj_hg.xml

NASA PDS Validate v3.6.3: PASS

traj_hg.tab



Sun Centered

HG = Heliographic or IAU_SUN

Plot created by SDDAS/gPlot - J. Mukherjee, et al. Generated on Wed Dec 18 18:33:06 2024.

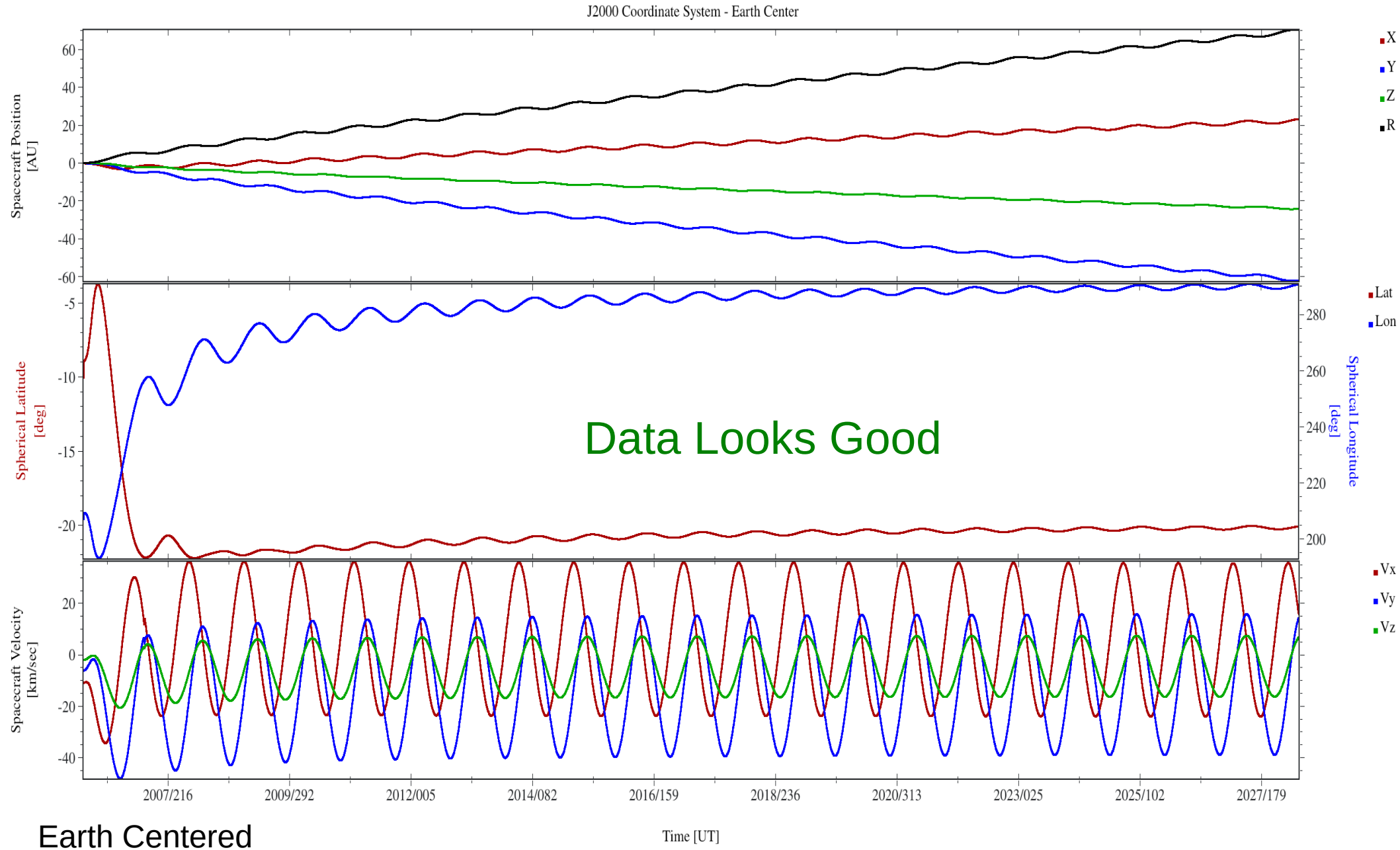
traj_hg.lbl

This looks like a PDS3 file. The information included in this file should be included in the PDS4 xml file. This file should not be included in a PDS4 archive.

traj_j2000.xml

NASA PDS Validate v3.6.3: PASS

traj_j2000.tab



Earth Centered

Plot created by SDDAS/gPlot - J. Mukherjee, et al. Generated on Wed Dec 18 18:19:11 2024.

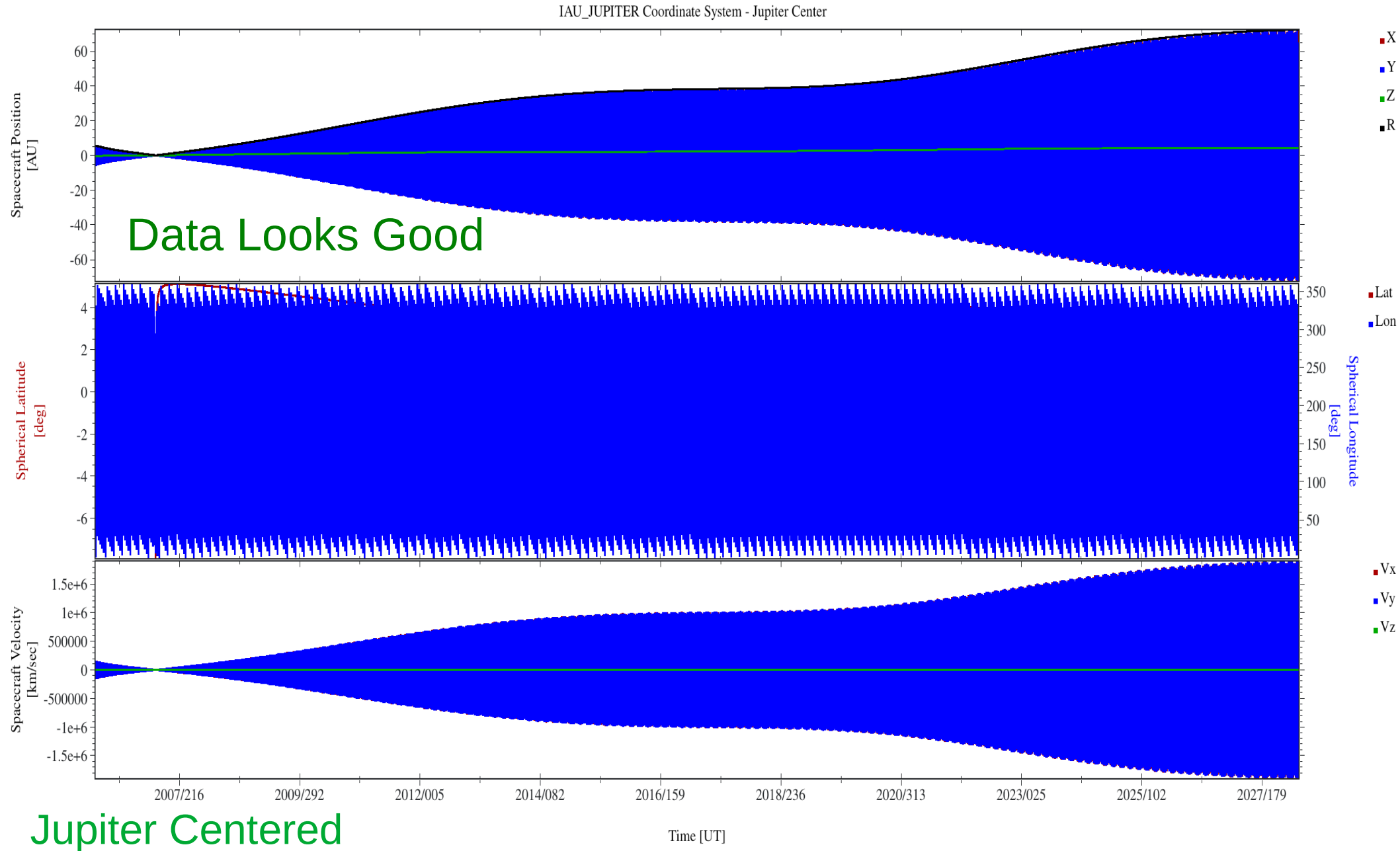
traj_jupiter_iau.lbl

This looks like a PDS3 file. The information included in this file should be included in the PDS4 xml file. This file should not be included in a PDS4 archive.

traj_jupiter_iau.xml

NASA PDS Validate v3.6.3: PASS

traj_jupiter_iau.tab



Jupiter Centered

Plot created by SDDAS/gPlot - J. Mukherjee, et al. Generated on Wed Dec 18 18:20:27 2024.

traj_j2000.lbl

This looks like a PDS3 file. The information included in this file should be included in the PDS4 xml file. This file should not be included in a PDS4 archive.

traj_jupiter_j2000.xml

NASA PDS Validate v3.6.3: PASS

traj_jupiter_j2000.tab

Jupiter Centered

Plot created by SDDAS/gPlot - J. Mukherjee, et al. Generated on Wed Dec 18 18:16:55 2024.

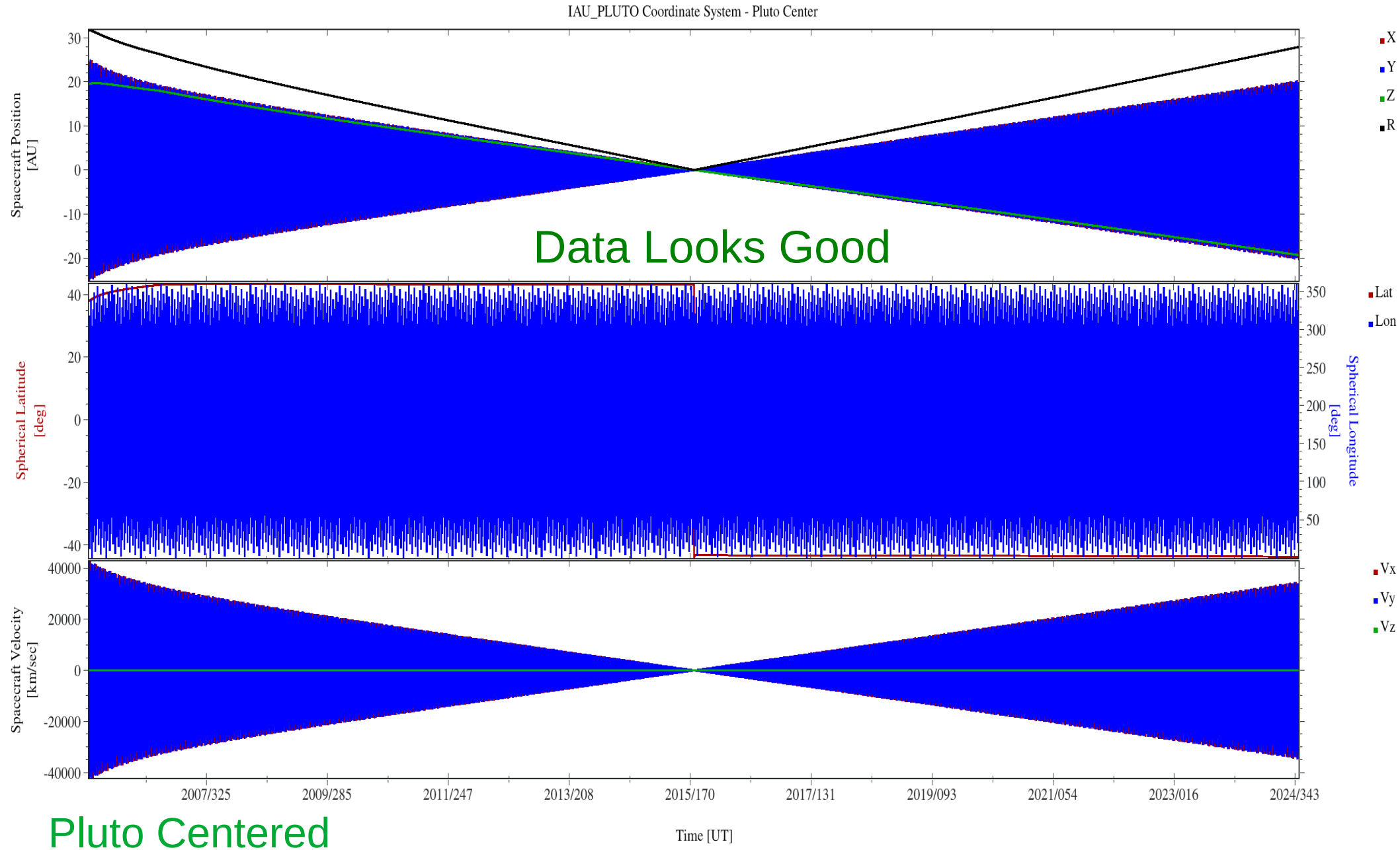
traj_jupiter_j2000.lbl

This looks like a PDS3 file. The information included in this file should be included in the PDS4 xml file. This file should not be included in a PDS4 archive.

traj_pluto_iau.lbl

This looks like a PDS3 file. The information included in this file should be included in the PDS4 xml file. This file should not be included in a PDS4 archive.

traj_pluto_iau.tab



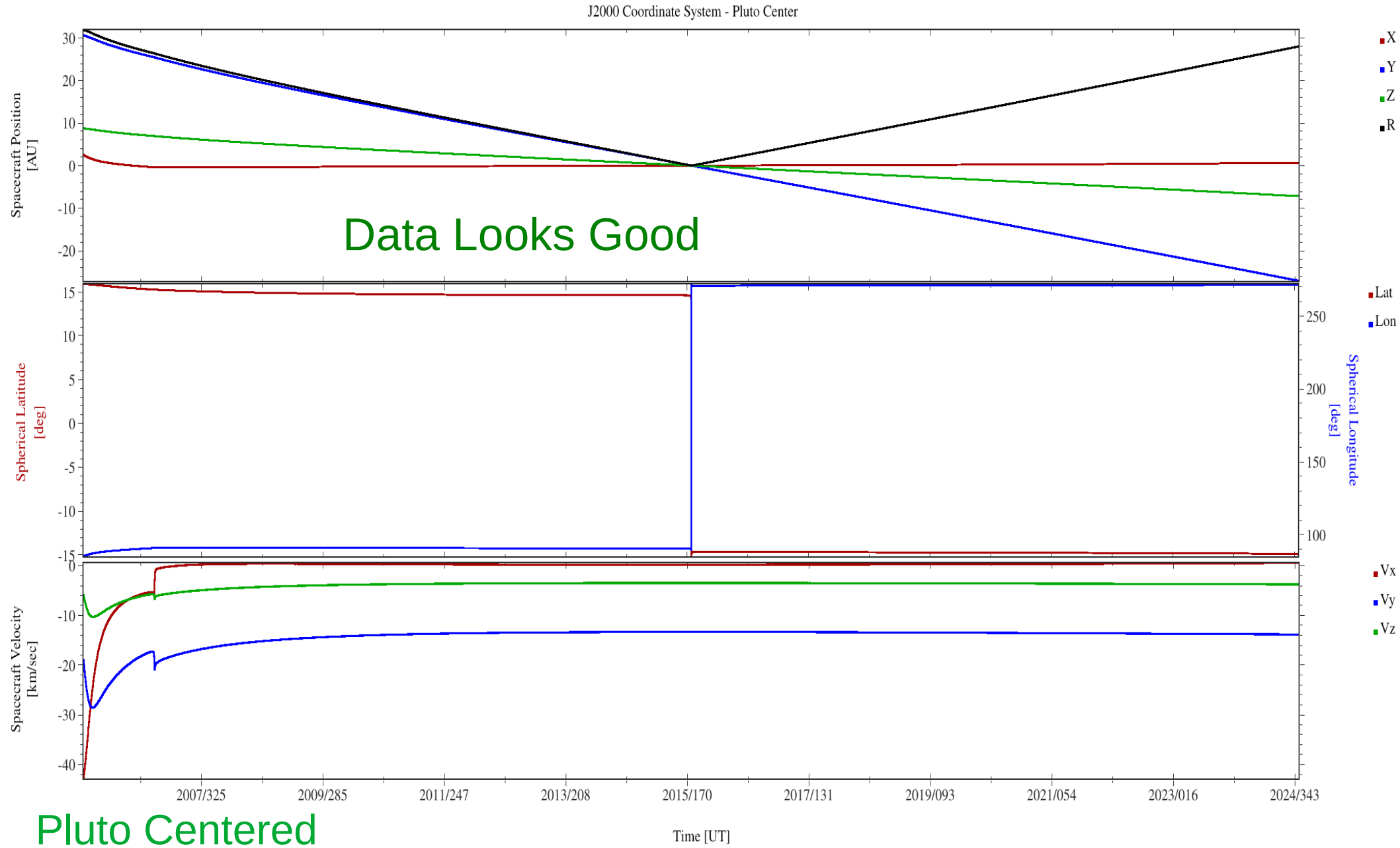
traj_pluto_iau.xml

NASA PDS Validate v3.6.3: PASS

traj_pluto_j2000.xml

NASA PDS Validate v3.6.3: PASS

traj_pluto_j2000.tab



traj_pluto_j2000.lbl

This looks like a PDS3 file. The information included in this file should be included in the PDS4 xml file. This file should not be included in a PDS4 archive.

PREVIOUSLY_RELEASED_FOR_REFERENCE

Remove this directory for PDS4 submission.

Collection Certification for Spacecraft Trajectory

The collection documentation totally fails; however the individual file labels pass the NASA validator. The data files themselves are good; however, without adequate collection documentation, the data can not be accessed.

Recommendation: Not Certified

3) Documents for the SWAP Instrument v2.0

collection.lblx

NASA PDS Validate v3.6.3: PASS

inventory.csv

```
[rudy@wile-e swap]$ more inventory.csv
P,urn:nasa:pds:nh_documents:swap:seq_swap_kem1::2.0
P,urn:nasa:pds:nh_documents:swap:seq_swap_kem2::1.0
P,urn:nasa:pds:nh_documents:swap:swap_ssr::1.1
P,urn:nasa:pds:nh_documents:swap:kem1_1annual_plots::1.0
P,urn:nasa:pds:nh_documents:swap:kem1_001day_plots::1.0
P,urn:nasa:pds:nh_documents:swap:kem1_010day_plots::1.0
P,urn:nasa:pds:nh_documents:swap:kem1_025day_plots::1.0
P,urn:nasa:pds:nh_documents:swap:kem1_100day_plots::1.0
P,urn:nasa:pds:nh_documents:swap:kem2_1annual_plots::1.0
P,urn:nasa:pds:nh_documents:swap:kem2_001day_plots::1.0
P,urn:nasa:pds:nh_documents:swap:kem2_010day_plots::1.0
P,urn:nasa:pds:nh_documents:swap:kem2_025day_plots::1.0
P,urn:nasa:pds:nh_documents:swap:kem2_100day_plots::1.0
[rudy@wile-e swap]$ du
39892   ./kem1_summary_plots/001day
5560    ./kem1_summary_plots/010day
2508    ./kem1_summary_plots/025day
680     ./kem1_summary_plots/100day
312     ./kem1_summary_plots/1annual
48956   ./kem1_summary_plots
140708  ./kem2_summary_plots/001day
19612   ./kem2_summary_plots/010day
8716    ./kem2_summary_plots/025day
2468    ./kem2_summary_plots/100day
792     ./kem2_summary_plots/1annual
172300  ./kem2_summary_plots
30489   ./PREVIOUSLY_RELEASED_FOR_REFERENCE
```

Why are these listed as data files yet they seem to be sub-directories which contain image files described in the ICD?

kem1_summary_plots/001day
kem1_001day_plots.lblx

NASA PDS Validate v3.6.3: PASS

kem1_summary_plots/001day
kem1_001day_*.png

GOOD

kem1_summary_plots/010day
kem1_010day_plots.lblx

NASA PDS Validate v3.6.3: PASS

kem1_summary_plots/010day
kem1_010day_*.png

GOOD

kem1_summary_plots/025day
kem1_025day_plots.lblx

NASA PDS Validate v3.6.3: PASS

kem1_summary_plots/025day
kem1_025day_*.png

GOOD

kem1_summary_plots/100day
kem1_100day_plots.lblx

NASA PDS Validate v3.6.3: PASS

kem1_summary_plots/100day
kem1_100day_*.png

GOOD

kem1_summary_plots/1annual
kem1_1annual_plots.lblx

NASA PDS Validate v3.6.3: PASS

kem1_summary_plots/1annual
kem1_1annual_*.png

GOOD

kem2_summary_plots/001day
kem2_001day_plots.lblx

NASA PDS Validate v3.6.3: PASS

kem2_summary_plots/001day
kem2_001day_*.png

GOOD

kem2_summary_plots/010day
kem2_010day_plots.lblx

NASA PDS Validate v3.6.3: PASS

kem2_summary_plots/010day
kem2_010day_*.png

GOOD

kem2_summary_plots/025day
kem2_025day_plots.lblx

NASA PDS Validate v3.6.3: PASS

kem2_summary_plots/025day
kem2_025day_*.png

GOOD

kem2_summary_plots/100day
kem2_100day_plots.lblx

NASA PDS Validate v3.6.3: PASS

kem2_summary_plots/100day
kem2_100day_*.png

GOOD

kem2_summary_plots/1annual
kem2_1annual_plots.lblx

NASA PDS Validate v3.6.3: PASS

kem2_summary_plots/1annual
kem2_1annual_*.png

GOOD

seq_swap_kem1.lblx

NASA PDS Validate v3.6.3: PASS

seq_swap_kem1.tab

GOOD

seq_swap_kem2.lblx

NASA PDS Validate v3.6.3: PASS

seq_swap_kem2.tab

GOOD

swap_ssr.lblx

NASA PDS Validate v3.6.3: PASS

swap_ssr.pdf

GOOD

PREVIOUSLY_RELEASED_FOR_REFERENCE

Remove this directory for PDS4 submission.

