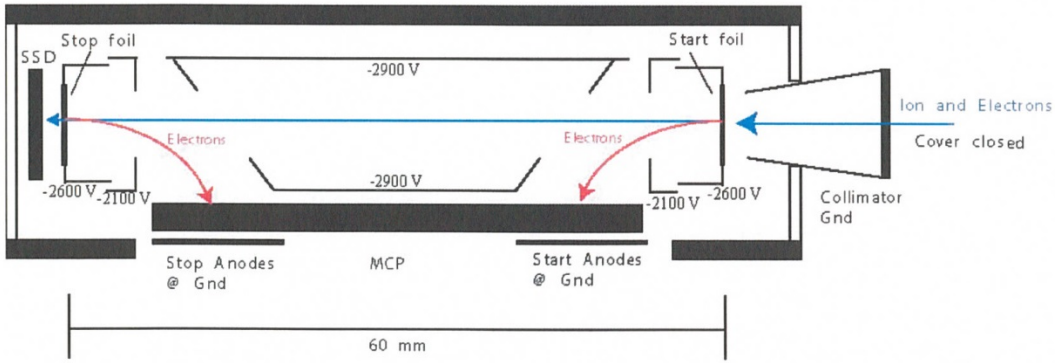
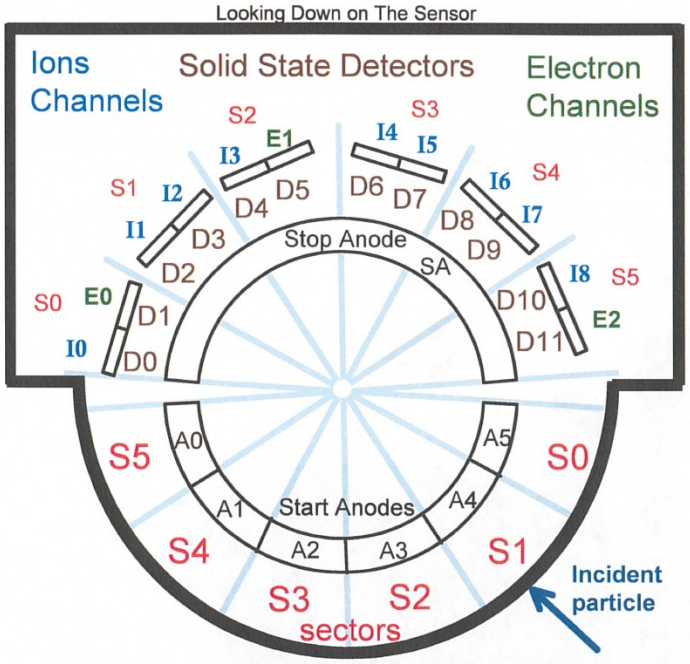
New Horizons Pluto Energetic Particle Spectrometer Science Investigation (PEPSSI)

PRINCIPAL INVESTIGATOR:	Ralph McNutt, APL
DESCRIPTION:	Medium Energy Particle Spectrometer
ENERGY RANGE:	25-1000 keV (protons) 60-1000 keV (atomic ions) 25-500 keV (electrons)
FIELD OF VIEW:	160 deg x 12 deg
ANGULAR RESOLUTION:	25 deg x 12 deg
ENERGY RESOLUTION:	0.25 keV
SENSOR SIZE:	7.6 cm dia. x 2.5 cm thick
POWER:	1.4 watt
MASS:	1.5 kg





New Horizons PEPSSI Data Sets

RAW ->

nh-x-pepssi-2-kemcruise1-v2.0

nh-p-pepssi-2-kem1-v1.0

CALIBRATED ->

nh-x-pepssi-3-kemcruise1-v2.0

nh-p-pepssi-3-kem1-v1.0

New Horizons PEPSSI Data Set Evaluation Tools

Staging and Plotting -
Machine: Dell Precision T3400
Operating System: Fedora 27 linux

Data Processing -
Machine: Sun Ultra-350
Operating System: Sun Solaris OS 5.9

Staging and Minor Diagnostics -
Machine: MacBook Pro
Operating System: OS X El Capitan 10.11.6
VM Windows 7 Pro

Machine: Dell PowerEdge 2900
Operating System: CentOS 5.11 linux

Documentation Evaluation

All Data Sets in the Top Level Directory voldesc.cat

Extra characters “\n” need to be deleted:

```
OBJECT                      = DATA_PRODUCER
  INSTITUTION_NAME          = "SOUTHWEST RESEARCH INSTITUTE"
  FACILITY_NAME             = "SOUTHWEST RESEARCH INSTITUTE"
  FULL_NAME                 = "JILLIAN REDFERN"
  ADDRESS_TEXT              = "SOUTHWEST RESEARCH INSTITUTE \n
                               DEPARTMENT OF SPACE STUDIES \n
                               1050 WALNUT STREET, SUITE 300 \n
                               BOULDER, CO 80302\n
                               USA"
END_OBJECT                  = DATA_PRODUCER
```

All Data Sets – catalog files

All catalog files look good.

All Data Sets index Directory index.lbl & index.tab

```
END_OBJECT = COLUMN

OBJECT      = COLUMN
  COLUMN_NUMBER = 7
  NAME = REDUCTION_LEVEL
  START_BYTE = 172
  BYTES = 10
  DATA_TYPE = CHARACTER
  FORMAT = "A10"
  DESCRIPTION = "This parameter provides the level of data
    reduction:

      LEVEL1   = Raw data

      LEVEL2   = Calibrated/Reduced data in engineering units
                 appropriate for the instrument.
    "
END_OBJECT = COLUMN
```

There is no level 3 description included. Level 3 data in the index.tab file lists all files as Level 2. Similarly, the index.tab file in the Level 2 data labels the Level 2 data as Level 1. This needs to be fixed.

Although the wording changed from the last review, the data levels are not consistent with the data delivered. This should be corrected as suggested in the last review.

All Data Sets in the document Directory docinfo.txt

```
|
+->SEQ_PEPSSI_KEMCRUISE1.TAB          Sequence summary table
+->SEQ_PEPSSI_KEMCRUISE1.TAB          Label for sequence summary table;
|                              please read the label for more detail
|
```

Should have
LBL extension

All Data Sets – Typos Found

- Document Directory
  - soc_inst_icd.lbl – Instument -> Instrument
  - nh_met2utc.lbl – thoughout -> throughout

- Calib Directory
  - rateboxdefinitionplanes.lbl – extenstions -> extensions

- Catalog Directory
  - pepssi.cat – dependant -> dependent

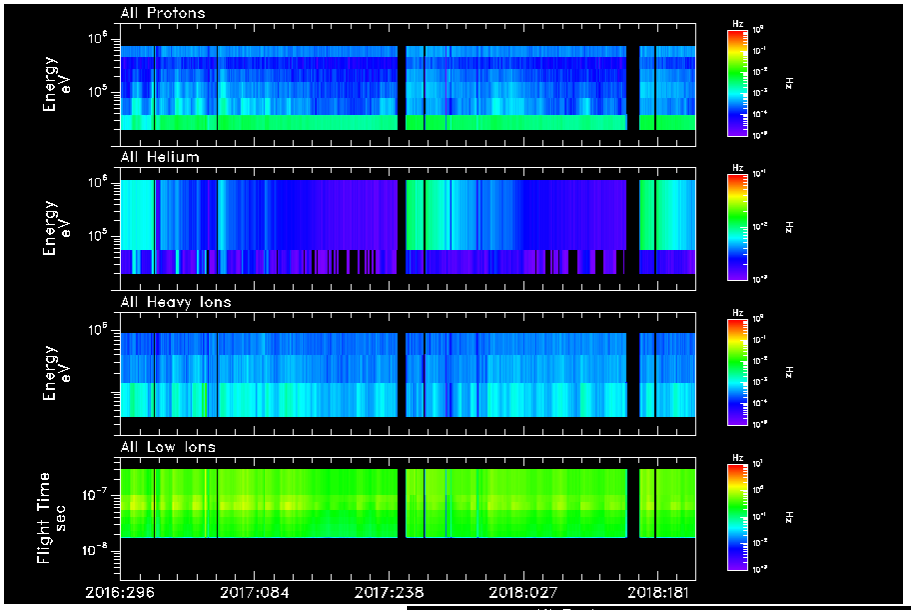
Description gets cut off

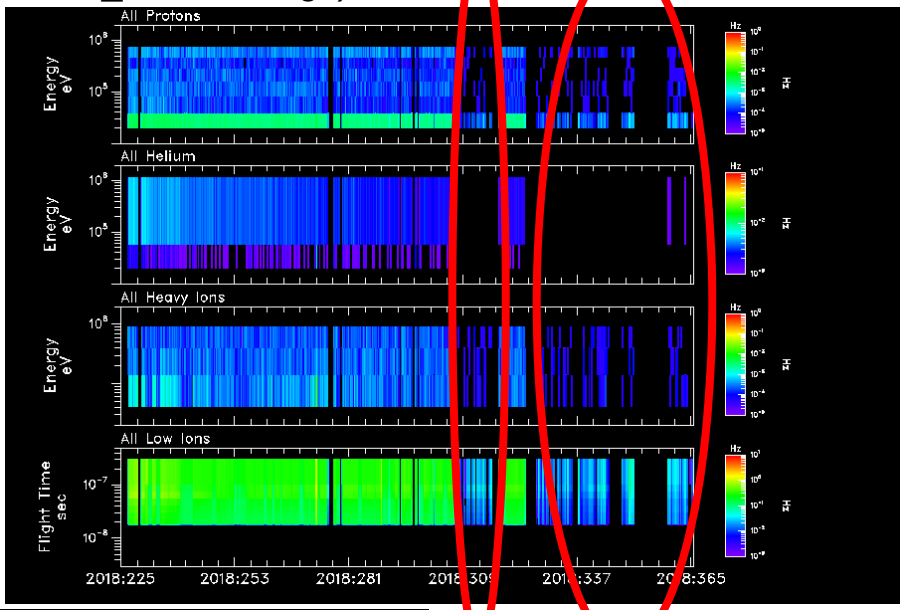
- Data Directories
  - nh-x-pepssi-2-kem*/data/*/*eng.lbl files – coun -> counts
  - nh-x-pepssi-2-kem*/data/*/*eng.lbl files – unbounde -> unbounded
  - nh-x-pepssi-*/data/*/*sci.lbl files – Descriminator -> Discriminator