Collection Certification for Documents for the SWAP Instrument v2.0

The collection documentation is questioned for the specification of sub-directories. File names do not seem to have relation to the sub-directory names. If the collection documentation does not specify the files correctly, they can not be accessed under PDS4. The remainder of the files and their labels within this collection are good.

Recommendation: Certified if the collection file specification is correct, but do not certify in the collection file specification is not correct.

4) SWAP KEM1 Encounter Raw Data v2.0

collection.lblx

NASA PDS Validate v3.6.3: PASS

```
    <Modification_Detail>
        <modification_date>2024-08-14</modification_date>
        <version_id>2.0</version_id>
        <description>Initial version of PDS4 dataset produced by the New Horizons SOC.</description>
    </Modification_Detail>
</Modification_History>
```

Note that this is version 2.0

collection_inventory.csv

Why do the contents of this file not reflect the version (2.0)?

Examples:

P,urn:nasa:pds:nh_swap:kem1_raw:overview::1.0
P,urn:nasa:pds:nh_swap:kem1_raw:swa_0513129600_0x584_eng::1.0

overview.lblx

Why is this not version 2.0?

```
<Modification_Detail>
    <modification_date>2024-08-14</modification_date>
    <version_id>1.0</version_id>
    <description>M.K. Crombie: Updated for New Horizons SOC production.</description>
</Modification_Detail>
```

Overview.txt – 1 of 3

Overview states SPICE v0008 used, but geometry items use v0006...why?

```
This is VERSION 2.0 of this data set.

This version includes data acquired by the spacecraft between
08/14/2018 and 04/30/2024. It only includes data downlinked before
05/01/2024 and after 04/30/2022. Future datasets may include more
data acquired by the spacecraft after 08/13/2018 but downlinked
after 04/30/2024.

This version included SWAP observations and plasma rolls taken after
the ASTEROID 486958 Arrokoth (2014 MU69) encounter.

This dataset corresponds to New Horizons NAIF SPICE distribution v0008.
```

```
Ancillary Data
==============

  The geometry items included in the data labels were computed
  using the SPICE kernels archived in the New Horizons SPICE
  data set, NH-J/P/SS-SPICE-6-V1.0.
```

https://sbnreview.astro.umd.edu/revpro/nh_k7_2025/nh-j_p_ss-spice-6-v1.0/voldesc.cat

```
PDS_VERSION_ID               = PDS3
LABEL_REVISION_NOTE          = "
  2007-10-19 SwRI:AJS original;
  2009-03-02 SwRI:AJS,NAIF:Semenov added missing catalog file pointers;
  2009-03-02 NAIF:Semenov removed ^TARGET_CATALOG, set MEDIUM_TYPE
                          to ELECTRONIC;
  2021-03-03 SwRI:BLEnke updated SwRI contact information and publication
                          date for Release 0005 delivery;
  2021-04-15 SwRI:BLEnke updated publication date for Release 0006 delivery;
  "
RECORD_TYPE                  = STREAM
```

Overview.txt – 2 of 3

```
Instrument   Instrument designators                ApIDs **
==========  ====================================  =============
 SWAP         SWA                                  0X584 - 0X587 *

 * Not all values in this range are in this data set
 ** ApIDs are case insensitive

 There are other ApIDs that contain housekeeping values and
 other values.  See SOC Instrument ICD (/DOCUMENT/SOC_INST_ICD.*)
 for more details.
```

Not a PDS4 Designation

What is <95>?

```
  DOCUMENTS

  <95>    New Horizon SDC instrument overview: urn:nasa:pds:nh_documents:swap:swap_inst_overview
          <95>    SWAP Space Science Review (SSR) paper: urn:nasa:pds:nh_documents:swap:swap_ssr
          <95>    SOC Instrument ICD: urn:nasa:pds:nh_documents:mission:soc_inst_icd
          <95>    SWAP SPICE Instrument Kernel: urn:nasa:pds:nh_documents:swap:nh_swap_ti


Other sources of information useful in interpreting these Data
--------------------------------------------------------------

  Refer to the following files for more information about these data

      NH Mission Trajectory Table: urn:nasa:pds:nh_documents:mission:nh_mission_trajectory
          <95>    Field of View Illustration: urn:nasa:pds:nh_documents:mission:nh_fov
          <95>    SWAP SPICE Instrument Kernel: urn:nasa:pds:nh_documents:swap:nh_swap_ti
```

Overview.txt – 3 of 3

```
Ancillary Data
==============

  The geometry items included in the data labels were computed
  using the SPICE kernels archived in the New Horizons SPICE
  data set, NH-J/P/SS-SPICE-6-V1.0.

  Every observation provided in this data set was taken as a part of a
  particular sequence.  A list of these sequences has been provided in
  file DOCUMENT/SEQ_SWAP_*.TAB.  In addition, the
  sequence identifier (ID) and description are included in the PDS label
  for every observation.  N.B. While every observation has an associated
  sequence, every sequence may not have associated observations.  Some
  sequences may have failed to execute due to spacecraft events (e.g.
  safing).  No attempt has been made during the preparation of this data
  set to identify such empty sequences, so it is up to the user to
  compare the times of the sequences to the times of the available
  observations from INDEX/INDEX.TAB to identify such sequences.
```

Does Not Exist

Not a PDS4 Designation

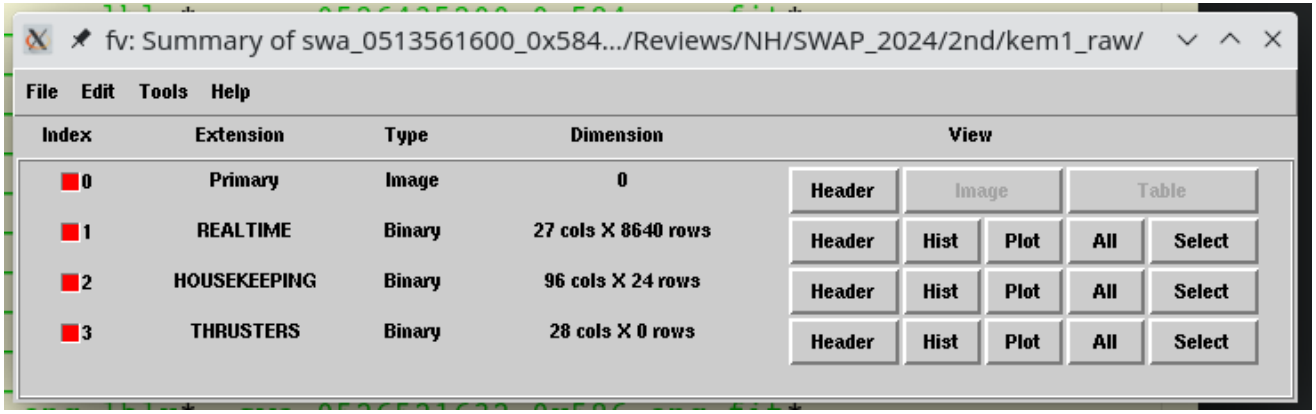
*0x584_eng.lblx

NASA PDS Validate v3.6.3: PASS

```
<Modification_History>
    <Modification_Detail>
        <modification_date>2024-08-16</modification_date>
        <version_id>1.0</version_id>
        <description>Creation for K7 delivery.</description>
    </Modification_Detail>
</Modification_History>
```

Why is this not version 2?

Raw Science Data (0x584)



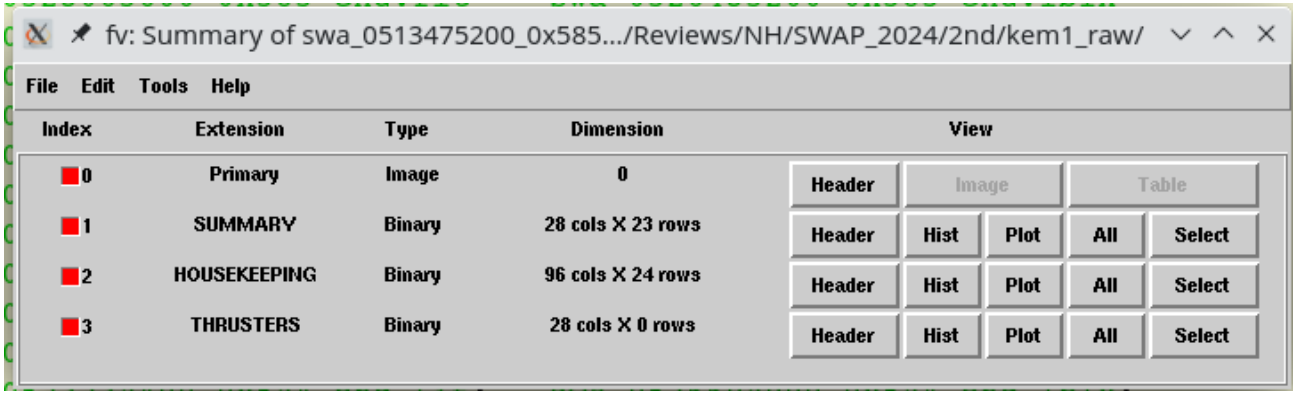
*0x585_eng.lblx

NASA PDS Validate v3.6.3: PASS

```
<Modification_History>
    <Modification_Detail>
        <modification_date>2024-08-16</modification_date>
        <version_id>1.0</version_id>
        <description>Creation for K7 delivery.</description>
    </Modification_Detail>
</Modification_History>
```

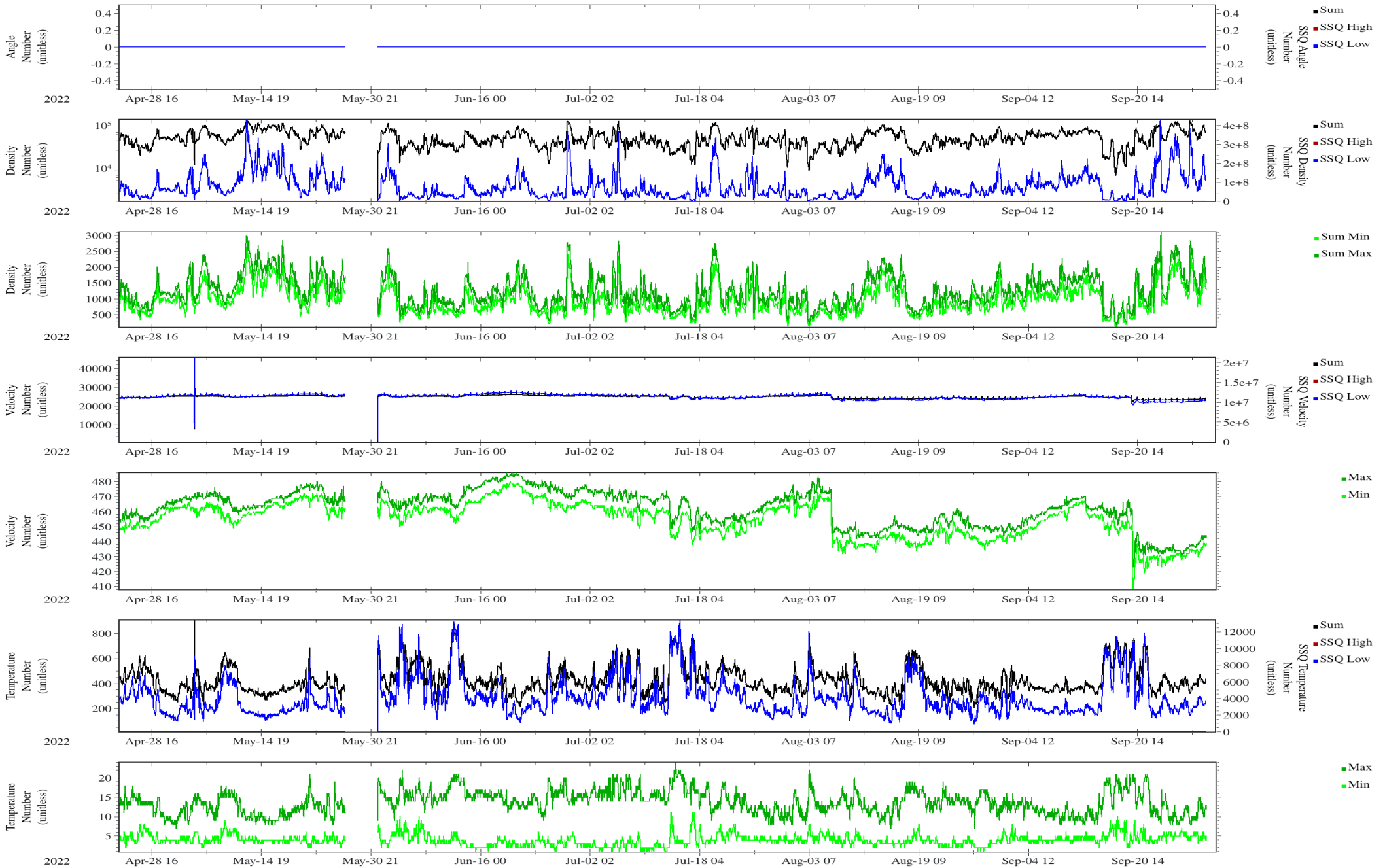
Why is this not version 2?

Raw Summary Data (0x585)



Data Looks Good

HDU (Index+1): 2



Plot created by SDDAS/gPlot - J. Mukherjee, et al. Generated on Wed Jan 22 21:12:40 2025.

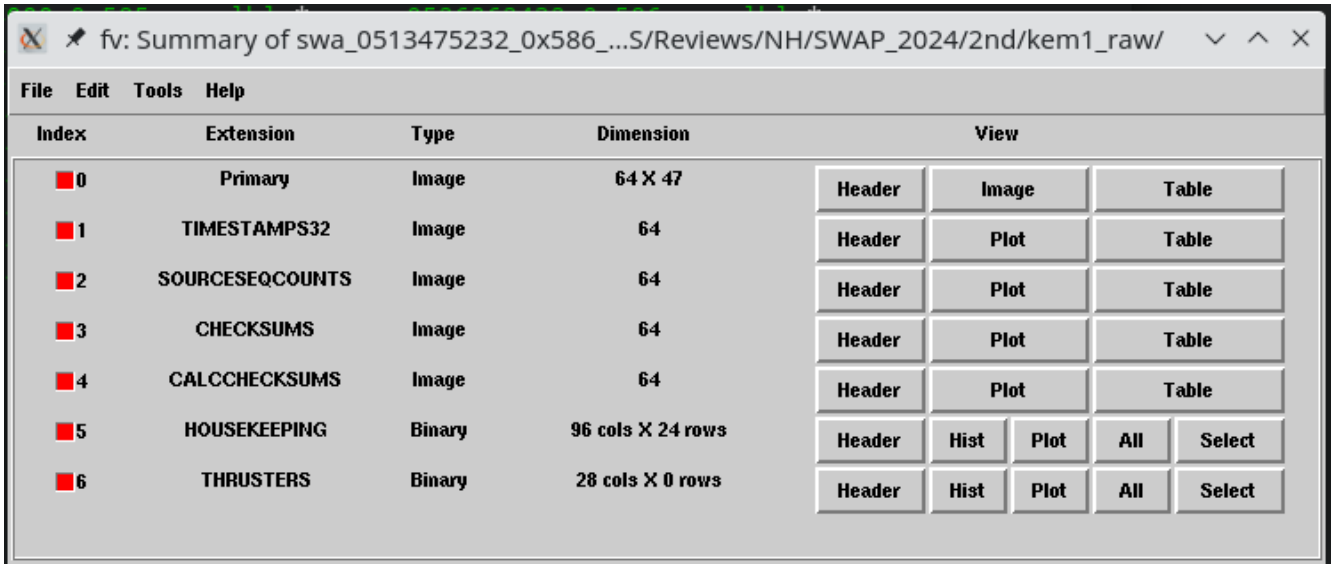
*0x586_eng.lblx

NASA PDS Validate v3.6.3: PASS

```
<Modification_History>
    <Modification_Detail>
        <modification_date>2024-08-16</modification_date>
        <version_id>1.0</version_id>
        <description>Creation for K7 delivery.</description>
    </Modification_Detail>
</Modification_History>
```

Why is this not version 2?

Histogram Raw Data (0x586)



Collection Certification for SWAP KEM1 Encounter Raw Data v2.0

There is a minor issue with version control that should be examined by the mission and PDS. The overview document has enough issues that it needs some correcting before it can be released. The data files (*.fit) themselves are good. However, the data can not be released without the labels and documentation.

Recommendation: do not certify until the documentation has been corrected.

5) SWAP KEM2 Encounter Raw Data v1.0

collection.lblx

NASA PDS Validate v3.6.3: PASS

collection_inventory.csv

GOOD

Overview.txt – 1 of 5

According to the PDS documentation, this is version 1.0, not version 2.0.

```
PDS4 Version History
====================

  This is VERSION 2.0 of this data set.
```

What is <95>?

```
  DOCUMENTS

  <95>    New Horizon SDC instrument overview: urn:nasa:pds:nh_documents:swap:swap_inst_overview
          <95>    SWAP Space Science Review (SSR) paper: urn:nasa:pds:nh_documents:swap:swap_ssr
          <95>    SOC Instrument ICD: urn:nasa:pds:nh_documents:mission:soc_inst_icd
          <95>    SWAP SPICE Instrument Kernel: urn:nasa:pds:nh_documents:swap:nh_swap_ti


Other sources of information useful in interpreting these Data
--------------------------------------------------------------

  Refer to the following files for more information about these data

      NH Mission Trajectory Table: urn:nasa:pds:nh_documents:mission:nh_mission_trajectory
          <95>    Field of View Illustration: urn:nasa:pds:nh_documents:mission:nh_fov
          <95>    SWAP SPICE Instrument Kernel: urn:nasa:pds:nh_documents:swap:nh_swap_ti
```

Overview.txt – 1 of 5

Overview states SPICE v0007 used, but geometry items use v0006...why?

```
V1.0
====
This version included data acquired by the spacecraft between
08/14/2018 and 04/30/2023. It only included data downlinked before
05/01/2023 and after 04/30/2022.

This version included SWAP observations and plasma rolls taken after
the ASTEROID 486958 Arrokoth (2014 MU69) encounter.

Six SWAP data files in the NH-A-SWAP-2-KEM1-V6.0 dataset from the KEM1
mission phase were superseded in this dataset due to new data.

After a lengthy hibernation period, the New Horizons spacecraft
resumed data playback on DOY 2023_060 (March 1, 2023). The spacecraft
collected SWAP data throughout its hibernation, but most of that data
has not been downlinked yet. As a result, this version will contain
substantial gaps in the data. These gaps will be filled in later
versions.

This dataset corresponded to New Horizons NAIF SPICE distribution v0007.
```

```
Ancillary Data
==============

  The geometry items included in the data labels were computed
  using the SPICE kernels archived in the New Horizons SPICE
  data set, NH-J/P/SS-SPICE-6-V1.0.
```

https://sbnreview.astro.umd.edu/revpro/nh_k7_2025/nh-j_p_ss-spice-6-v1.0/voldesc.cat

```
PDS_VERSION_ID               = PDS3
LABEL_REVISION_NOTE          = "
  2007-10-19 SwRI:AJS original;
  2009-03-02 SwRI:AJS,NAIF:Semenov added missing catalog file pointers;
  2009-03-02 NAIF:Semenov removed ^TARGET_CATALOG, set MEDIUM_TYPE
                          to ELECTRONIC;
  2021-03-03 SwRI:BLEnke updated SwRI contact information and publication
                          date for Release 0005 delivery;
  2021-04-15 SwRI:BLEnke updated publication date for Release 0006 delivery;
  "
RECORD_TYPE                  = STREAM
```

Overview.txt – 2 of 5

```
Instrument    Instrument designators                 ApIDs **
===========   ====================================   =============
 SWAP          SWA                                   0X584 - 0X587 *

 * Not all values in this range are in this data set
 ** ApIDs are case insensitive

 There are other ApIDs that contain housekeeping values and
 other values.  See SOC Instrument ICD (/DOCUMENT/SOC_INST_ICD.*)
 for more details.
```

Not a PDS4 Designation

```
For a list of observations, refer to the data set index table. This
is typically INDEX.TAB initially in the INDEX/ area of the data set.
There is also a file SLIMINDX.TAB in INDEX/ that summarizes key
information relevant to each observation, including which sequence
was in effect and what target was likely intended for the
observation.
```

None of this information exists in the indicated locations under PDS4.
This paragraph needs to be updated with PDS4 information.

Overview.txt – 3 of 5

```
Ancillary Data
==============

  The geometry items included in the data labels were computed
  using the SPICE kernels archived in the New Horizons SPICE
  data set, NH-J/P/SS-SPICE-6-V1.0.

  Every observation provided in this data set was taken as a part of a
  particular sequence.  A list of these sequences has been provided in
  file DOCUMENT/SEQ_SWAP_*.TAB.  In addition, the
  sequence identifier (ID) and description are included in the PDS label
  for every observation.  N.B. While every observation has an associated
  sequence, every sequence may not have associated observations.  Some
  sequences may have failed to execute due to spacecraft events (e.g.
  safing).  No attempt has been made during the preparation of this data
  set to identify such empty sequences, so it is up to the user to
  compare the times of the sequences to the times of the available
  observations from INDEX/INDEX.TAB to identify such sequences.
```

Does Not Exist

Not a PDS4 Designation

Overview.txt – 4 of 5

```
Six SWAP data files in the NH-A-SWAP-2-KEM1-V6.0 dataset from the KEM1
mission phase were superseded in this dataset due to new data.
```

Why are these files
Not marked version 2?

Not a PDS4 Designation

```
Observation descriptions in this data set catalog
=================================================

  Some users will expect to find descriptions of the observations
  in this data set here, in this Confidence Level Note.  This data
  set follows the more common convention of placing those
  descriptions under the Data Set Description (above, if the user is
  reading this in the DATASET.CAT file) of this data set catalog.
```

Does Not Exist

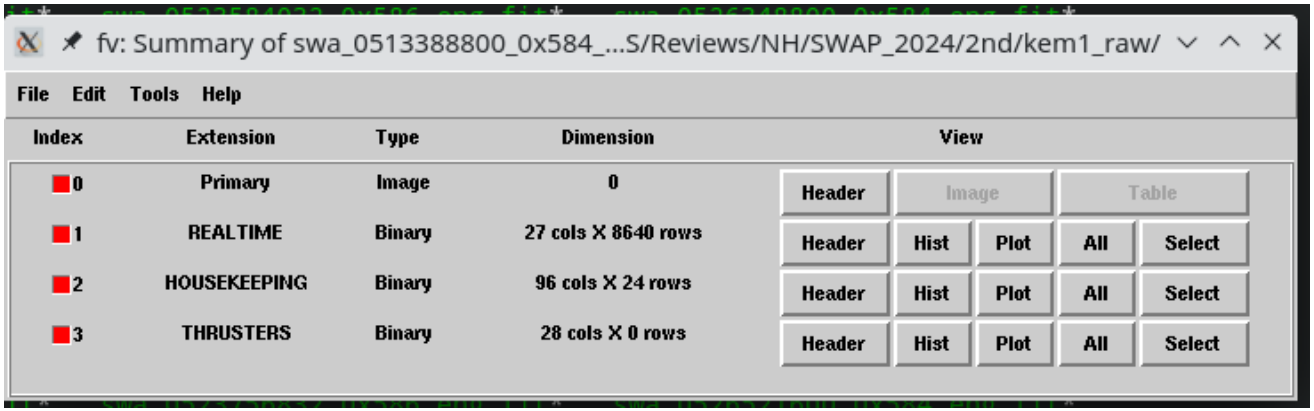
```
Refer to the document/superseded_files_*.tab file for the affected
filenames and product IDs for KEM1 and KEM2 datasets.
```

Does Not Exist

*0x584_eng.lblx

NASA PDS Validate v3.6.3: PASS

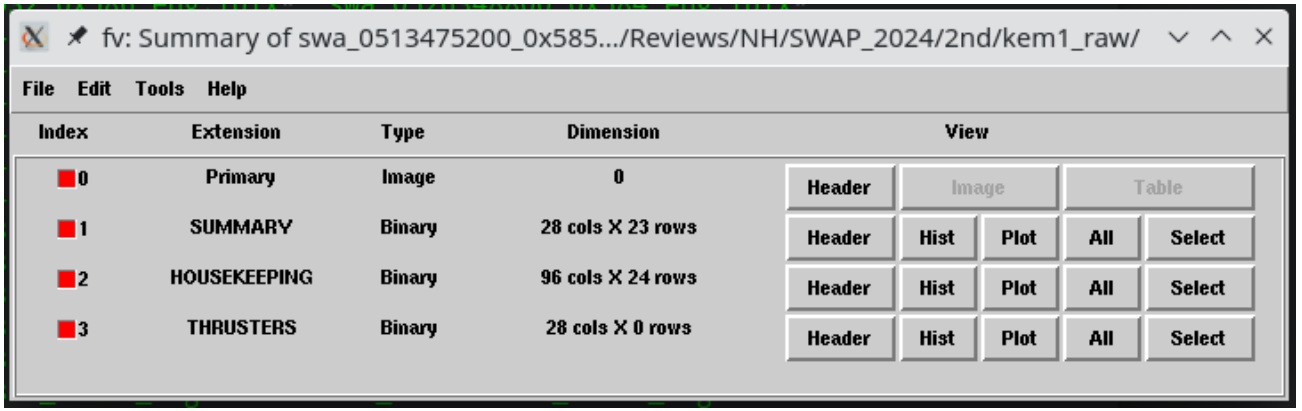
Science Raw Data (0x584)



*0x585_eng.lblx

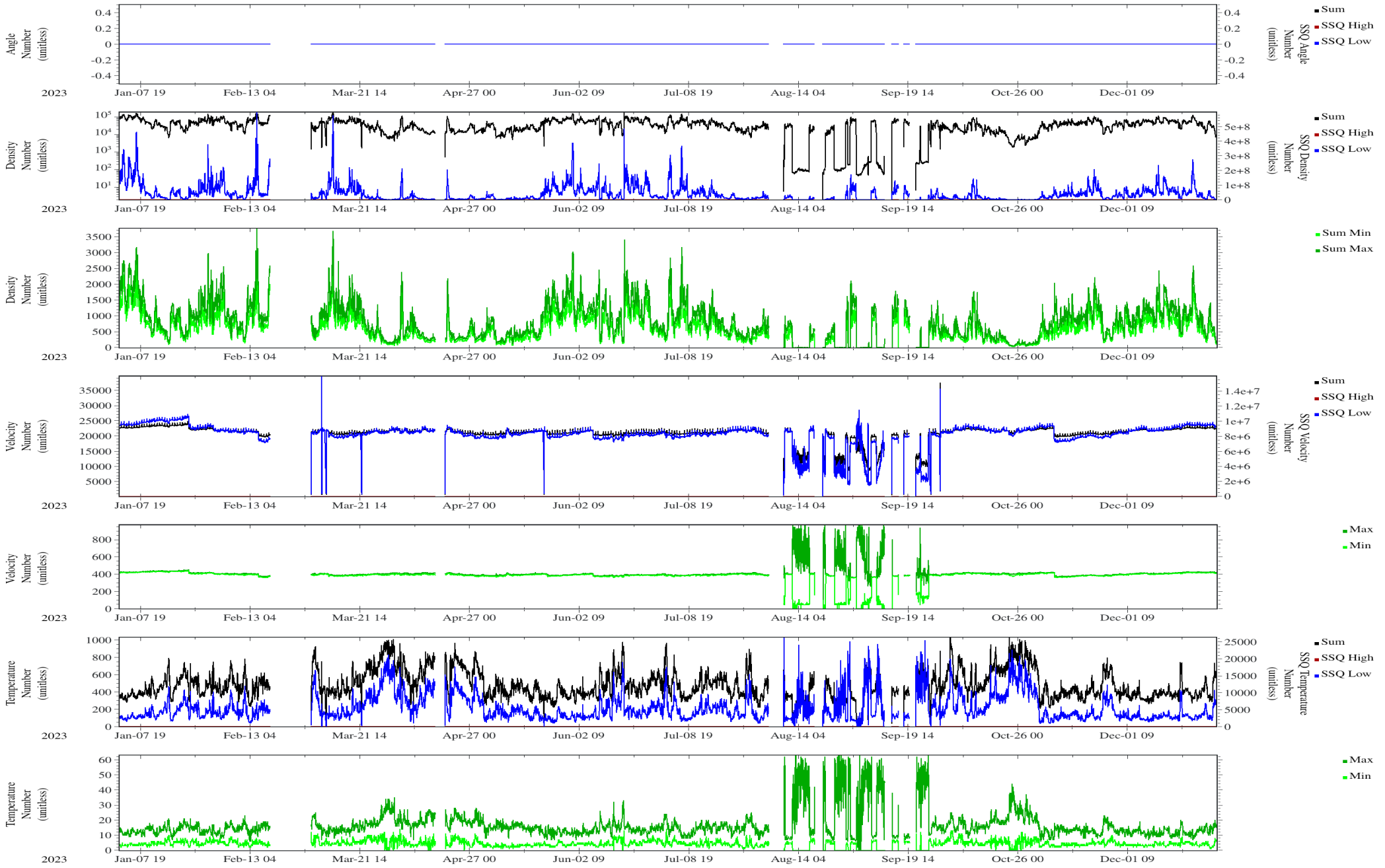
NASA PDS Validate v3.6.3: PASS

Summary Data (0x585)



Data Looks Good

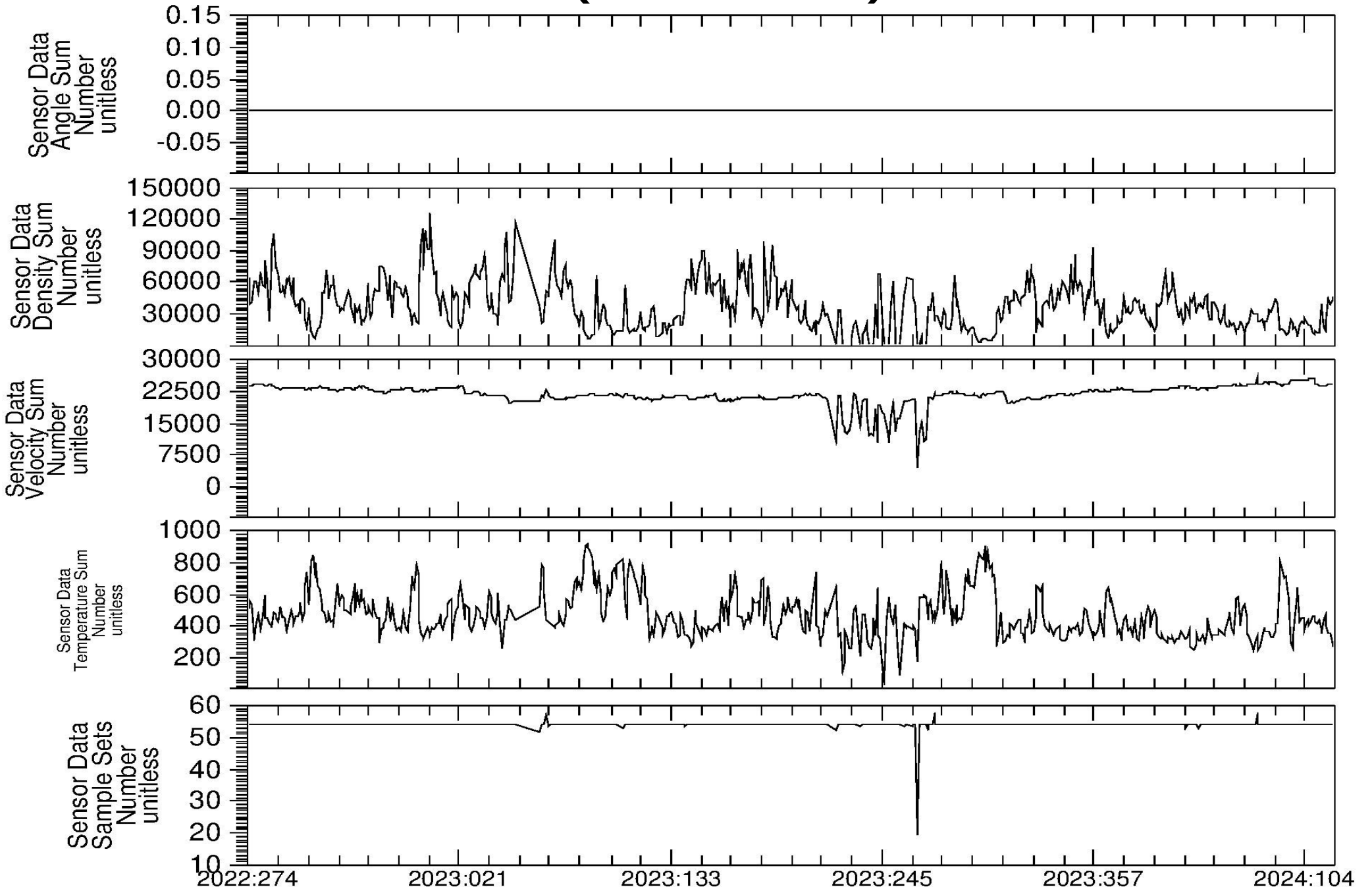
HDU (Index+1): 2



Plot created by SDDAS/gPlot - J. Mukherjee, et al. Generated on Wed Jan 22 21:46:51 2025.

Data Looks Good

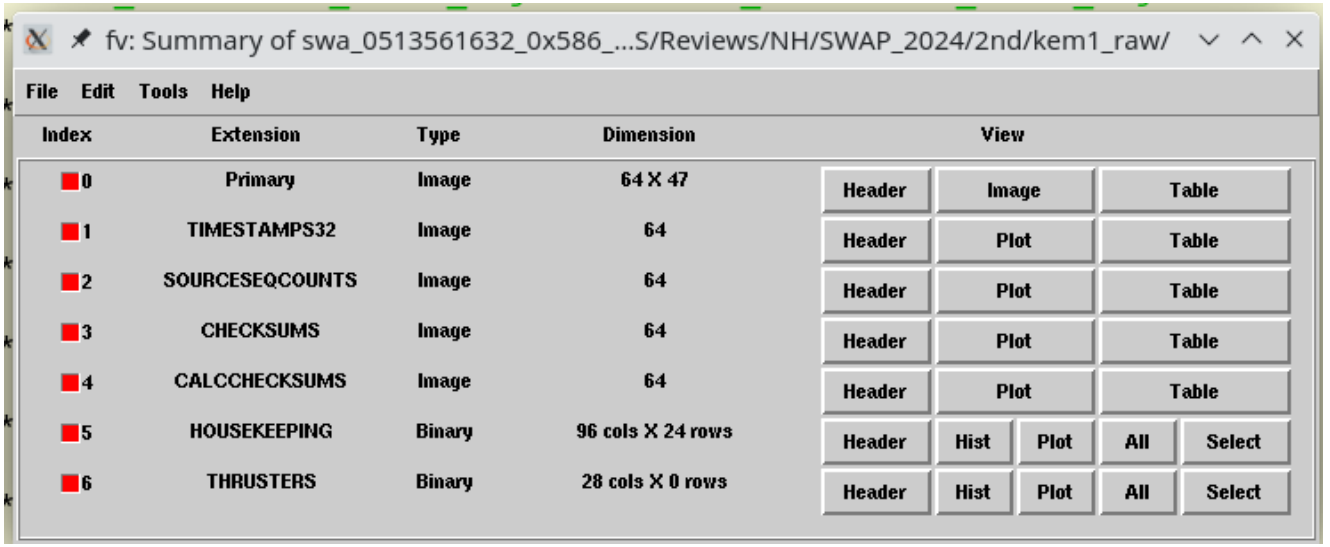
HDU (Index+1): 2



*0x586_eng.lblx

NASA PDS Validate v3.6.3: PASS

Raw Histogram Data (0x586)



Collection Certification for SWAP KEM2 Encounter Raw Data v1.0

The collection documentation, data files and labels are good, but the overview document has issues and needs to be updated. Releasing the collection without the overview document should not cause enough interpretation confusion.