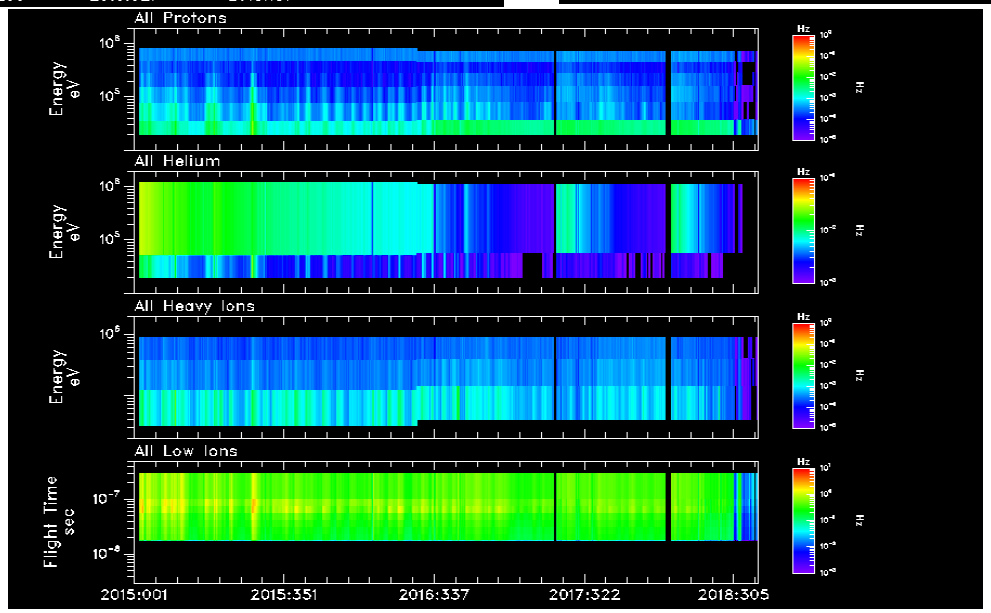
Data Evaluation

nh-x-pepssi-3-kemcruise1-v2.0/data
nh-x-pepssi-3-kem1-v1.0/data
PEPSSI QL for Ions

(PEPS3_P_HE_HV_LI_v4_KEMCruise0.gif, PEPS3_P_HE_HV_LI_v4_KEM0.gif, PEPS3_P_HE_LI_v4_2015001_20190010.gif)





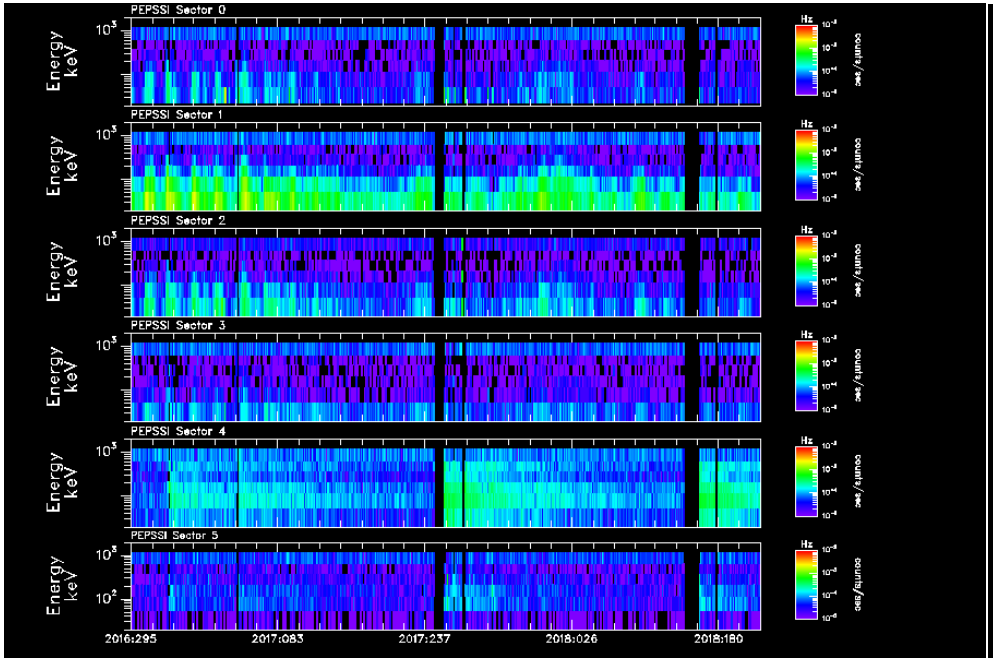


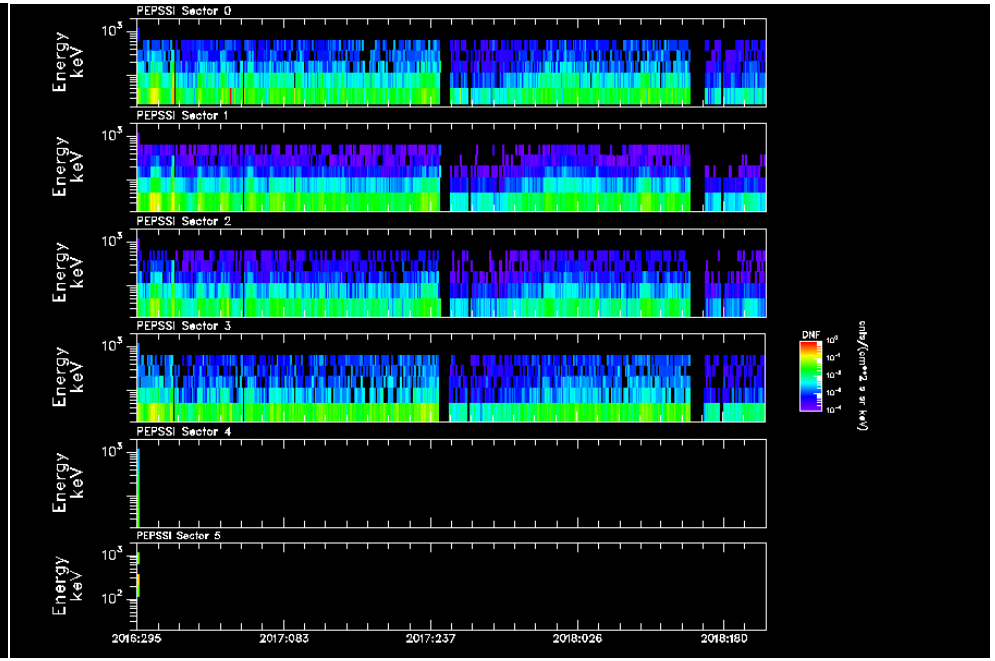
Why are these less intense times?