Recommendation: Certify with liens to update the overview documentation

6) SWAP Reference Files Used in Calibrating Data v2.0

collection.lblx

NASA PDS Validate v3.6.3: PASS

collection_inventory.csv

GOOD

overview.lblx

NASA PDS Validate v3.6.3: PASS

overview.txt

This file looks like it is not from the SWAP instrument and needs to be updated.

```
New Horizons SDC Calibration Reference Files - Overview
=======================================================

Content
-------
This collection contains ancillary files used in the calibration of data
from the Student Dust Experiment instrument for all phases of
the New Horizons primary and extended missions. These files are not the result
of SDC observations. They consist of a set of ancillary files (shapes, energy lists, and backgrounds).
```

I expected the overview to describe the files included in THIS archive.

list_energy_files.lblx

NASA PDS Validate v3.6.3: PASS

list_energy_files.csv

Expected 3 records via label:

```
<Table_Delimited>
    <name>Energy File List Table</name>
    <offset unit="byte">31</offset>
    <parsing_standard_id>PDS DSV 1</parsing_standard_id>
    <records>3</records>
```

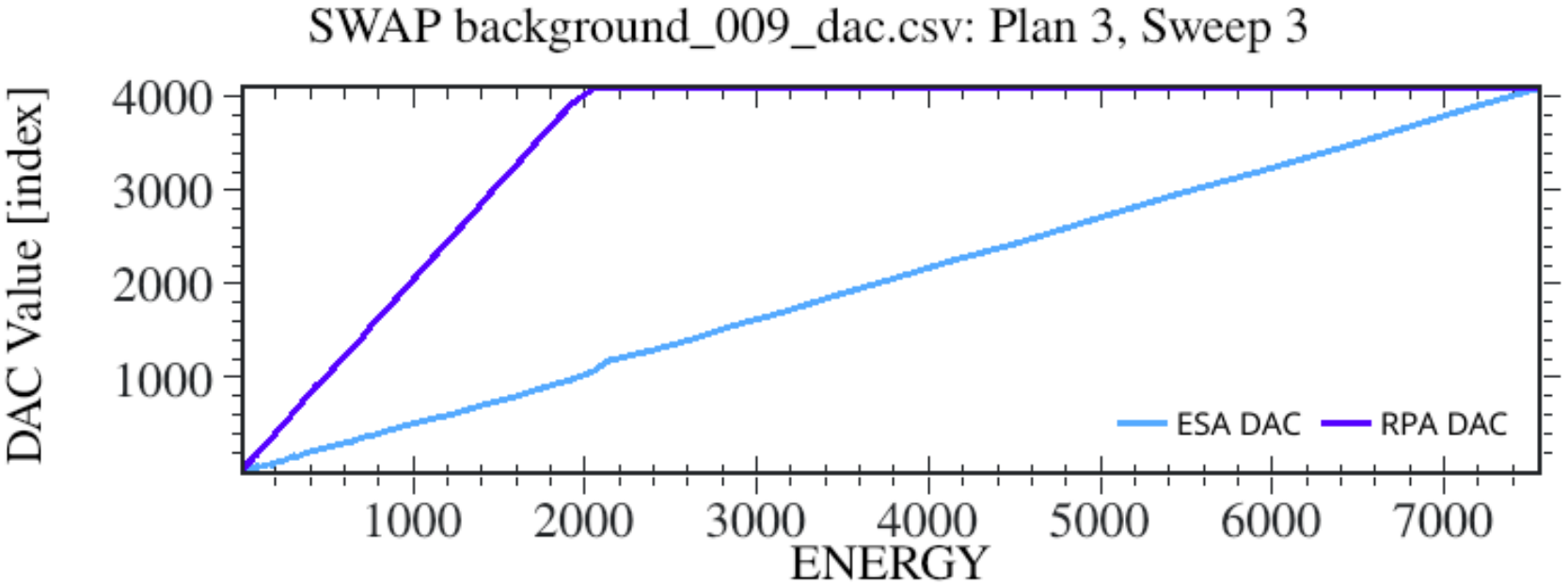
4 records are in the file:

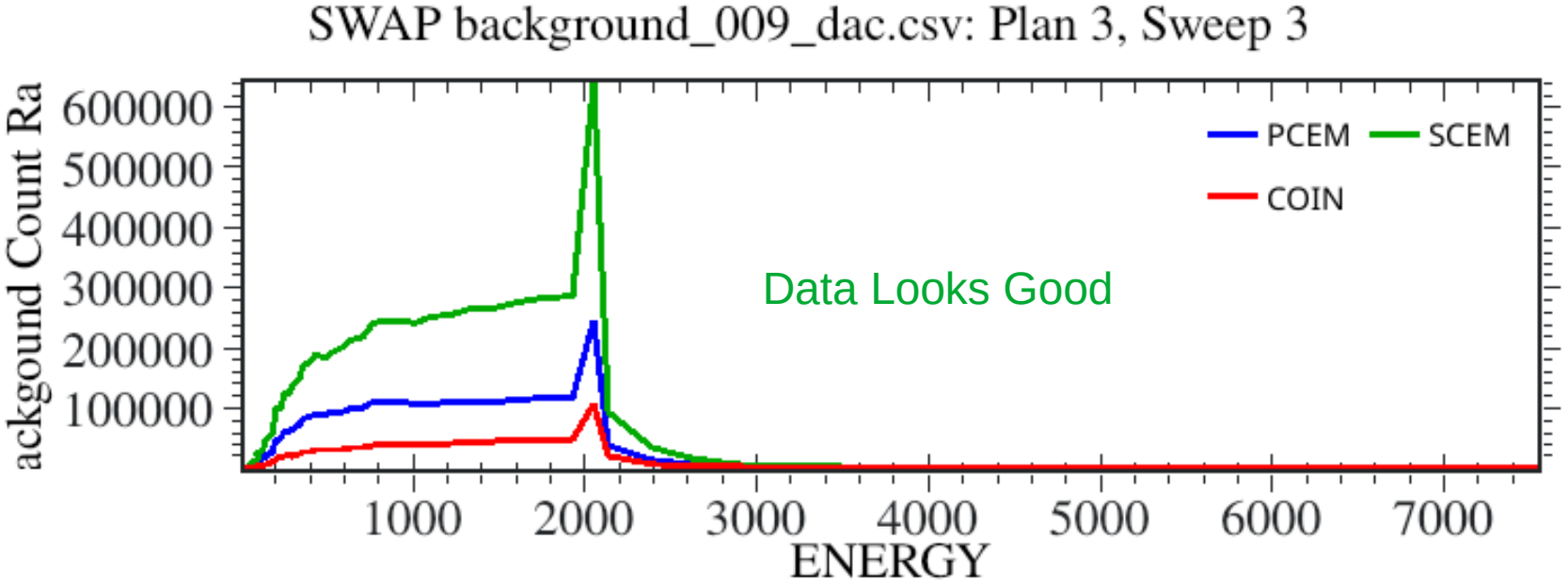
```
npts, met_st,   met_sp,   file
2048,000064317,021145917,esa_rpa_v16_energy_binsf_new.csv
2048,021145918,029526717,esa_rpa_v18_energy_binsf_new.csv
2048,029526718,999999999,esa_rpa_v19_energy_binsf_new2.csv
```

I expect the overview.txt to tell me what are these files.

Somewhere I expect to be pointed to these files, but I could not find references to the previous released files in the label files. Are these files missing from this release?

background_009_dac.lblx



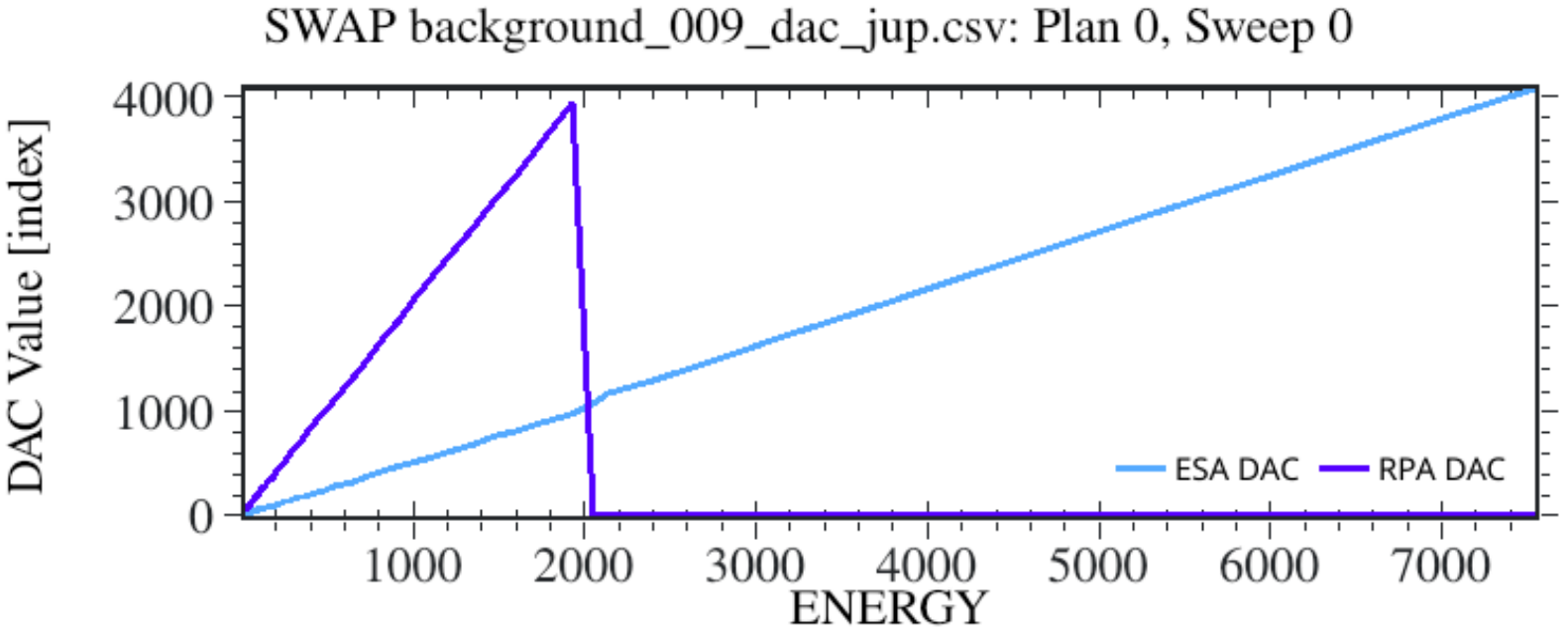


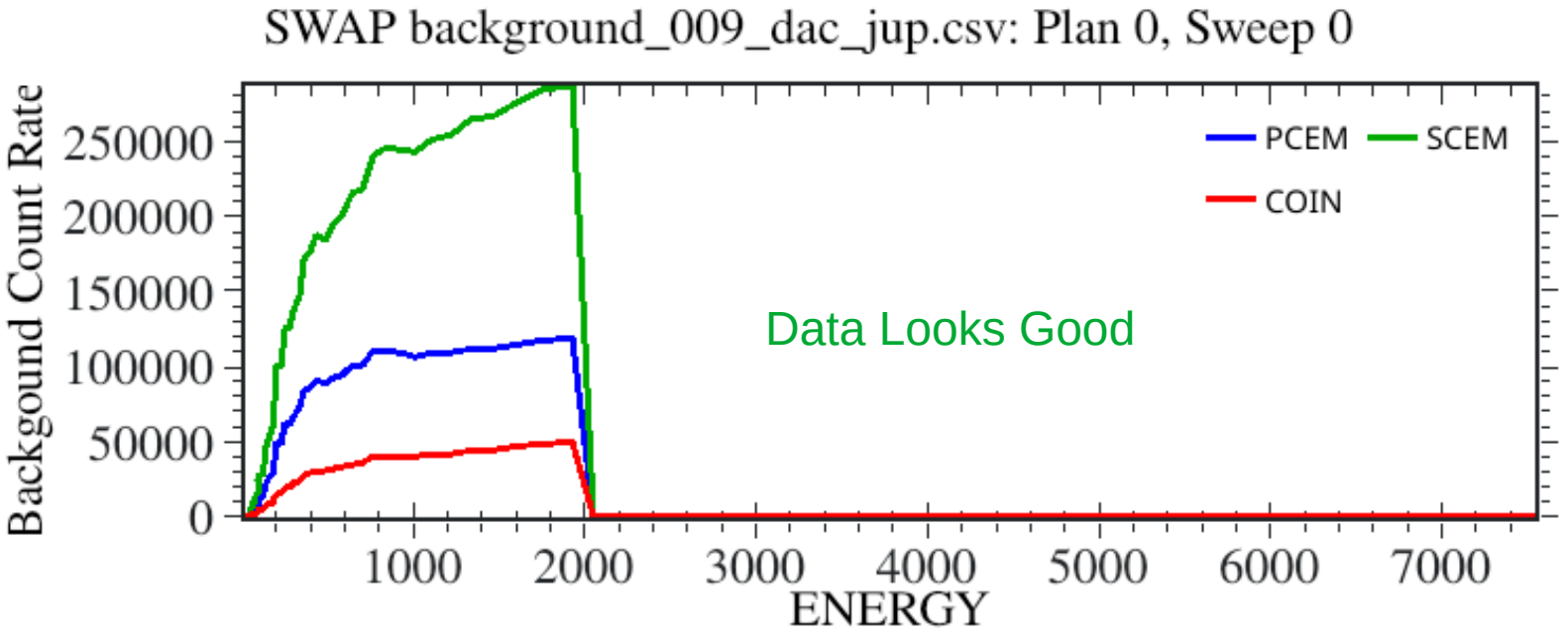
Plot created by SDDAS/gPlot - J. Mukherjee, et al. Generated on Tue Jan 28 12:14:23 2025.

background_009_dac_jup.lblx

NASA PDS Validate v3.6.3: PASS

background_009_dac_jup.lblx





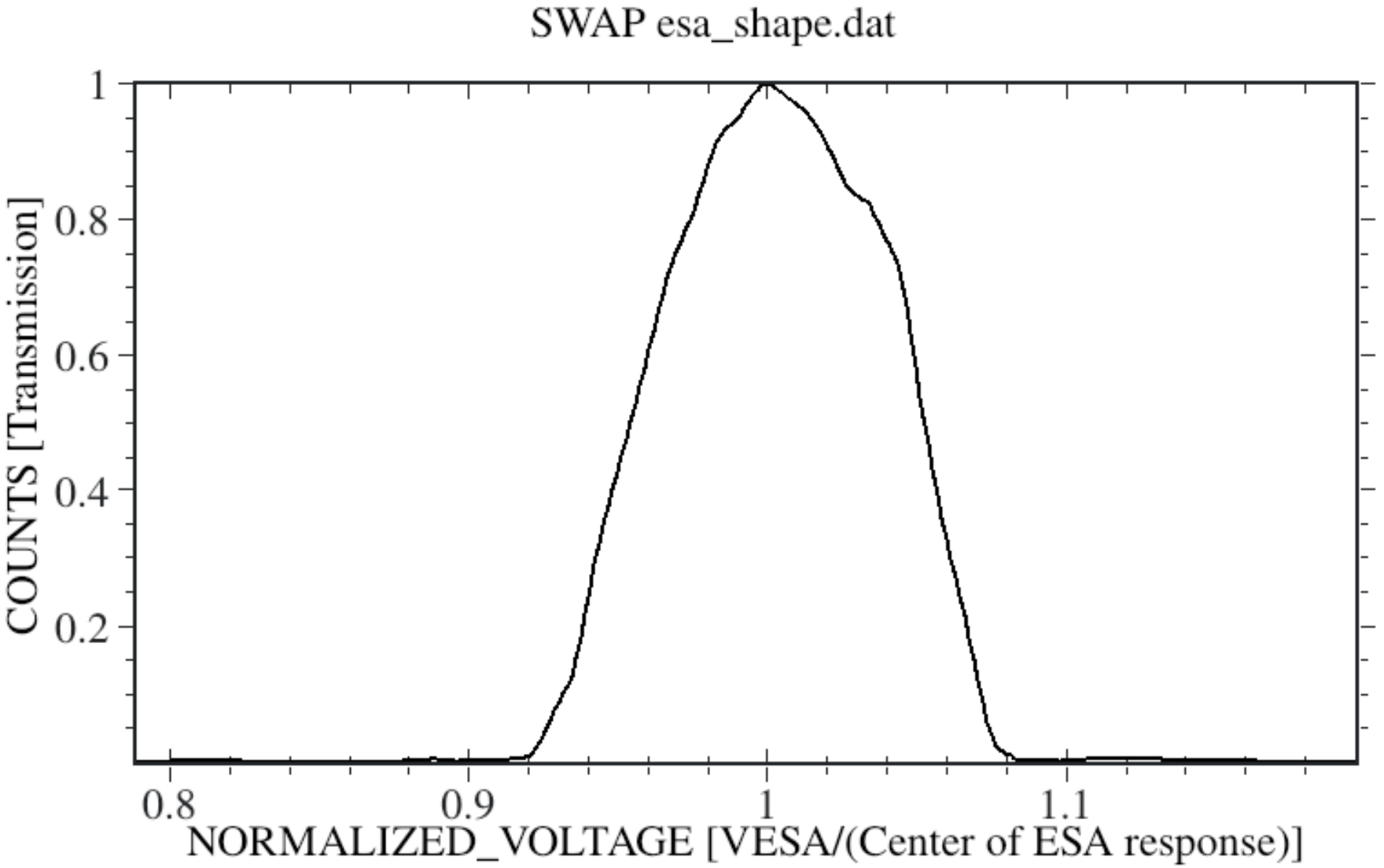
Plot created by SDDAS/gPlot - J. Mukherjee, et al. Generated on Tue Jan 28 12:11:21 2025.

esa_shape.lblx

NASA PDS Validate v3.6.3: PASS

esa_shape.dat
(top 2 lines skipped)

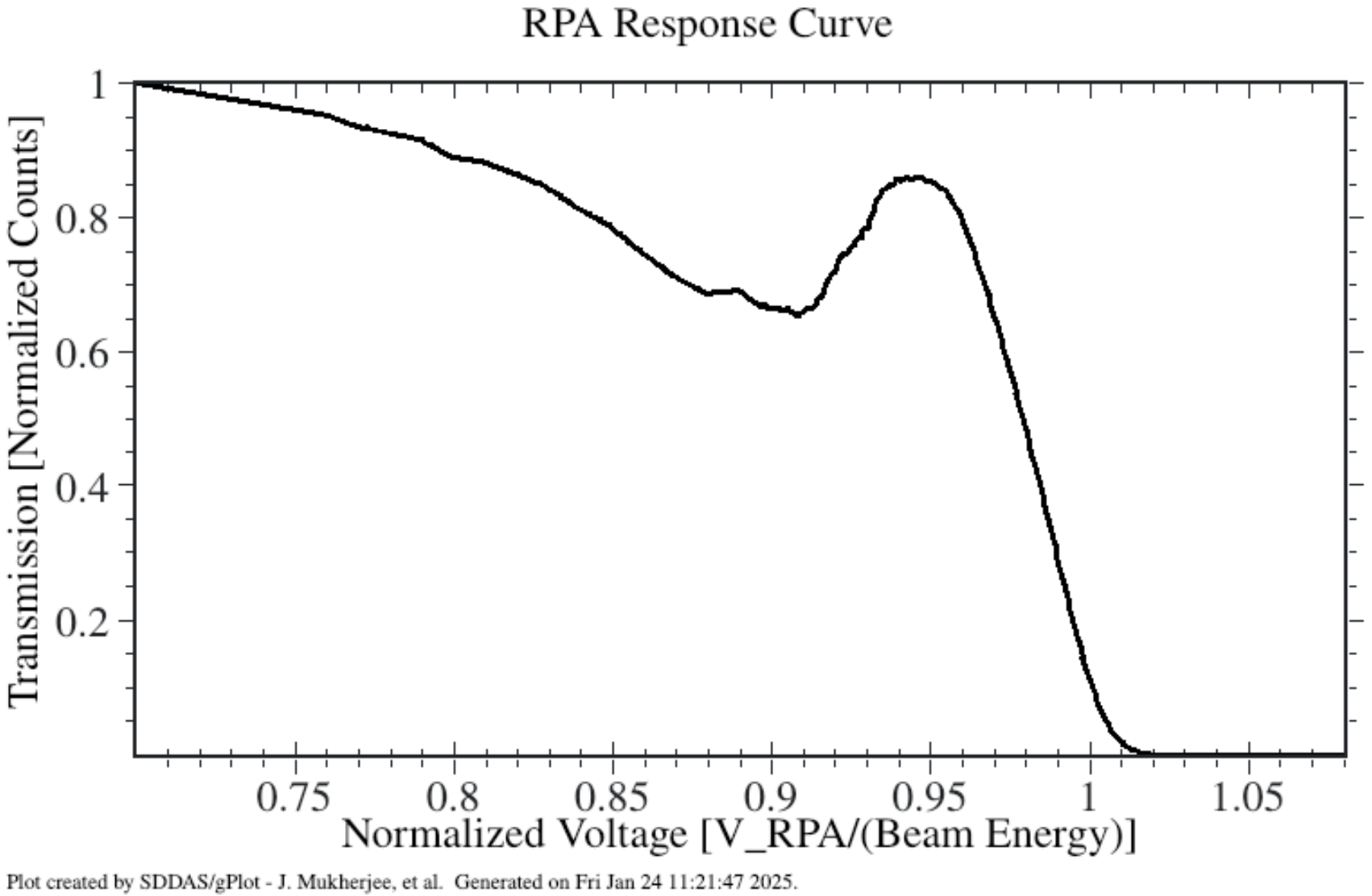
Data Looks Good



rpa_shape.lblx

NASA PDS Validate v3.6.3: PASS

rpa_shape.dat
(top 2 lines skipped)



PREVIOUSLY_RELEASED_FOR_REFERENCE

Remove this directory for PDS4 submission.

Collection Certification for SWAP Reference Files Used in Calibrating Data v2.0

The label to the energy index file accounts for an incorrect number of records. A large number of label files in this directory have header lines which do not contain the same information as the data records. No attempt has been made to account for header lines in the label. The experimenters and PDS should review the label files. As well, the overview document is for the wrong instrument. This needs to be addressed.

Recommendation: Not Certified

7) SWAP KEM1 Encounter Calibrated Data v2.0

collection.lblx

NASA PDS Validate v3.6.3: PASS

```
    <Modification_Detail>
        <modification_date>2024-08-14</modification_date>
        <version_id>2.0</version_id>
        <description>Initial version of PDS4 dataset produced by the New Horizons SOC.</description>
    </Modification_Detail>
</Modification_History>
```

Note that this is version 2.0

collection_inventory.csv

GOOD

overview.lblx – 1 of 2

Why is this not version 2.0?

```
<Modification_Detail>
    <modification_date>2024-08-14</modification_date>
    <version_id>1.0</version_id>
    <description>M.K. Crombie: Updated for New Horizons SOC production.</description>
</Modification_Detail>
```

Error Message from Browser:

XML Parsing Error: mismatched tag. Expected: </editor_list>.
Location: https://sbnreview.astro.umd.edu/revpro/nh_k7_2025/nh_swap/kem1_cal/overview.lblx
Line Number 17, Column 37:
<editor_list>Gobat, C.</author_list>
----------------------------------^

overview.lblx – 2 of 2

Error Message from NASA PDS Validate v3.6.3:

Fatal error: [node=null,object=null,url=file:overview.lblx,line=17,col=37,offset=-1]: The element type "editor_list" must be terminated by the matching end-tag "</editor_list>".
Error on line 17 column 37 of overview.lblx:
  SXXP0003 Error reported by XML parser: The element type "editor_list" must be terminated
  by the matching end-tag "</editor_list>".
Error on line 17 column 37 of overview.lblx:
  SXXP0003 Error reported by XML parser: The element type "editor_list" must be terminated
  by the matching end-tag "</editor_list>".
Error on line 17 column 37 of overview.lblx:
  SXXP0003 Error reported by XML parser: The element type "editor_list" must be terminated
  by the matching end-tag "</editor_list>".
Fatal error: [node=null,object=null,url=file:overview.lblx,line=17,col=37,offset=-1]: The element type "editor_list" must be terminated by the matching end-tag "</editor_list>".

Product Level Validation Results

  FAIL: file:overview.lblx
      WARNING [error.validation.missing_required_file] Cannot check versioning because XML could not be parsed.
      ERROR [error.label.schema] line 17, 37: The element type "editor_list" must be terminated by the matching end-tag "</editor_list>".
1 product validation(s) completed

Overview.txt – 1 of 3

Overview states SPICE v0008 used, but geometry items use v0006...why?

```
This is VERSION 2.0 of this data set.

This version includes data acquired by the spacecraft between
08/14/2018 and 04/30/2024. It only includes data downlinked before
05/01/2024 and after 04/30/2022. Future datasets may include more
data acquired by the spacecraft after 08/13/2018 but downlinked
after 04/30/2024.

This version included SWAP observations and plasma rolls taken after
the ASTEROID 486958 Arrokoth (2014 MU69) encounter.

This dataset corresponds to New Horizons NAIF SPICE distribution v0008.
```

```
Ancillary Data
==============

  The geometry items included in the data labels were computed
  using the SPICE kernels archived in the New Horizons SPICE
  data set, NH-J/P/SS-SPICE-6-V1.0.
```

https://sbnreview.astro.umd.edu/revpro/nh_k7_2025/nh-j_p_ss-spice-6-v1.0/voldesc.cat

```
PDS_VERSION_ID               = PDS3
LABEL_REVISION_NOTE          = "
  2007-10-19 SwRI:AJS original;
  2009-03-02 SwRI:AJS,NAIF:Semenov added missing catalog file pointers;
  2009-03-02 NAIF:Semenov removed ^TARGET_CATALOG, set MEDIUM_TYPE
                          to ELECTRONIC;
  2021-03-03 SwRI:BLEnke updated SwRI contact information and publication
                          date for Release 0005 delivery;
  2021-04-15 SwRI:BLEnke updated publication date for Release 0006 delivery;
  "
RECORD_TYPE                  = STREAM
```

Overview.txt – 2 of 3

```
Instrument    Instrument designators                 ApIDs **
===========   ====================================   =============
 SWAP          SWA                                   0X584 - 0X587 *

 * Not all values in this range are in this data set
 ** ApIDs are case insensitive

 There are other ApIDs that contain housekeeping values and
 other values.  See SOC Instrument ICD (/DOCUMENT/SOC_INST_ICD.*)
 for more details.
```

Not a PDS4 Designation

What is <95>?

```
  DOCUMENTS

  <95>    New Horizon SDC instrument overview: urn:nasa:pds:nh_documents:swap:swap_inst_overview
          <95>    SWAP Space Science Review (SSR) paper: urn:nasa:pds:nh_documents:swap:swap_ssr
          <95>    SOC Instrument ICD: urn:nasa:pds:nh_documents:mission:soc_inst_icd
          <95>    SWAP SPICE Instrument Kernel: urn:nasa:pds:nh_documents:swap:nh_swap_ti


Other sources of information useful in interpreting these Data
--------------------------------------------------------------

  Refer to the following files for more information about these data

      NH Mission Trajectory Table: urn:nasa:pds:nh_documents:mission:nh_mission_trajectory
          <95>    Field of View Illustration: urn:nasa:pds:nh_documents:mission:nh_fov
          <95>    SWAP SPICE Instrument Kernel: urn:nasa:pds:nh_documents:swap:nh_swap_ti
```

Overview.txt – 3 of 3

```
Ancillary Data
==============

  The geometry items included in the data labels were computed
  using the SPICE kernels archived in the New Horizons SPICE
  data set, NH-J/P/SS-SPICE-6-V1.0.

  Every observation provided in this data set was taken as a part of a
  particular sequence.  A list of these sequences has been provided in
  file DOCUMENT/SEQ_SWAP_*.TAB.  In addition, the
  sequence identifier (ID) and description are included in the PDS label
  for every observation.  N.B. While every observation has an associated
  sequence, every sequence may not have associated observations.  Some
  sequences may have failed to execute due to spacecraft events (e.g.
  safing).  No attempt has been made during the preparation of this data
  set to identify such empty sequences, so it is up to the user to
  compare the times of the sequences to the times of the available
  observations from INDEX/INDEX.TAB to identify such sequences.
```

Does Not Exist

Not a PDS4 Designation

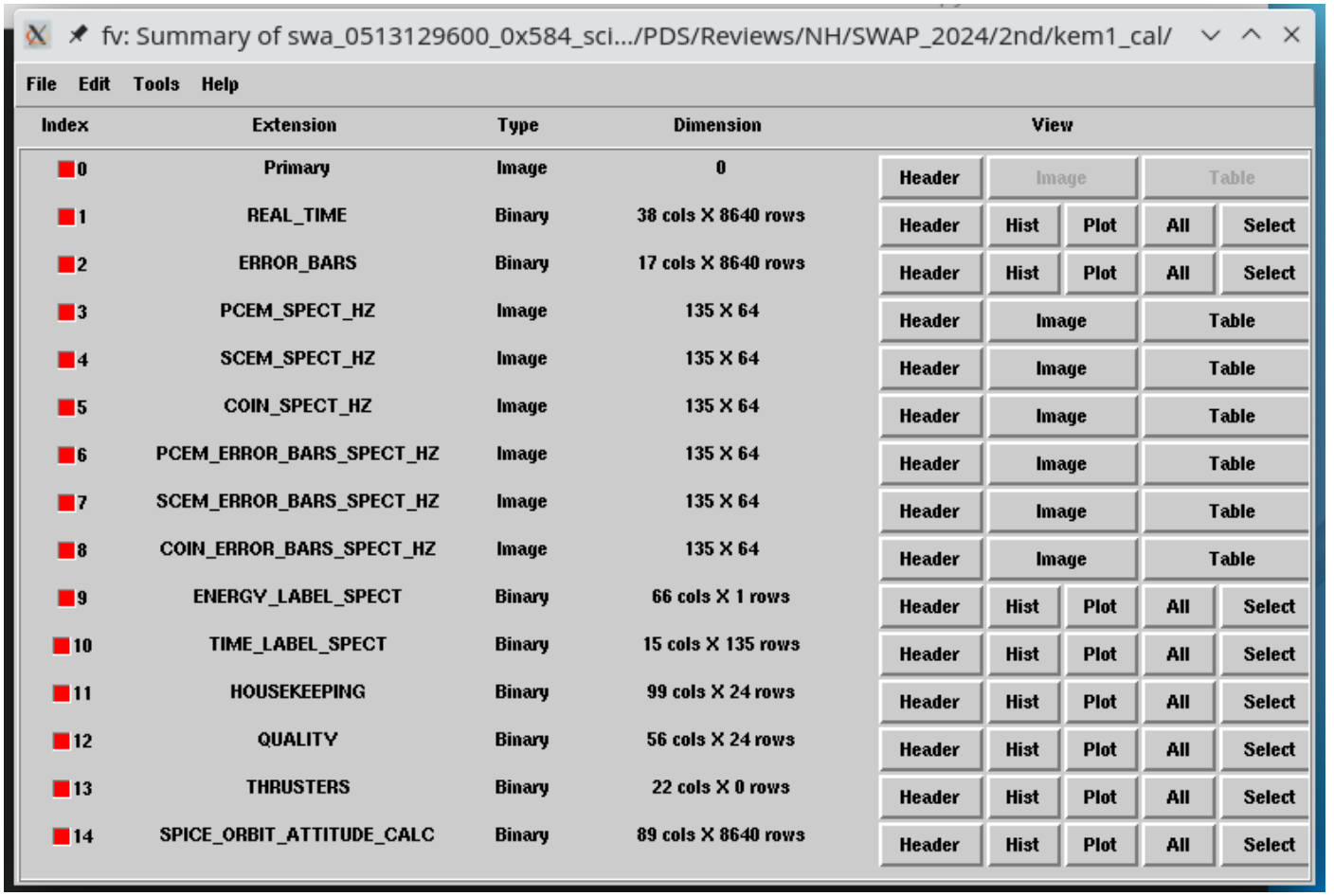
*0x584_sci.lblx

NASA PDS Validate v3.6.3: PASS

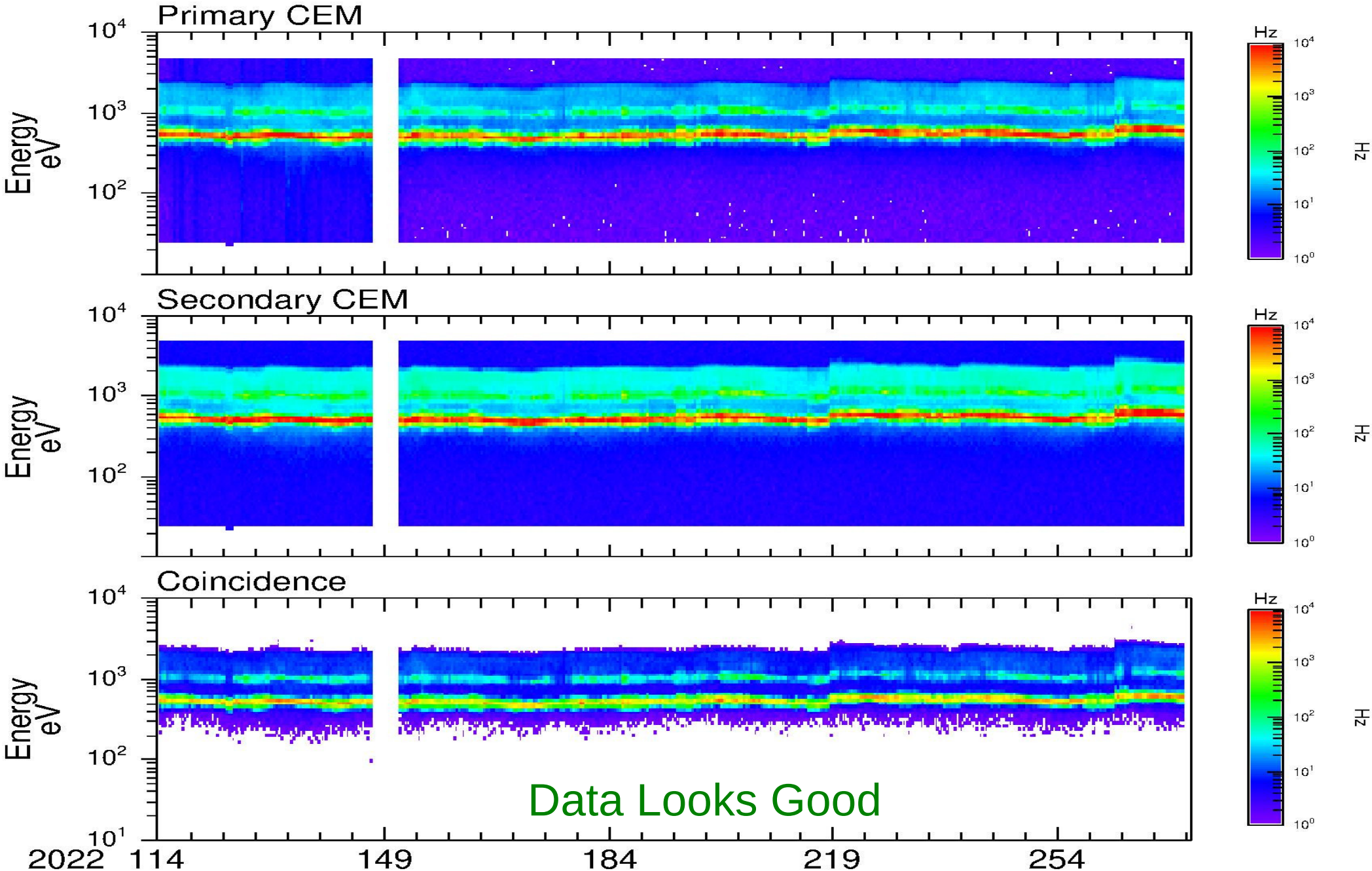
```
<Modification_History>
    <Modification_Detail>
        <modification_date>2024-08-16</modification_date>
        <version_id>1.0</version_id>
        <description>Creation for K7 delivery.</description>
    </Modification_Detail>
</Modification_History>
```

Why is this not version 2?

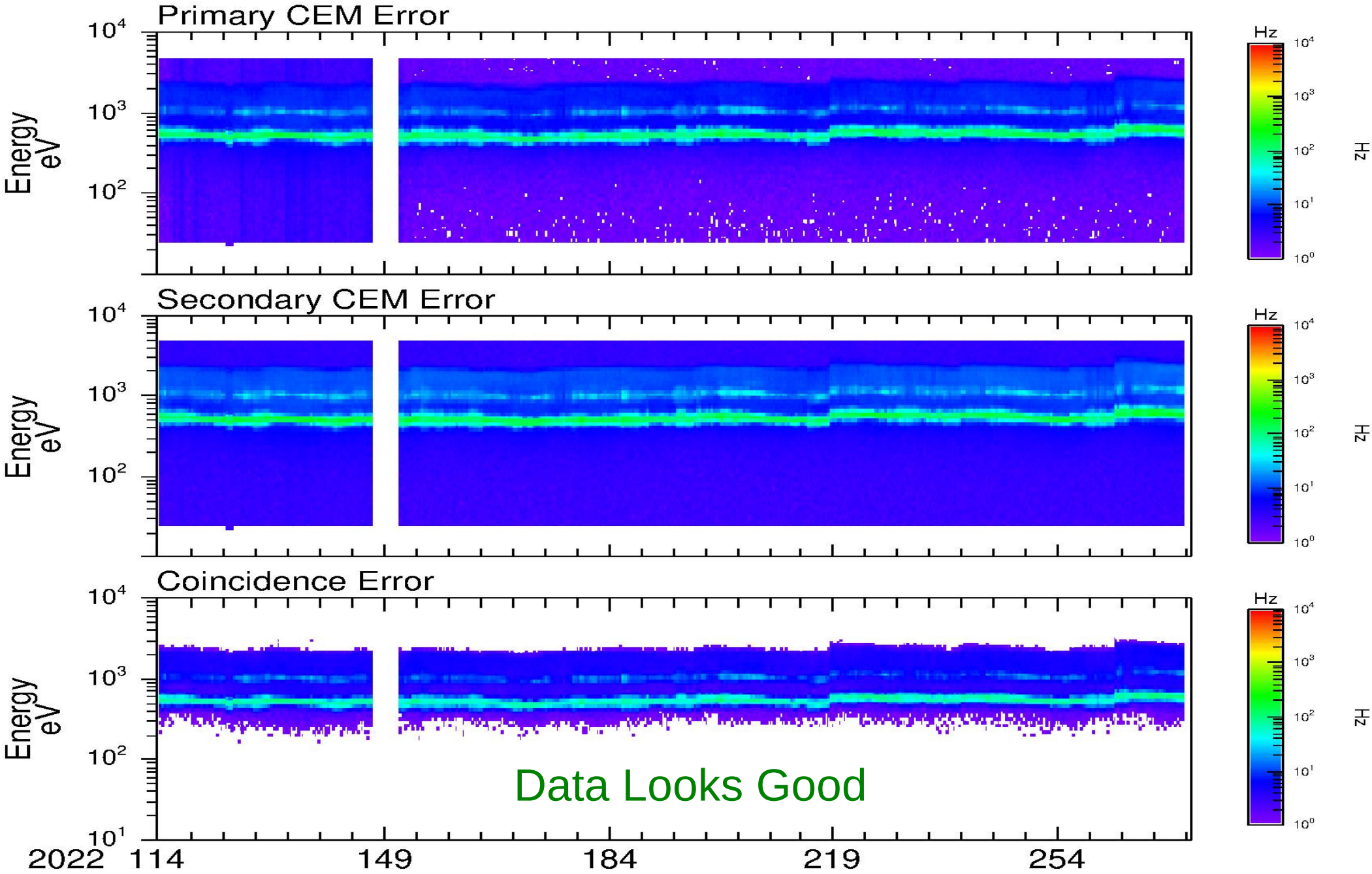
Calibrated Science Data (*0x584.sci.fit)