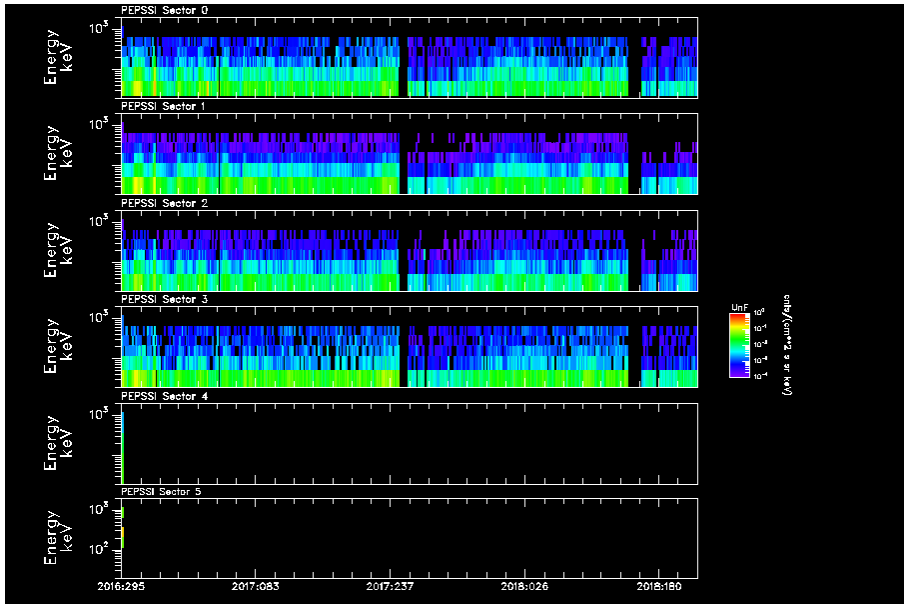
nh-x-pepssi-3-kemcruise1-v2.0/data

PEPSSI Protons & Uncertainty for KEM Cruise data set

(PEPSSI6_3BFlux_Protons_CPSvskeV_KEMCruise0.gif, PEPSSI6_3BFlux_Protons_DNFvskeV_KEMCruise0.gif, PEPSSI6_3BFlux_Protons_UNCvskeVup_KEMCruise0.gif)



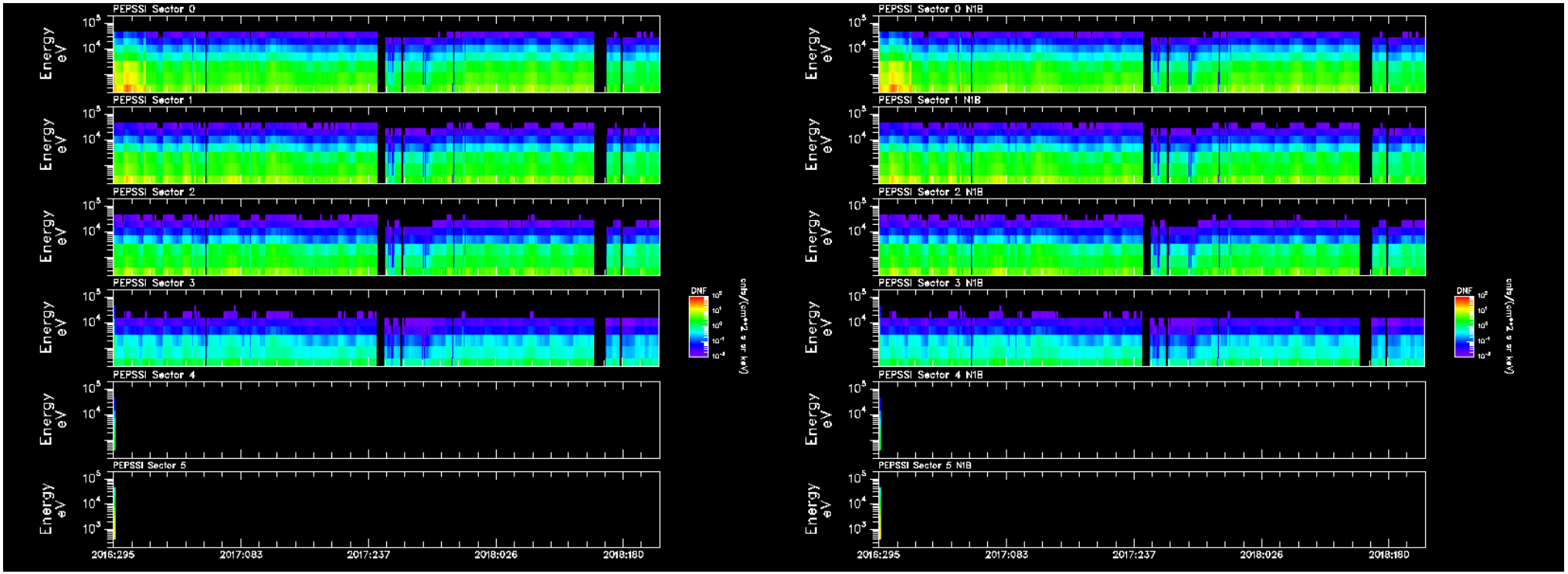




nh-x-pepssi-3-kemcruise1-v2.0/data

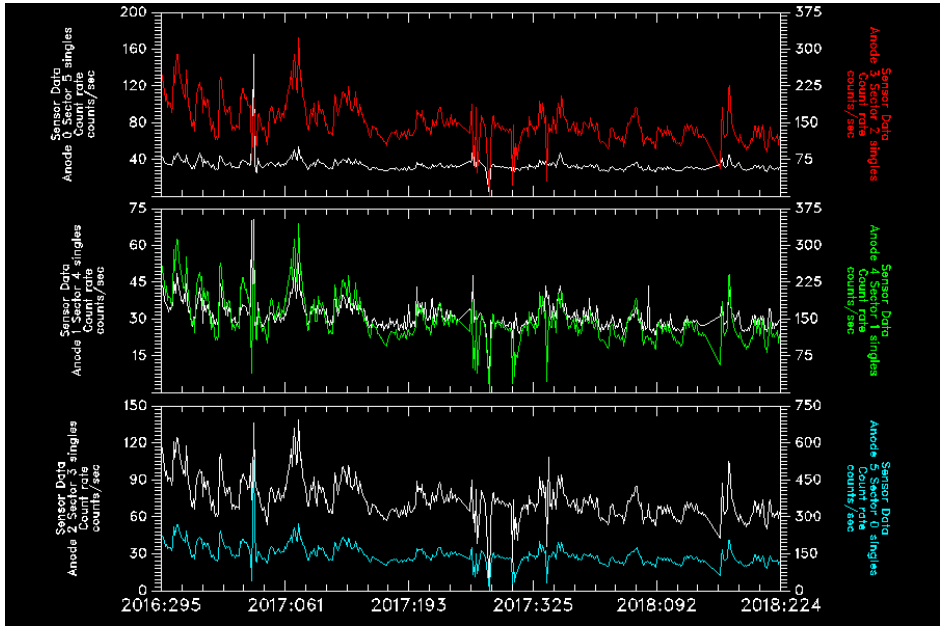
B Flux Protons & and L Flux Protons

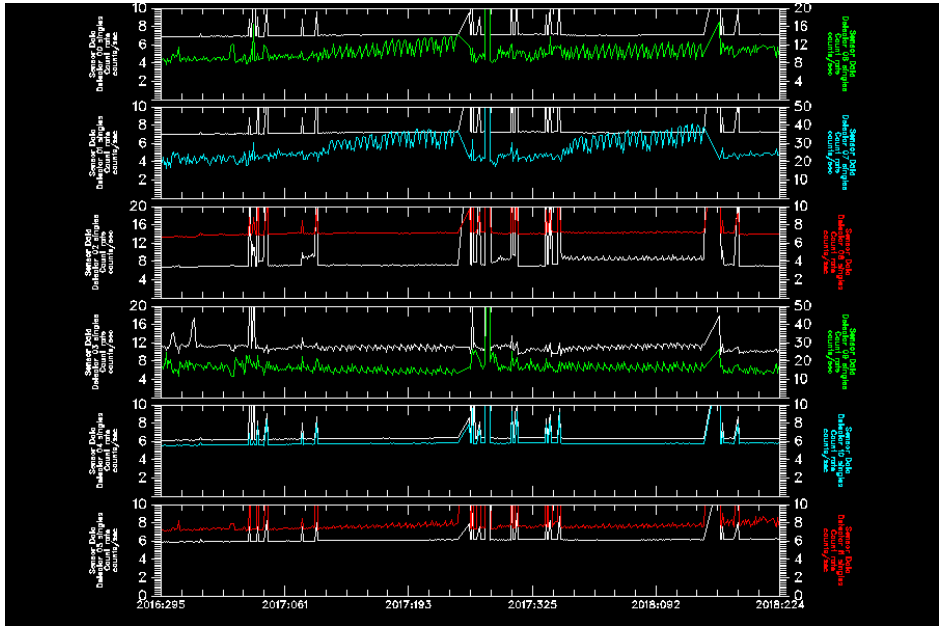
(PEPSSI6_3LFlux_Protons_DNFvseV_KEMCruise0.gif, PEPSSI6_3LFlux_Protons_DNFvskeV_KEMCruise0.gif)

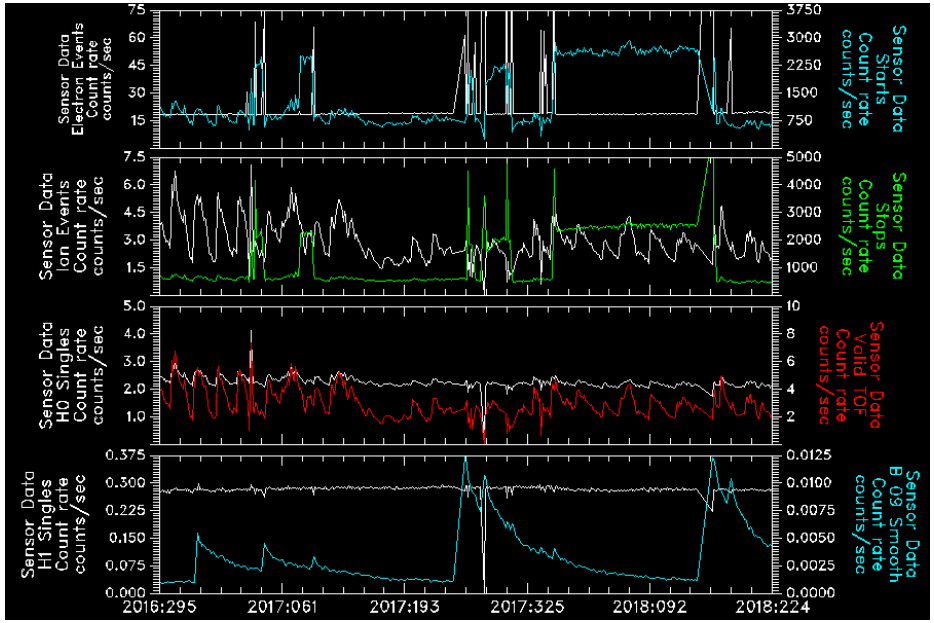


nh-x-pepssi-3-kemcruise1-v2.0/data
Flux B Anode Singles, Detector Singles, & Events