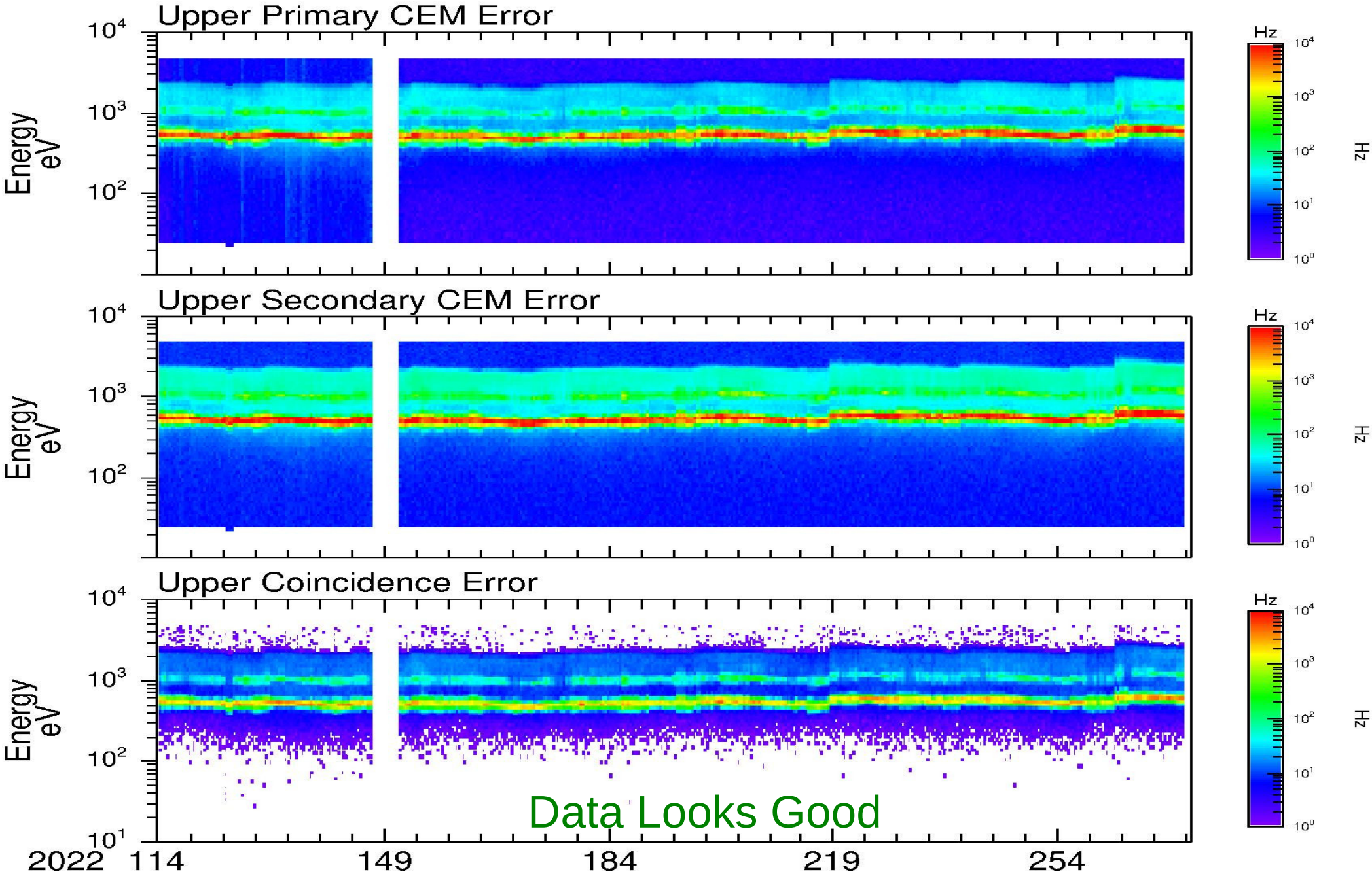
HDU (Index+1): 10, 11, 4, 5, 6



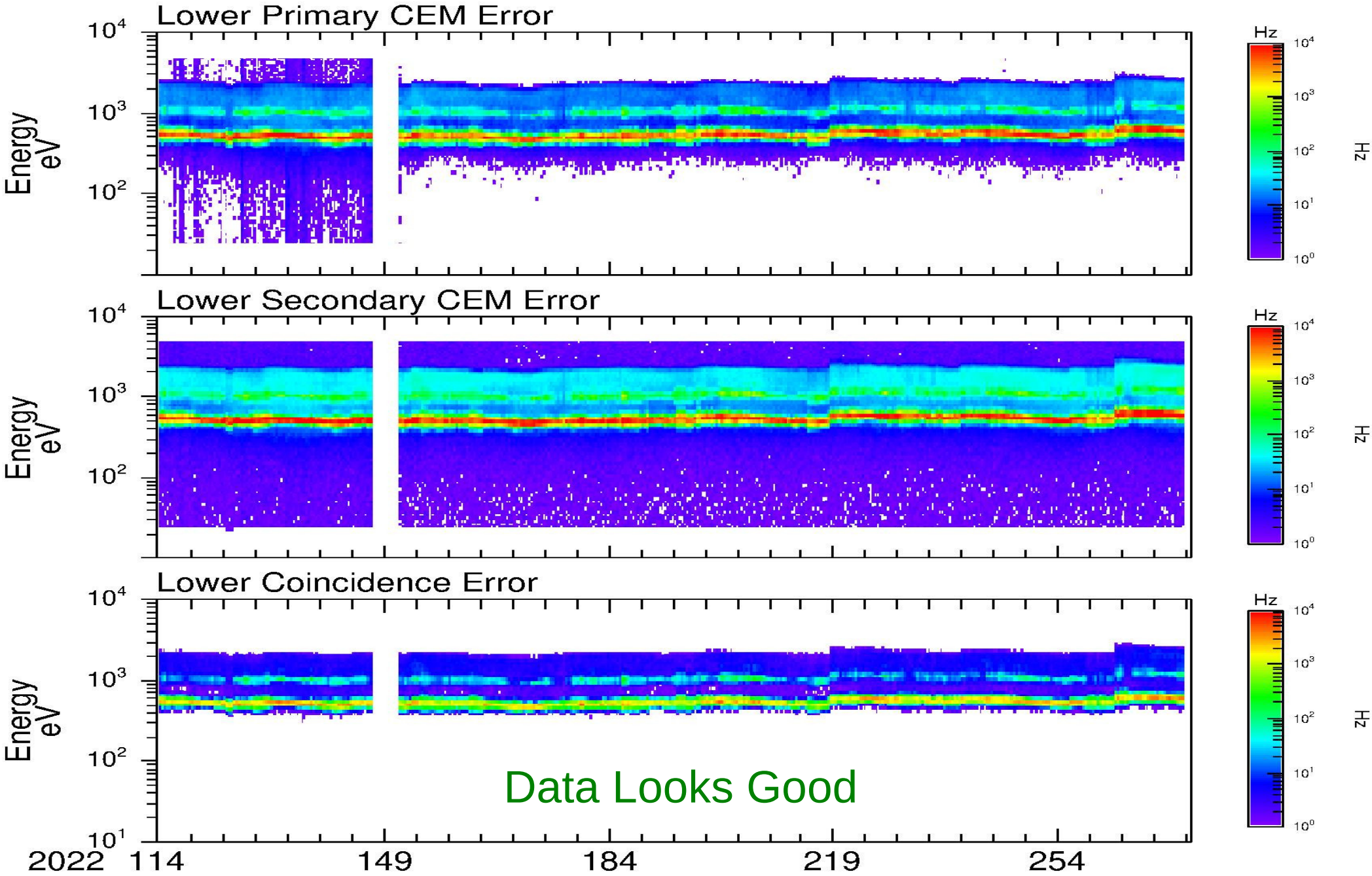
HDU (Index+1): 10, 11, 7, 8, 9



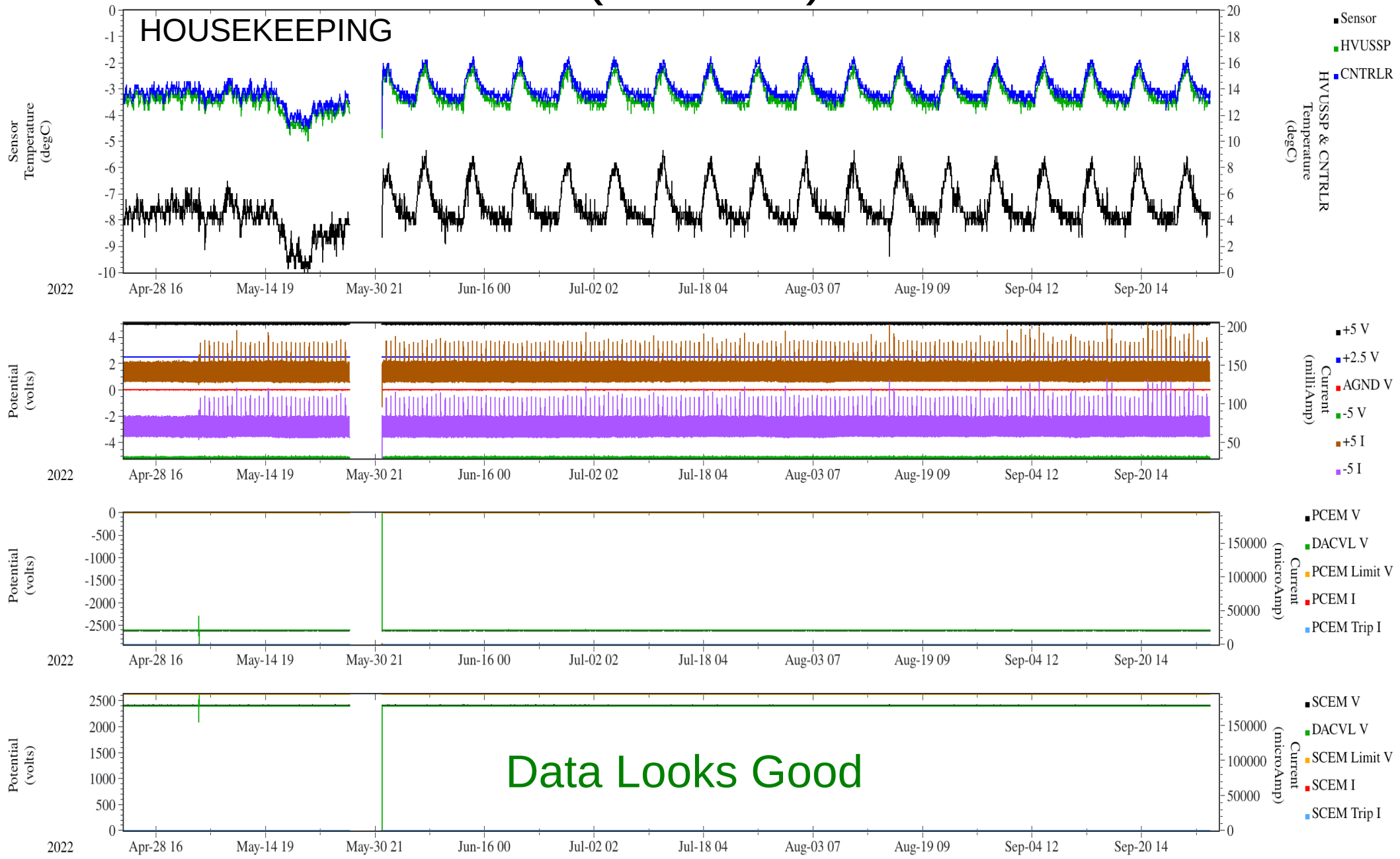
HDU (Index+1): 10, 11, 4+7, 5+8, 6+9



HDU (Index+1): 10, 11, 4-7, 5-8, 6-9



HDU (Index+1): 12



Plot created by SDDAS/gPlot - J. Mukherjee, et al. Generated on Thu Jan 16 17:49:28 2025.

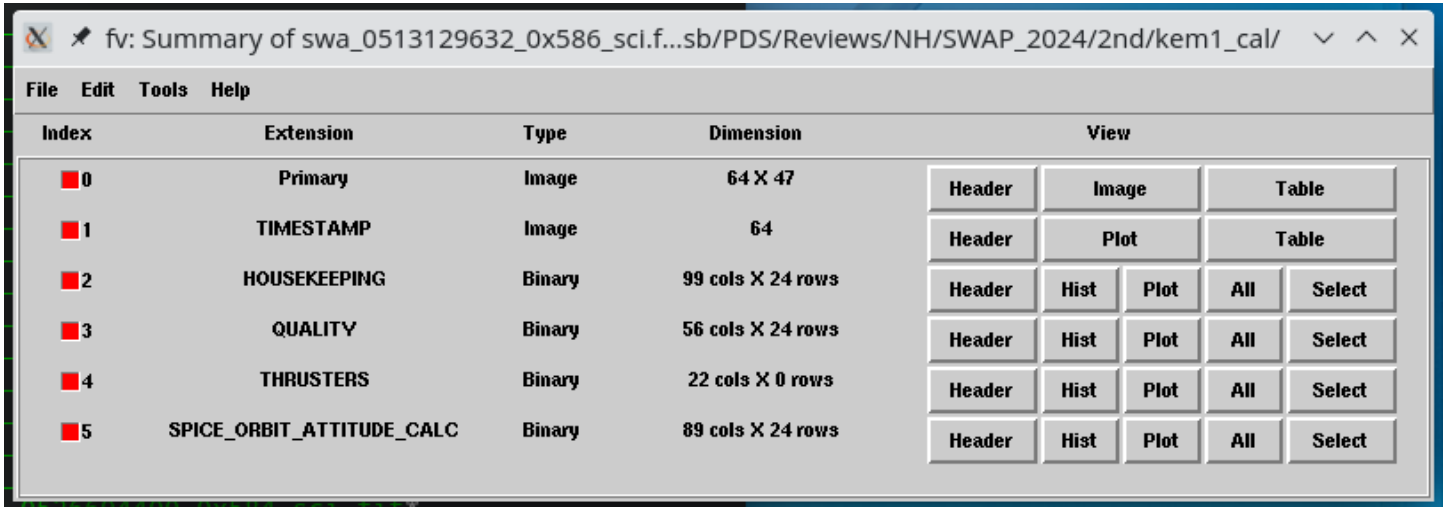
*0x586_sci.lblx

NASA PDS Validate v3.6.3: PASS

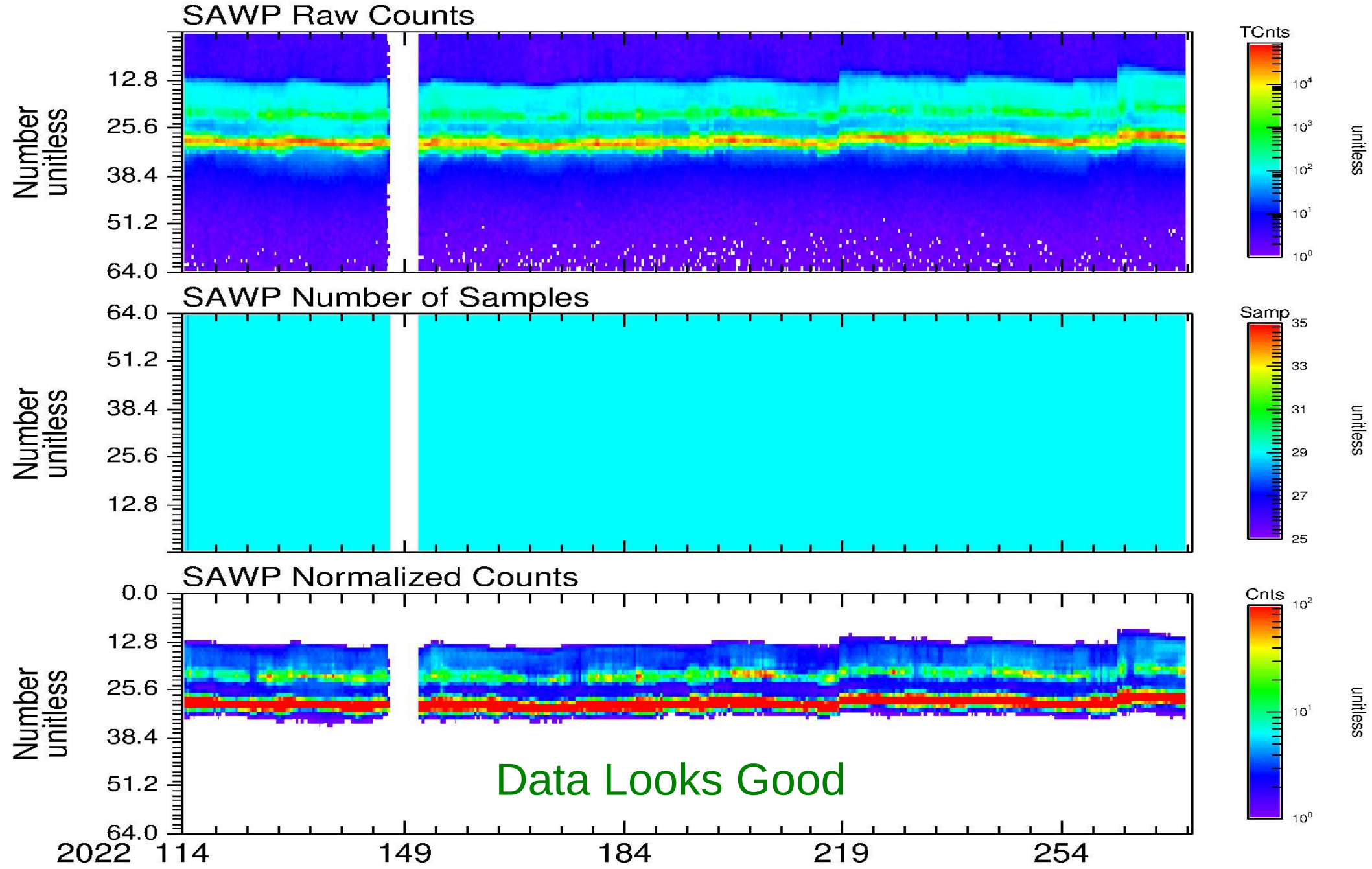
```
<Modification_History>
    <Modification_Detail>
        <modification_date>2024-08-16</modification_date>
        <version_id>1.0</version_id>
        <description>Creation for K7 delivery.</description>
    </Modification_Detail>
</Modification_History>
```

Why is this not version 2?

Calibrated Histogram Data (*0x586.sci.fit)



HDU (Index+1): 1, 2



HDU (Index+1): 2, 5

There was no Thruster Firing information in the 0x586 data for this collection….is this correct?

Collection Certification for SWAP KEM1 Encounter Calibrated Data v2.0

The overview label file fails to display and validate, it is unknown why the data files are not shown and version 2. There is confusion over which leap second kernel is really used to generate the orbital data, and there are incorrectly referenced files within the overview document. For the SWAP instrument, being off a a leap second will not make a difference because the instrument time resolution is much greater than a second. The Science and Histogram data can be released.

Recommendation: The SWAP data in this collection could be certificated if the corresponding labels reflect the current version; however, the documentation is totally inadequate and not certifiable.

8) SWAP KEM2 Encounter Calibrated Data v1.0

collection.lblx

NASA PDS Validate v3.6.3: PASS

collection_inventory.csv

GOOD

overview.lblx

NASA PDS Validate v3.6.3: PASS

Overview.txt – 1 of 4

According to the PDS documentation, this is version 1.0, not version 2.0.

```
PDS4 Version History
====================

  This is VERSION 2.0 of this data set.
```

What is <95>?

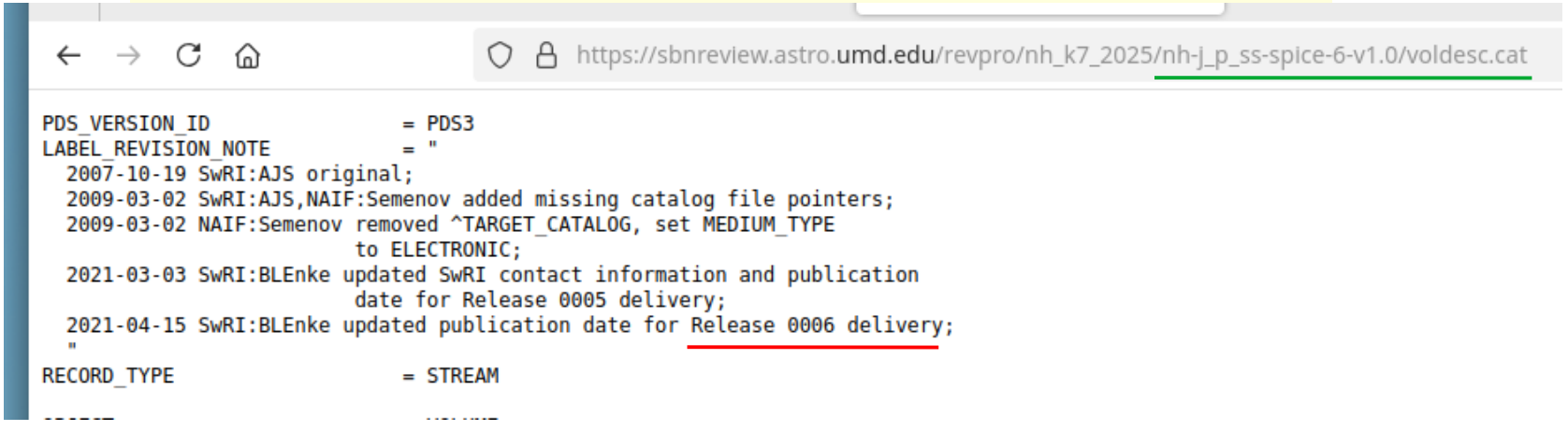
```
  DOCUMENTS

  <95>    New Horizon SDC instrument overview: urn:nasa:pds:nh_documents:swap:swap_inst_overview
          <95>    SWAP Space Science Review (SSR) paper: urn:nasa:pds:nh_documents:swap:swap_ssr
          <95>    SOC Instrument ICD: urn:nasa:pds:nh_documents:mission:soc_inst_icd
          <95>    SWAP SPICE Instrument Kernel: urn:nasa:pds:nh_documents:swap:nh_swap_ti


Other sources of information useful in interpreting these Data
--------------------------------------------------------------

  Refer to the following files for more information about these data

      NH Mission Trajectory Table: urn:nasa:pds:nh_documents:mission:nh_mission_trajectory
          <95>    Field of View Illustration: urn:nasa:pds:nh_documents:mission:nh_fov
          <95>    SWAP SPICE Instrument Kernel: urn:nasa:pds:nh_documents:swap:nh_swap_ti
```