(PEPSSI6_3FluxB_AnodeSingles_KEMCruise0.gif, PEPSSI6_3FluxB_DetectorSingles_KEMCruise0.gif, PEPSSI6_3FluxB_Events_KEMCruise0.gif)

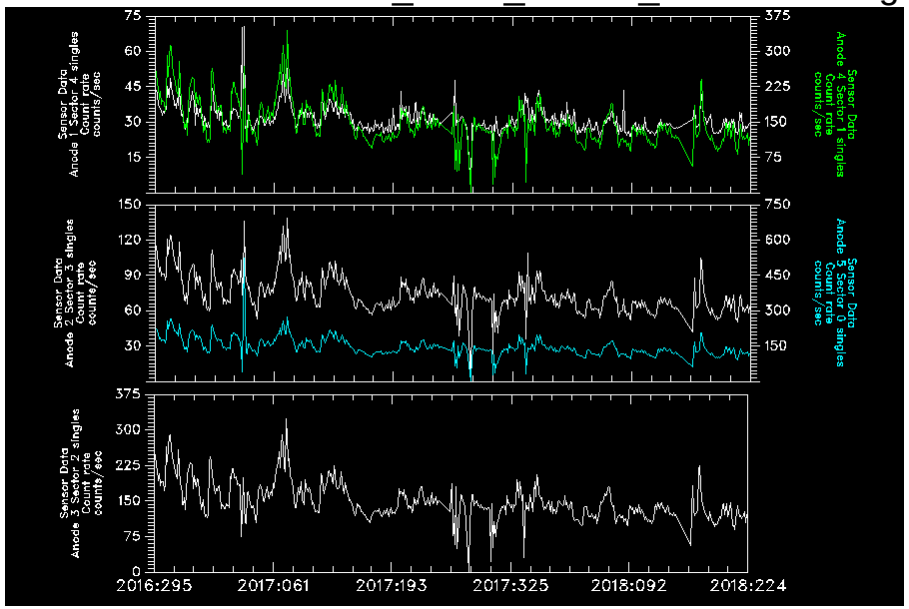


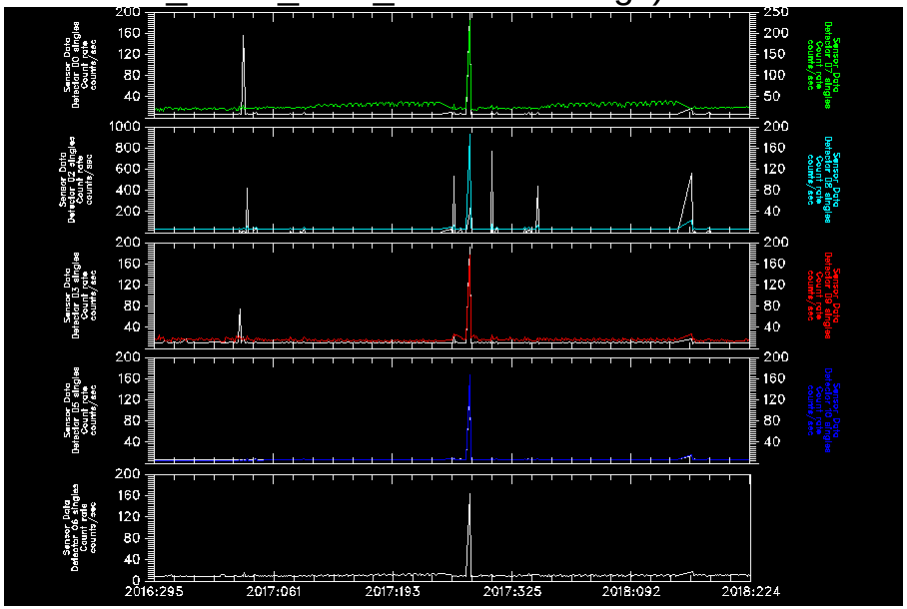


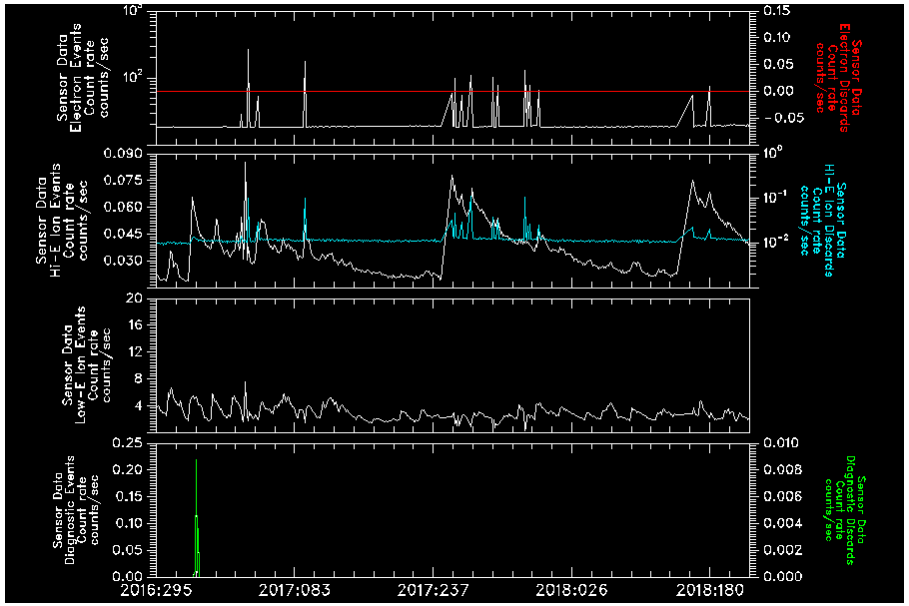


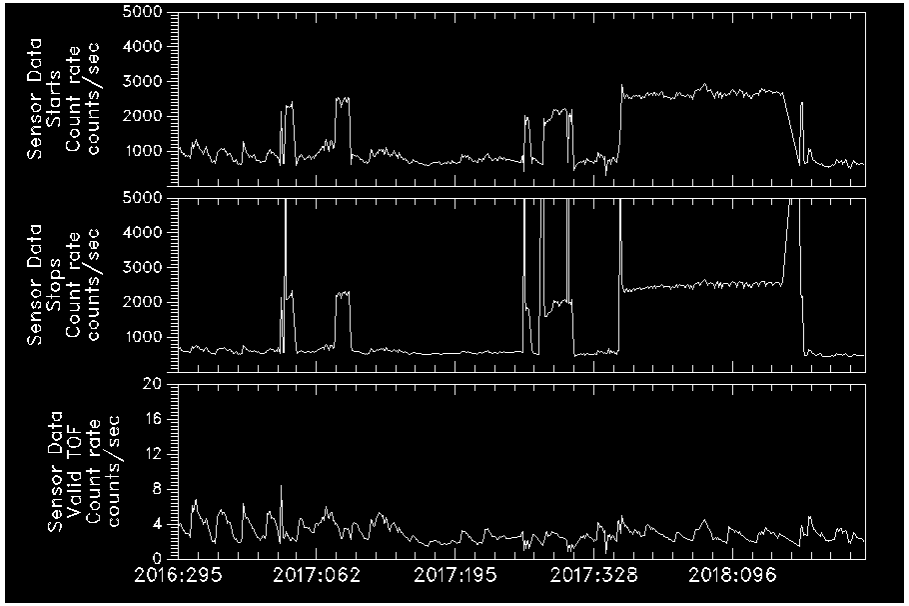
nh-x-pepssi-3-kemcruise1-v2.0/data
L3 Flux Anode Singles, Detector Singles, Events, & Start-Stop-Valid

(PEPSSI6_3Flux_AnodeSingles_KEMCruise0.gif, PEPSSI6_3Flux_DetectorSingles_KEMCruise0.gif, PEPSSI6_3Flux_Events_KEMCruise0.gif, PEPSSI6_3Flux_SSV_KEMCruise0.gif)



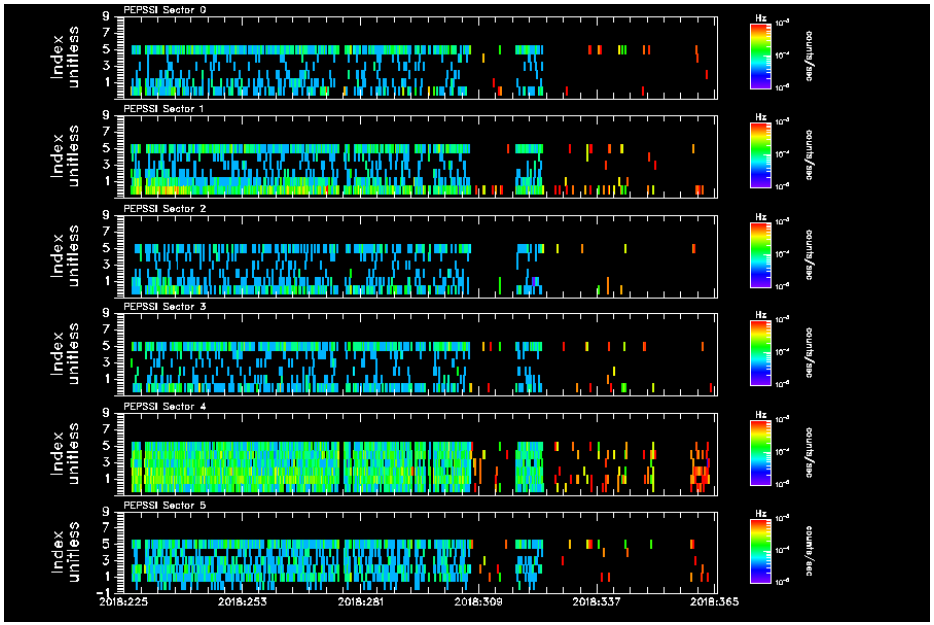


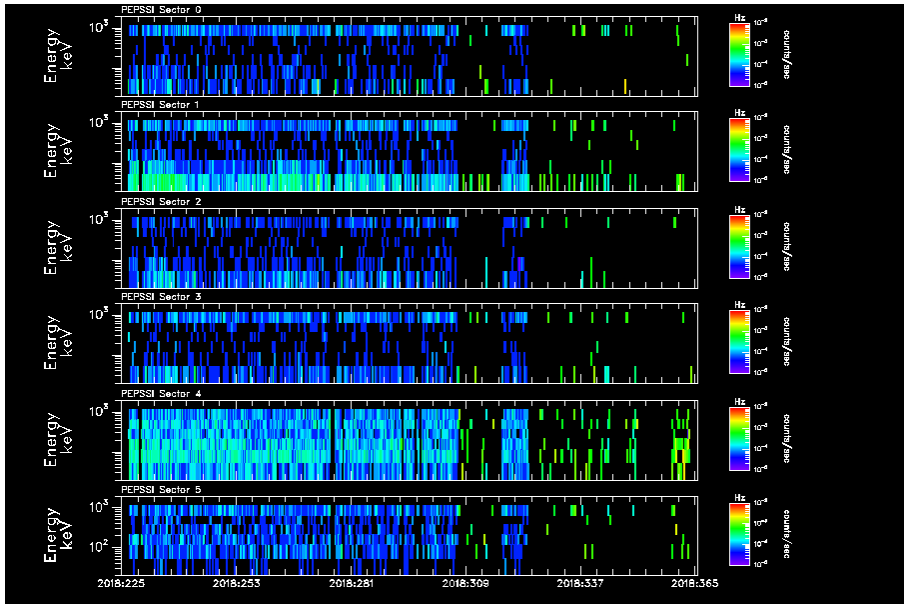


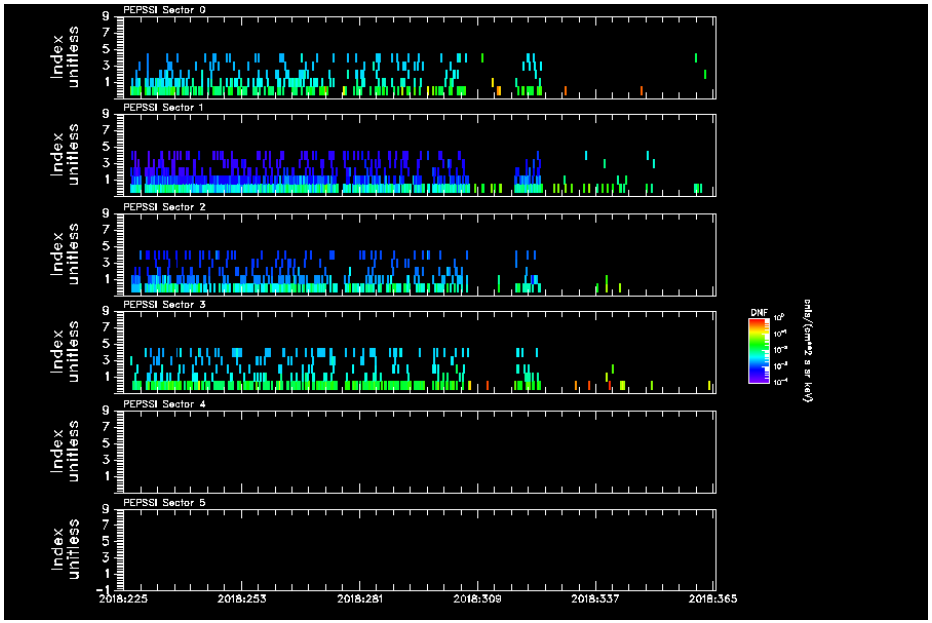


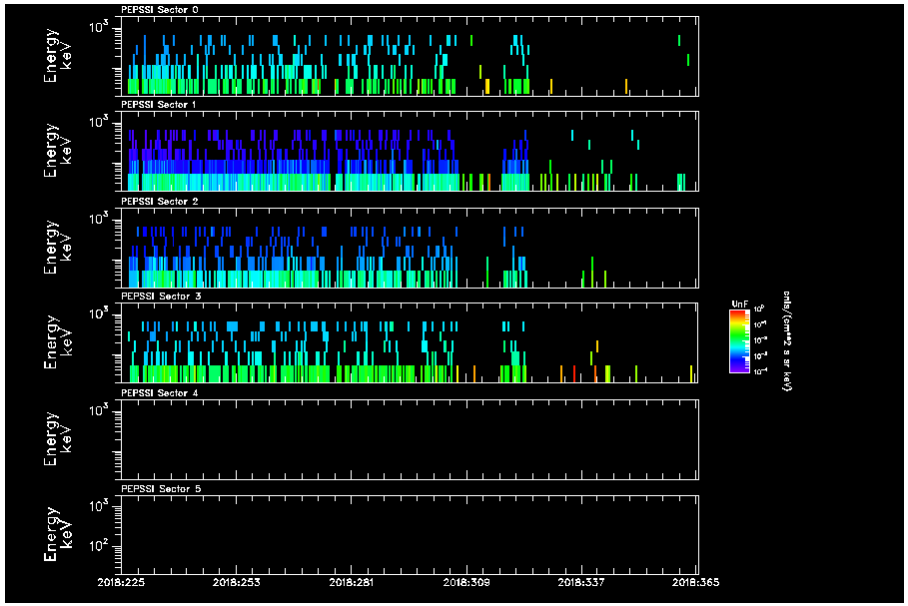
nh-x-pepssi-3-kem1-v1.0/data
Protons + Uncertainty for KEM data set

(PEPSSI6_3BFlux_Protons_CPSvsEI_KEM0.gif, PEPSSI6_3BFlux_Protons_CPSvskeV_KEM0.gif, PEPSSI6_3BFlux_Protons_DNFvsEI_KEM0.gif, PEPSSI6_3BFlux_Protons_UNCvskev_KEM0.gif)