Overview.txt – 2 of 4

Overview states SPICE v0007 used, but geometry items use v0006...why?

```
V1.0
----
This version included data acquired by the spacecraft between
08/14/2018 and 04/30/2023. It only included data downlinked before
05/01/2023 and after 04/30/2022.

This version included SWAP observations and plasma rolls taken after
the ASTEROID 486958 Arrokoth (2014 MU69) encounter.

After a lengthy hibernation period, the New Horizons spacecraft
resumed data playback on DOY 2023_060 (March 1, 2023). The spacecraft
collected SWAP data throughout its hibernation, but most of that data
has not been downlinked yet. As a result, this version will contain
substantial gaps in the data. These gaps will be filled in later
versions.

This dataset corresponded to New Horizons NAIF SPICE distribution v0007.
```

```
Ancillary Data
==============

  The geometry items included in the data labels were computed
  using the SPICE kernels archived in the New Horizons SPICE
  data set, NH-J/P/SS-SPICE-6-V1.0.
```



Overview.txt – 3 of 4

```
Instrument   Instrument designators                 ApIDs **
==========  ====================================  =============
 SWAP         SWA                                  0X584 - 0X587 *

 * Not all values in this range are in this data set
 ** ApIDs are case insensitive

 There are other ApIDs that contain housekeeping values and
 other values.  See SOC Instrument ICD (/DOCUMENT/SOC_INST_ICD.*)
 for more details.
```

Not a PDS4 Designation

Overview.txt – 4 of 4

```
Ancillary Data
==============

  The geometry items included in the data labels were computed
  using the SPICE kernels archived in the New Horizons SPICE
  data set, NH-J/P/SS-SPICE-6-V1.0.

  Every observation provided in this data set was taken as a part of a
  particular sequence.  A list of these sequences has been provided in
  file DOCUMENT/SEQ_SWAP_*.TAB.  In addition, the
  sequence identifier (ID) and description are included in the PDS label
  for every observation.  N.B. While every observation has an associated
  sequence, every sequence may not have associated observations.  Some
  sequences may have failed to execute due to spacecraft events (e.g.
  safing).  No attempt has been made during the preparation of this data
  set to identify such empty sequences, so it is up to the user to
  compare the times of the sequences to the times of the available
  observations from INDEX/INDEX.TAB to identify such sequences.
```

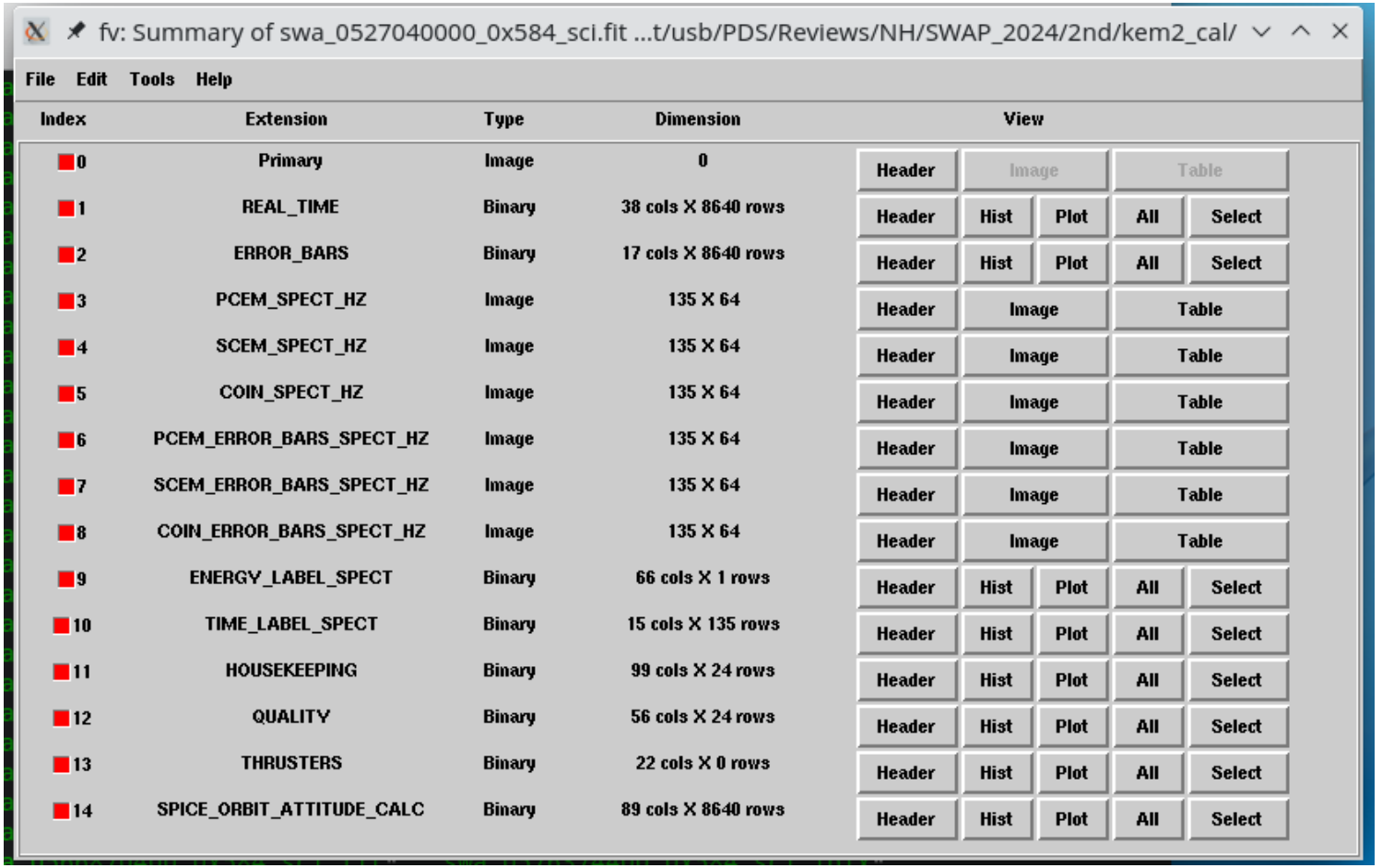
Does Not Exist

Not a PDS4 Designation

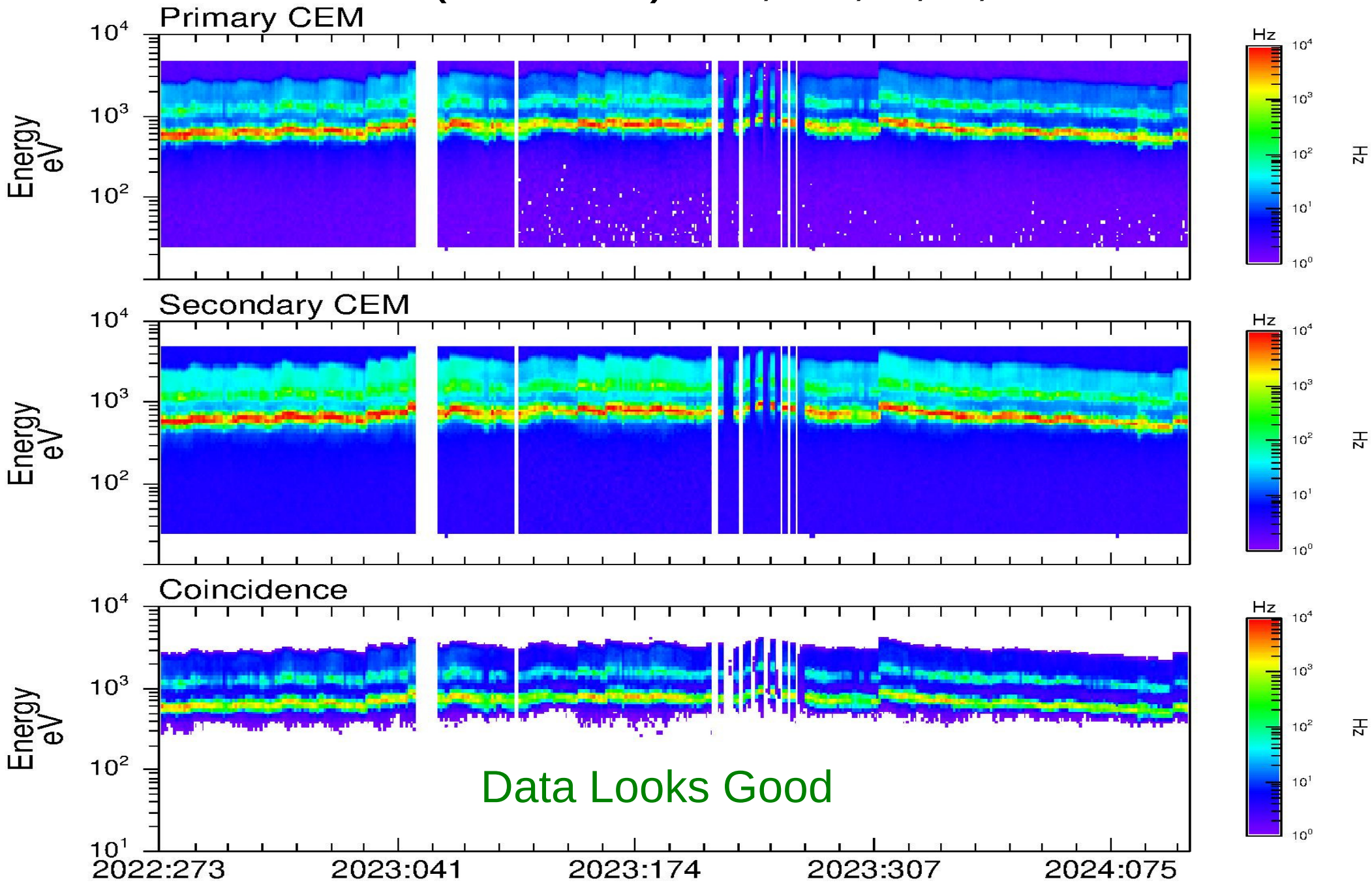
*0x584_sci.lblx

NASA PDS Validate v3.6.3: PASS

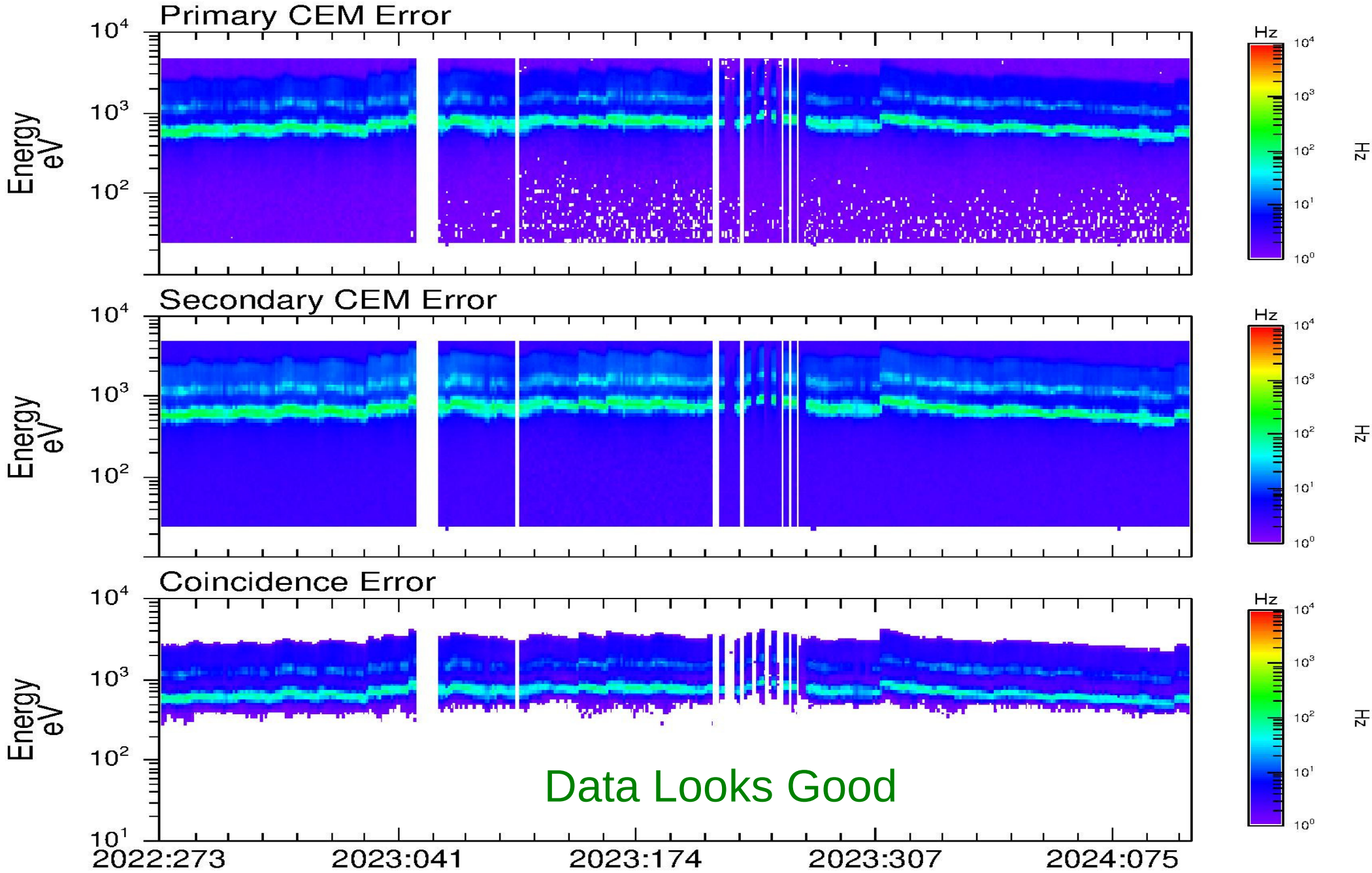
Calibrated Science Data (*0x584.sci.fit)