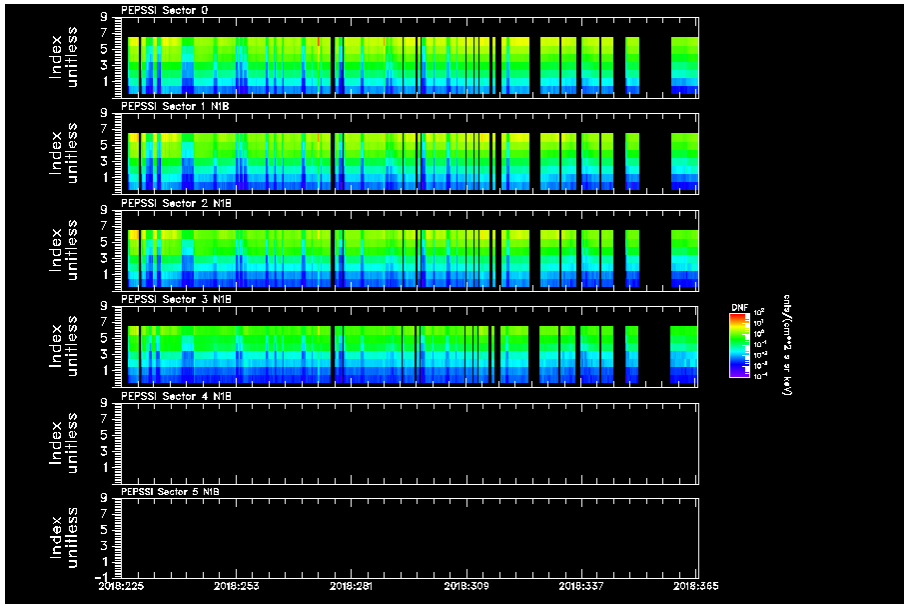


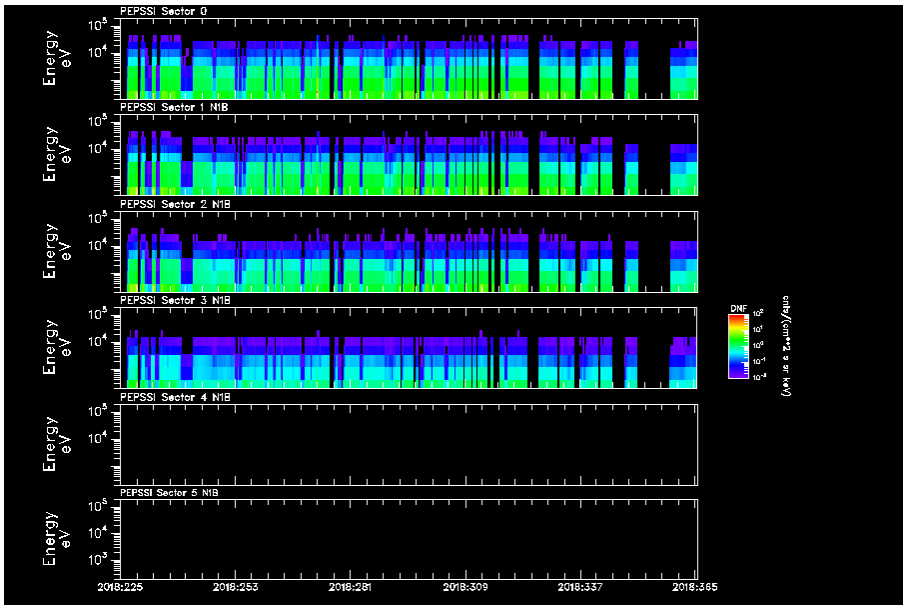


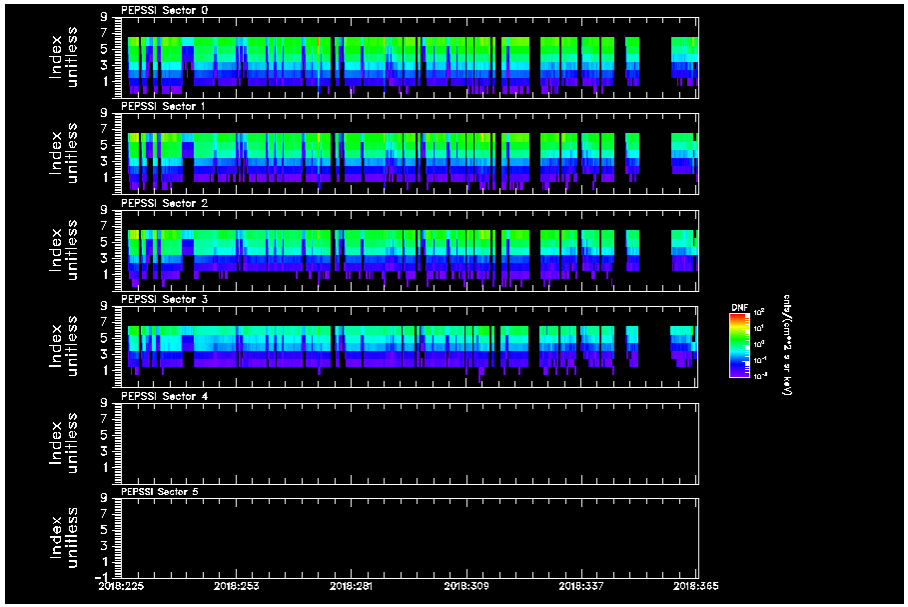


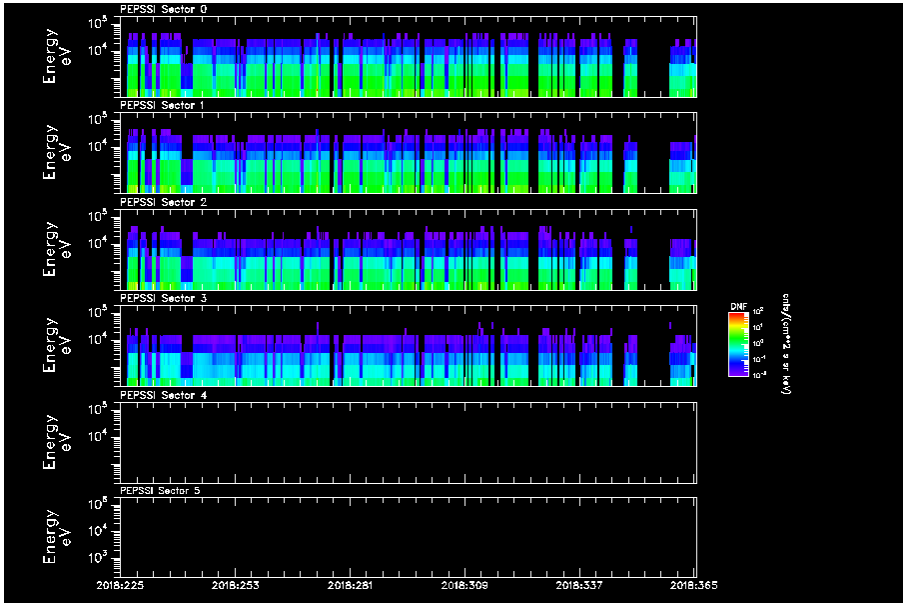
nh-x-pepssi-3-kem1-v1.0/data
B Flux Protons & and L Flux Protons

(PEPSSI6_3LFluxB_Protons_DNFvsEI_KEM0.gif, PEPSSI6_3LFluxB_Protons_DNFvseV_KEM0.gif, PEPSSI6_3LFlux_Protons_DNFvsEI_KEM0.gif, PEPSSI6_3LFlux_Protons_DNFvseV_KEM0.gif)



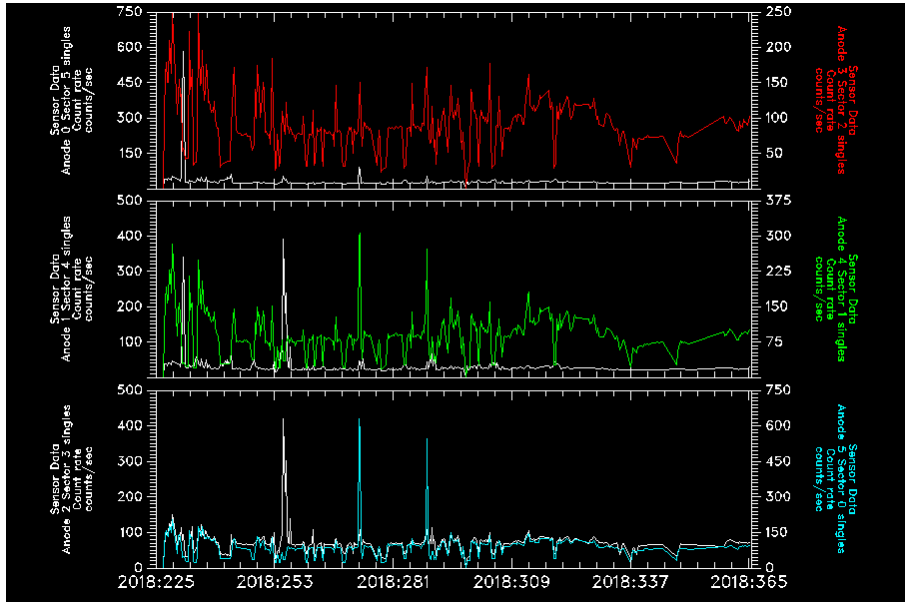


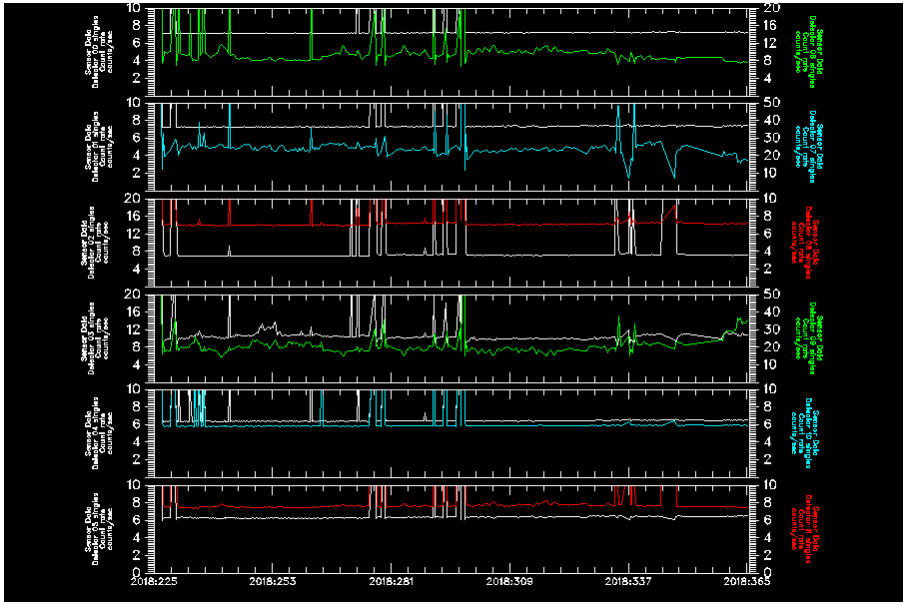


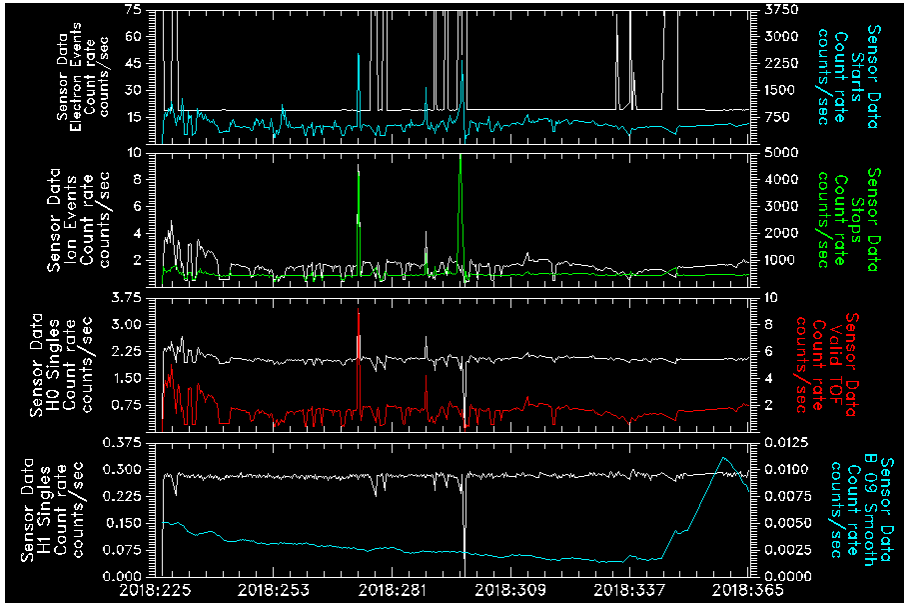


nh-x-pepssi-3-kem1-v1.0/data
Flux B Anode Singles, Detector Singles, & Events

(PEPSSI6_3FluxB_AnodeSingles_KEM0.gif, PEPSSI6_3FluxB_DetectorSingles_KEM0.gif, PEPSSI6_3FluxB_Events_KEM0.gif)

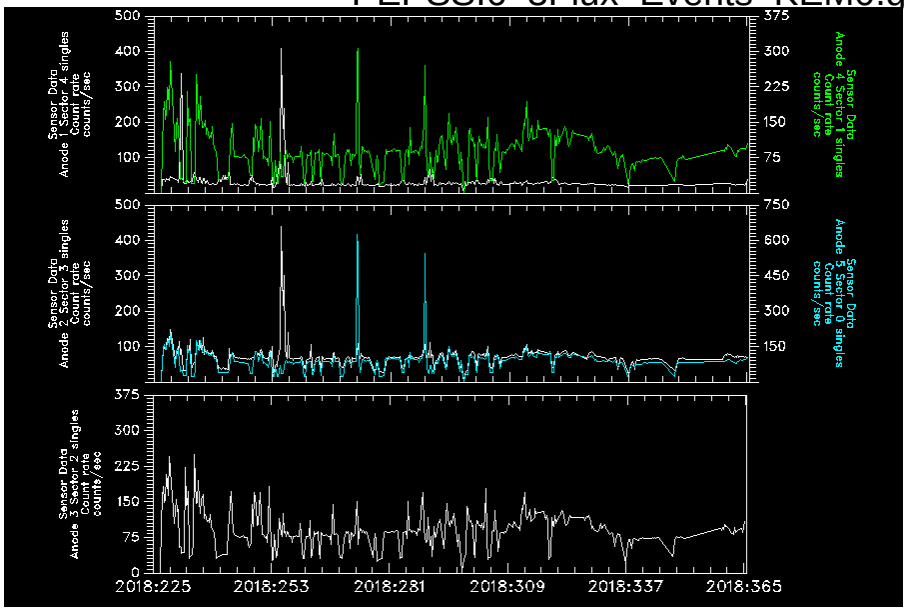


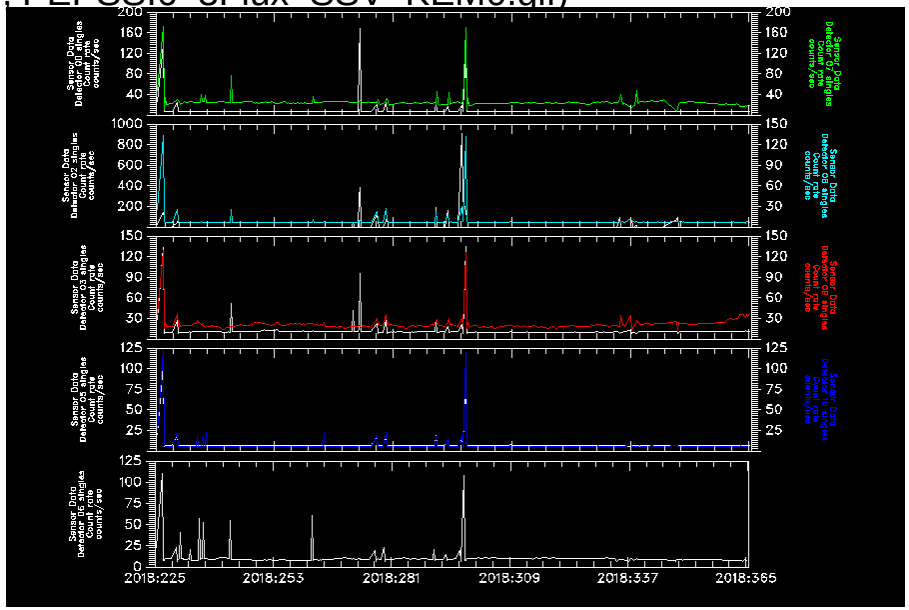


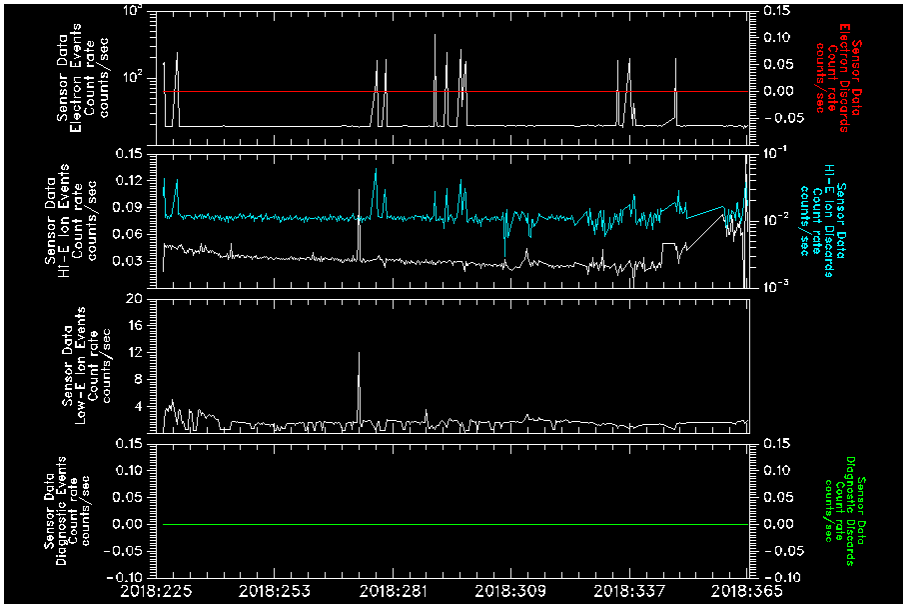


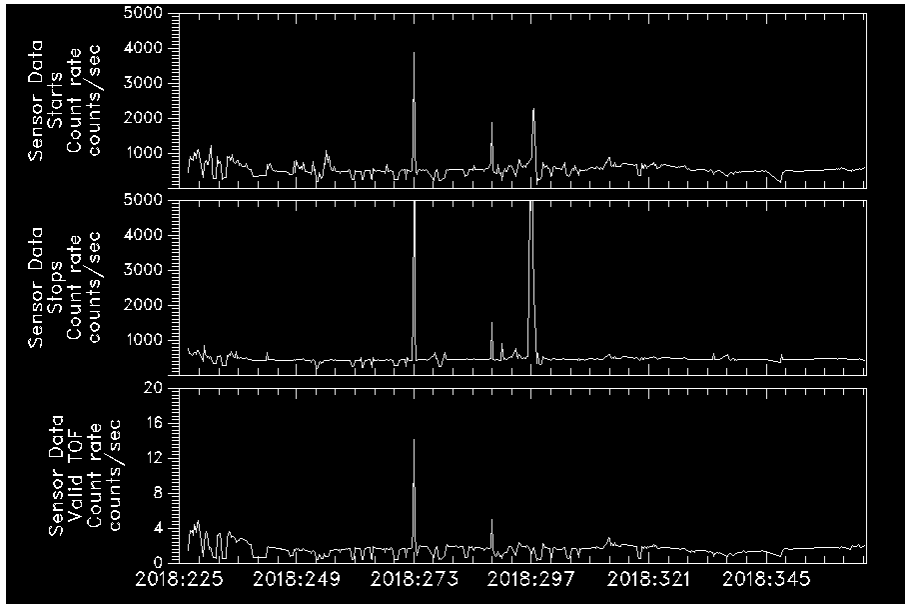
nh-x-pepssi-3-kem1-v1.0/data
Flux HDU Anode Singles, Detector Singles, Events, & Start-Stop-Valid