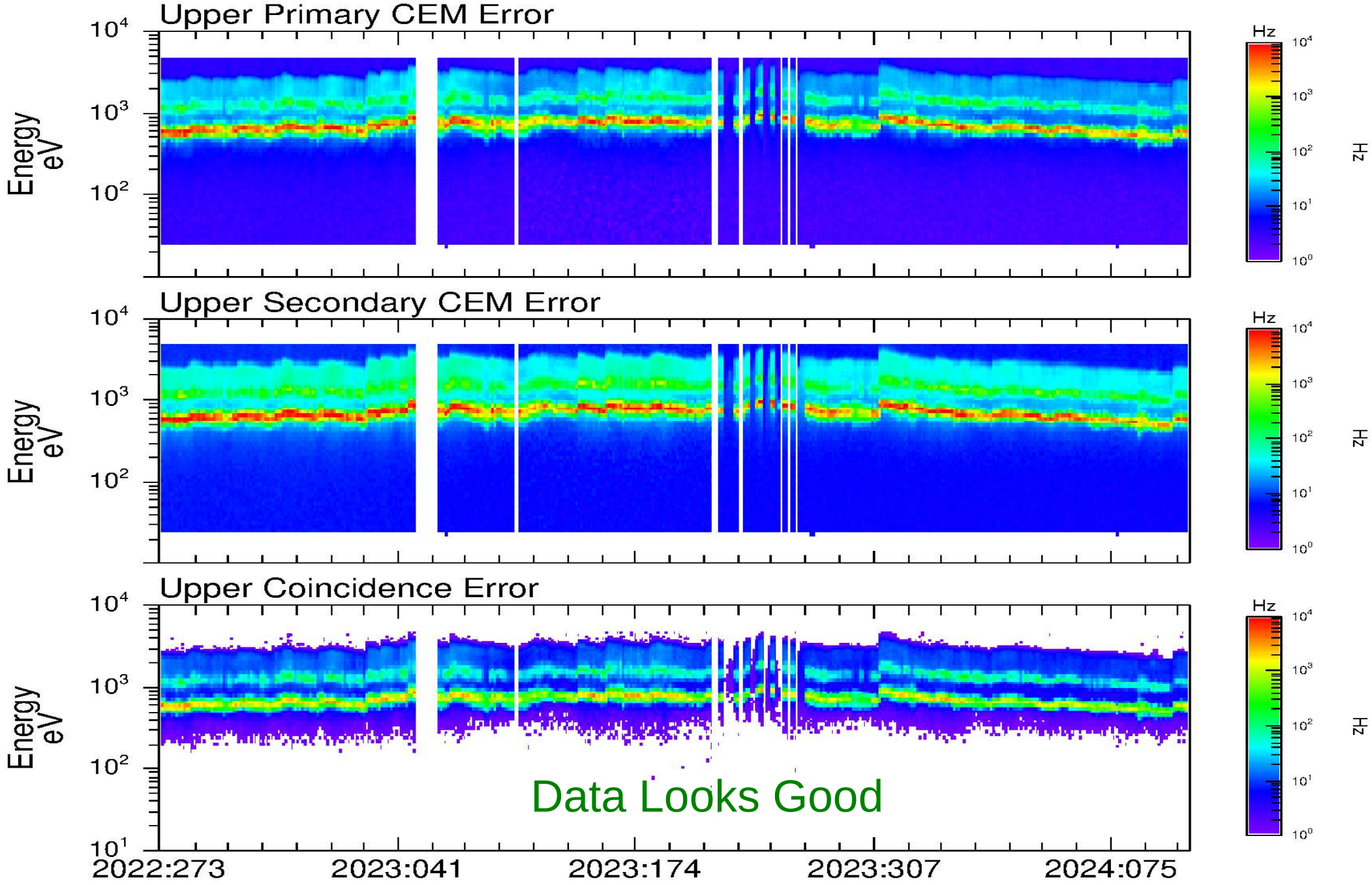
HDU (Index+1): 10, 11, 4, 5, 6



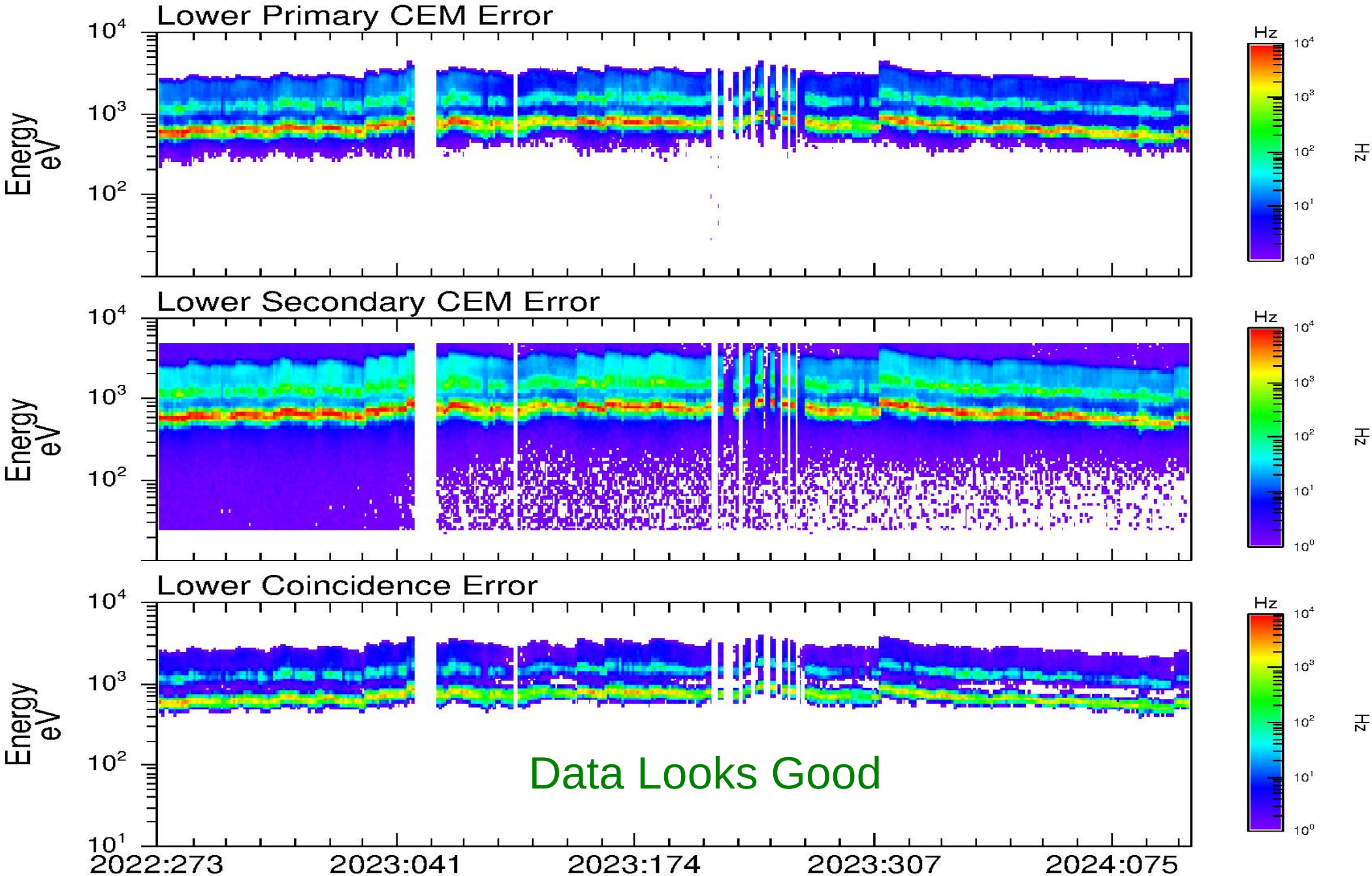
HDU (Index+1): 10, 11, 7, 8, 9



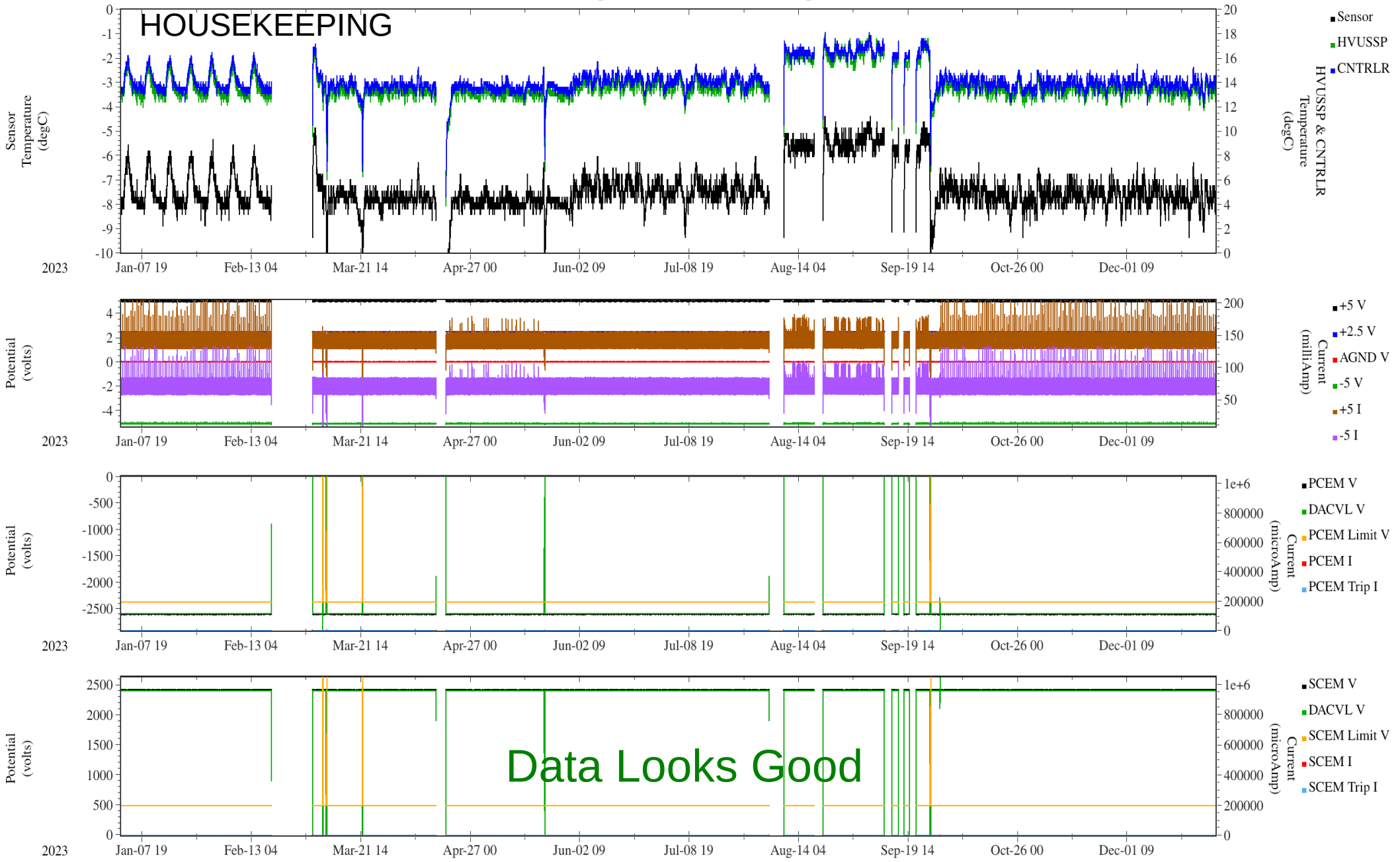
HDU (Index+1): 10, 11, 4+7, 5+8, 6+9



HDU (Index+1): 10, 11, 4-7, 5-8, 6-9



HDU (Index+1): 12

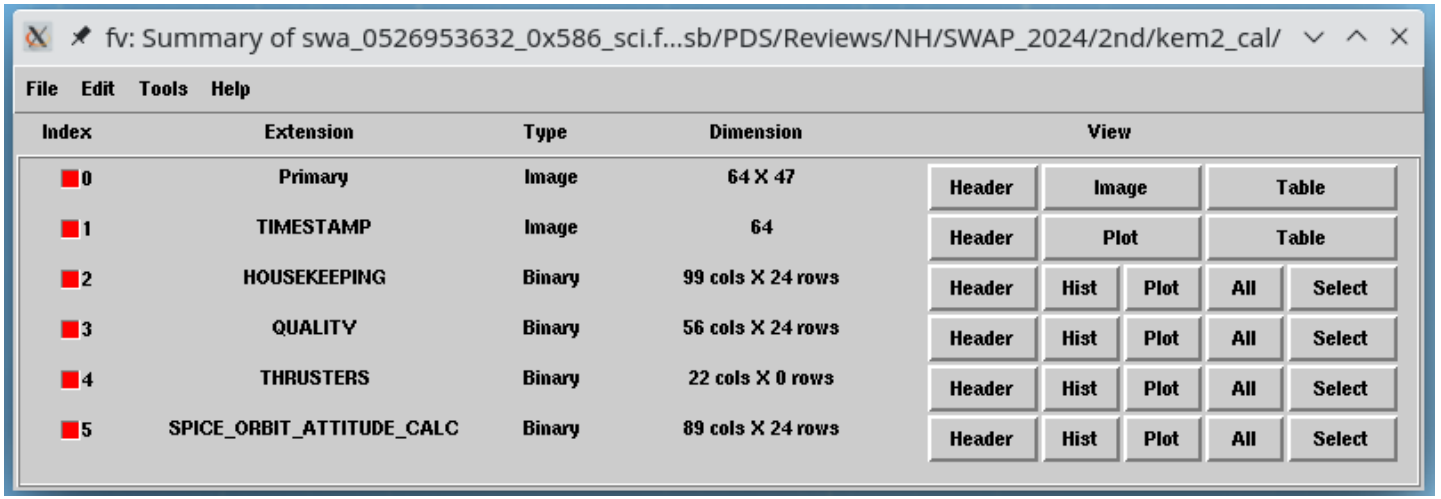


Plot created by SDDAS/gPlot - J. Mukherjee, et al. Generated on Thu Jan 16 18:42:41 2025.

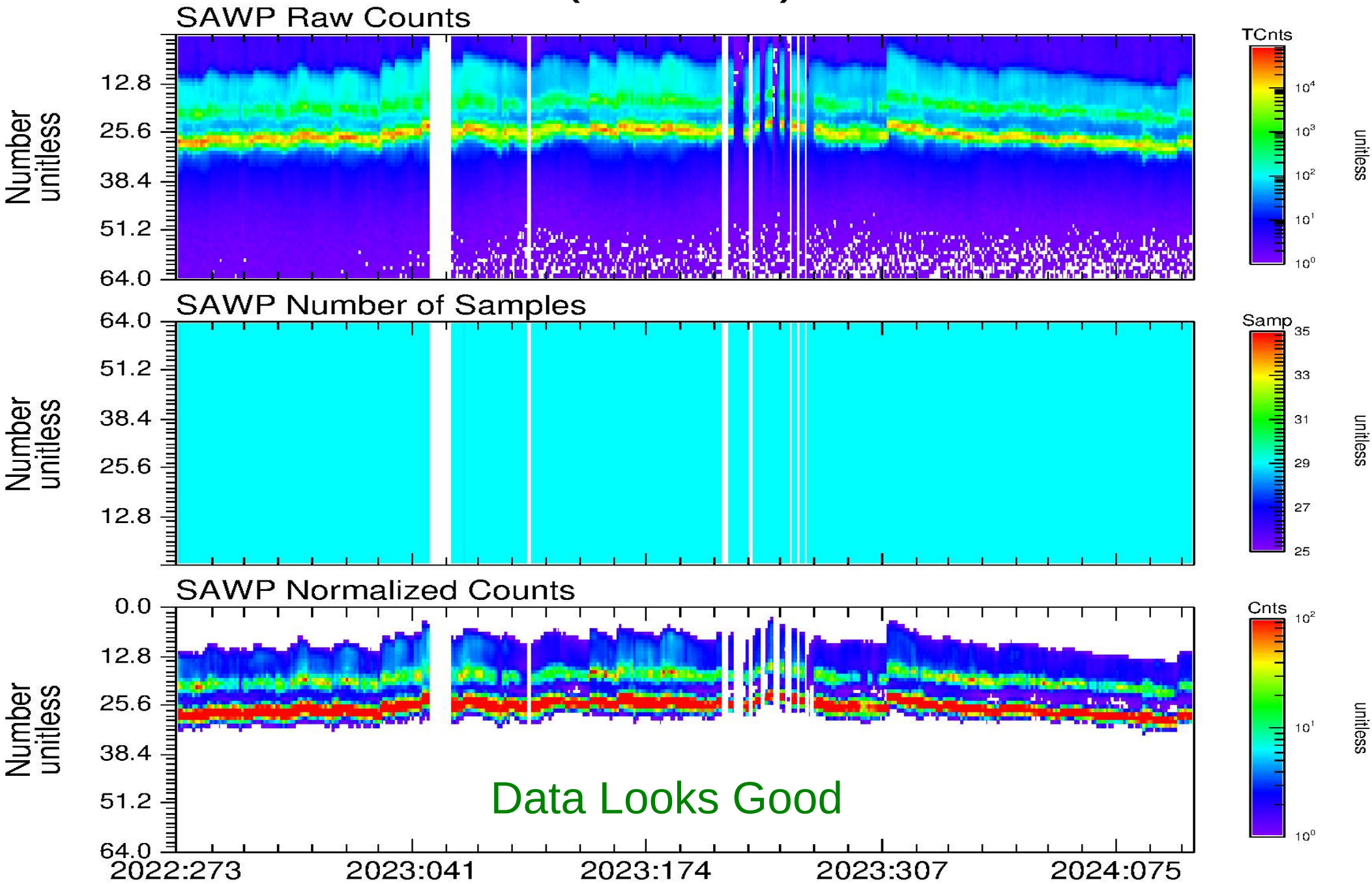
*0x586_sci.lblx

NASA PDS Validate v3.6.3: PASS

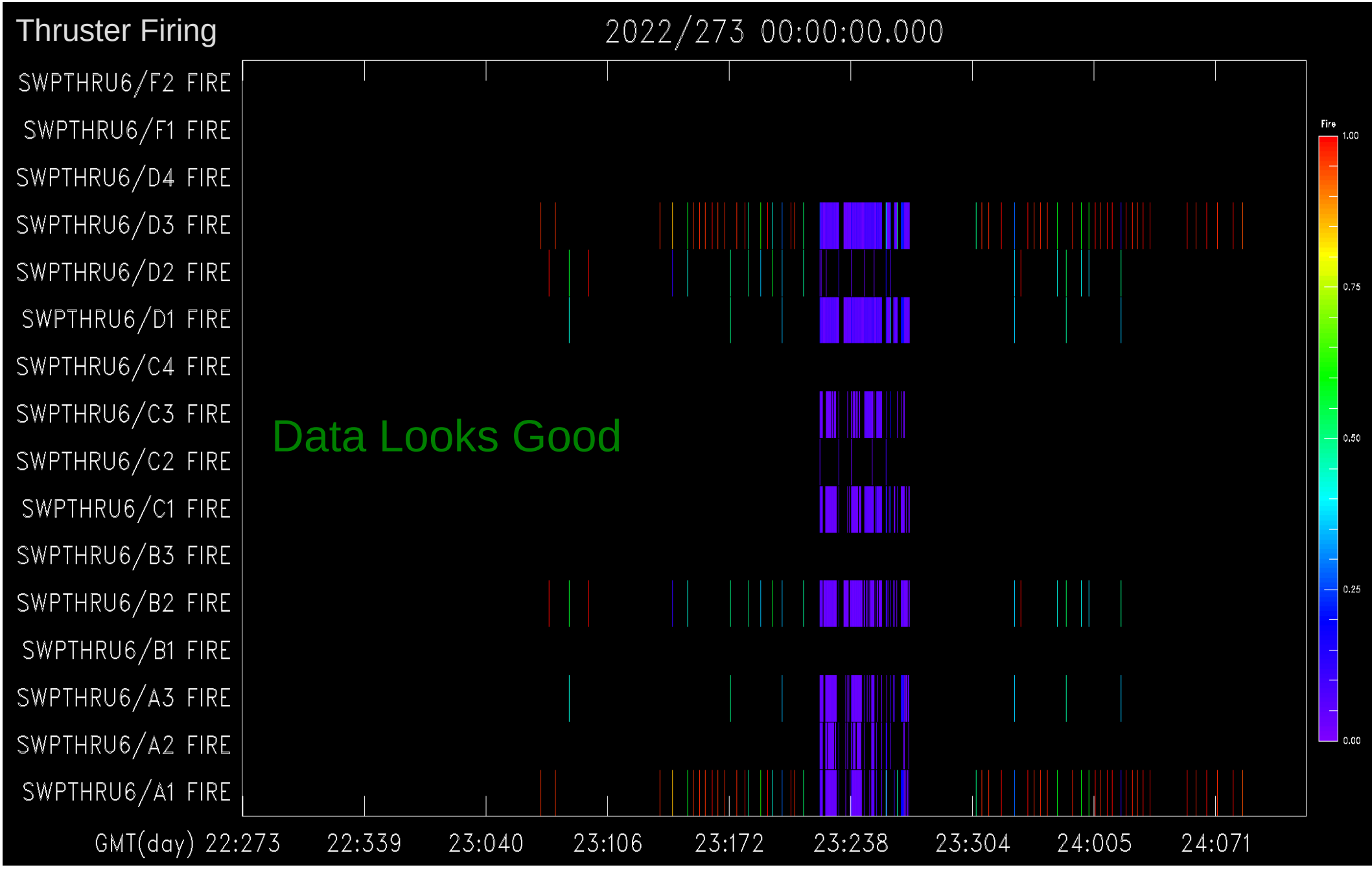
Calibrated Histogram Data (*0x586.sci.fit)



HDU (Index+1): 1, 2



HDU (Index+1): 2, 5



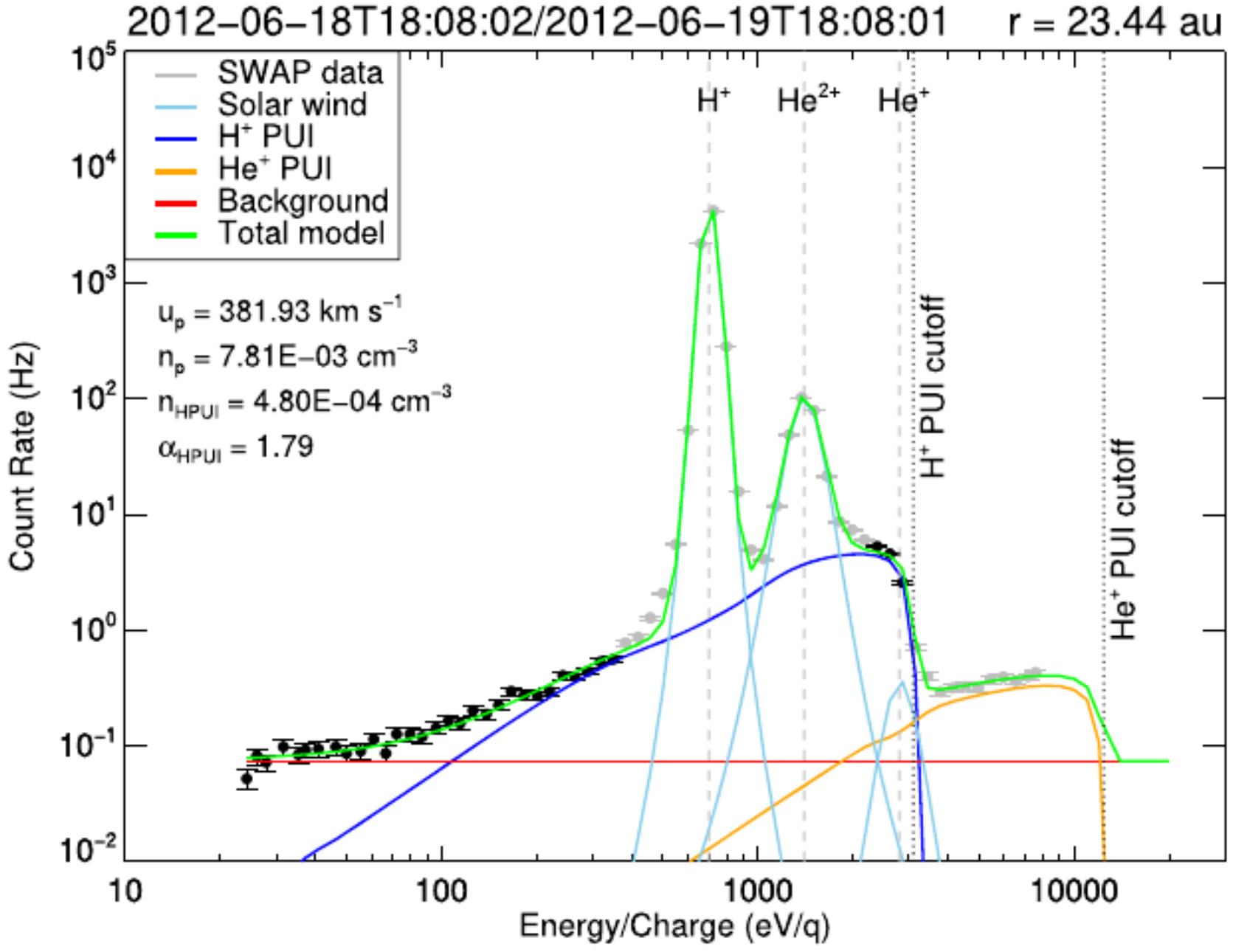
Collection Certification for SWAP KEM2 Encounter Calibrated Data v1.0

The overview file has issues in referencing other documents. There is confusion over which leap second kernel is really used to generate the data, and there are incorrectly referenced files within the overview document. For the SWAP instrument, being off a a leap second will not make a difference because the instrument time resolution is much greater than a second. The Science and Histogram data can be released.

Recommendation: Certified with liens to fix the overview document.

New Horizons SWAP Collections Certification Summary

1) Mission Documents v3.0
    ?
2) Spacecraft Trajectory
    ?
3) Documents for the SWAP Instrument v2.0
    ?
4) SWAP KEM1 Encounter Raw Data v2.0
    ?
5) SWAP KEM2 Encounter Raw Data v1.0
    ?
6) SWAP Reference Files Used in Calibrating Data v2.0
    ?
7) SWAP KEM1 Encounter Calibrated Data v2.0
    ?
8) SWAP KEM2 Encounter Calibrated Data v1.0
    ?

BACK-UP SLIDES

Example Spectrum
Swaczyna et al., Astrophysical Journal, 2020.