(PEPSSI6_3Flux_AnodeSingles_KEM0.gif, PEPSSI6_3Flux_DetectorSingles_KEM0.gif, PEPSSI6_3Flux_Events_KEM0.gif, PEPSSI6_3Flux_SSV_KEM0.gif)



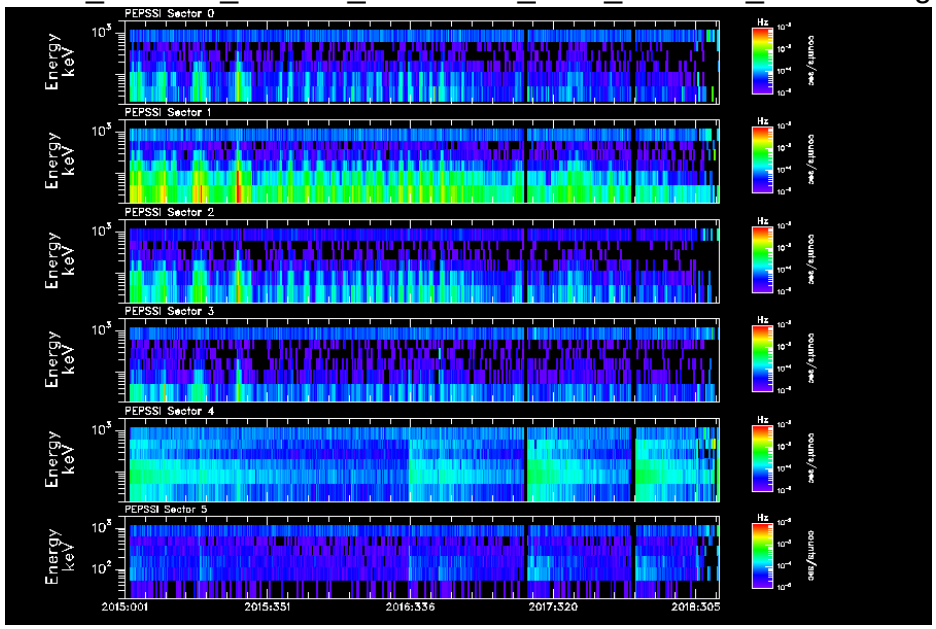


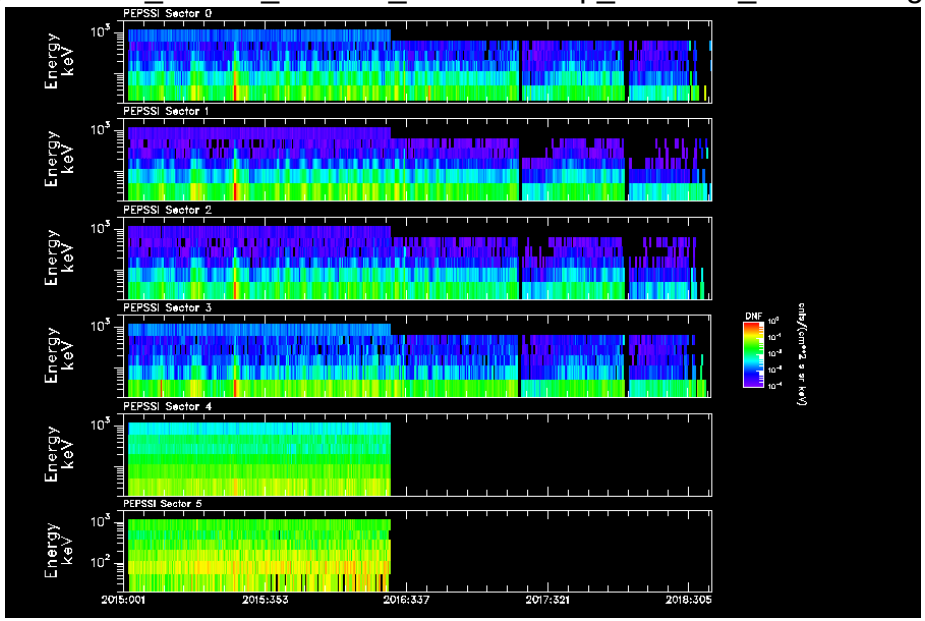


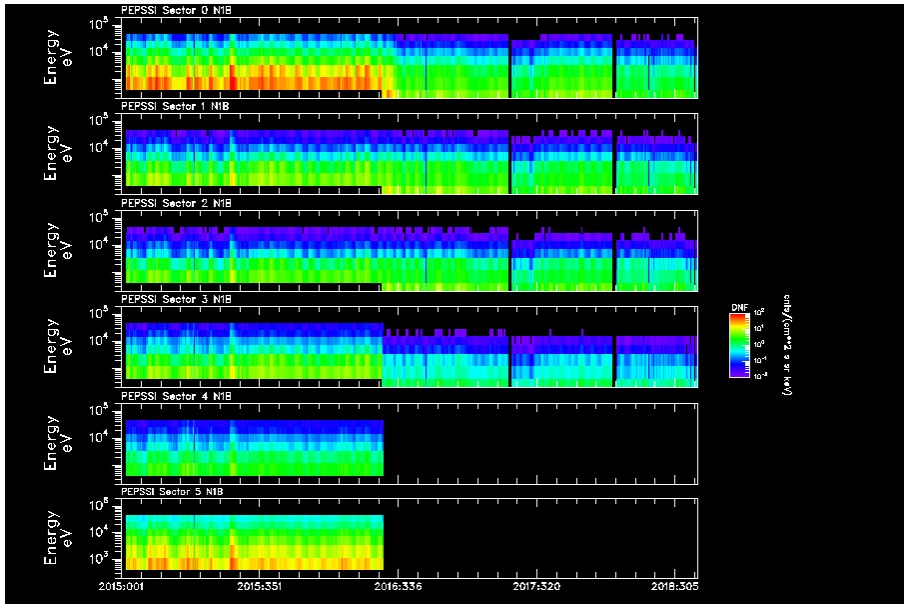


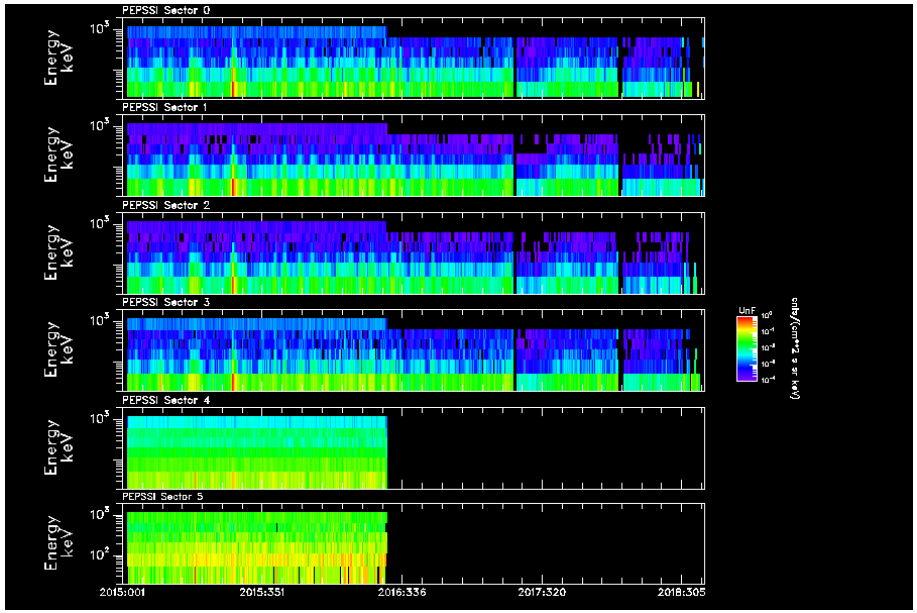
nh-x-pepssi-3-kemcruise1-v2.0/data
nh-x-pepssi-3-kem1-v1.0/data
B Flux Protons/Uncertainty & L Flux Protons

(PEPSSI6_3BFlux_Protons_CPSvskeV_2015001_20190010.gif, PEPSII6_3BFlux_Protons_DNFvskeV_2015001_20190010.gif, PEPSII6_3LFluxB_Protons_DNFvskeV_KEM_2015001_20190010.gif, PEPSSI6_3BFlux_Protons_UNCvskeVup_2015001_20190010.gif)



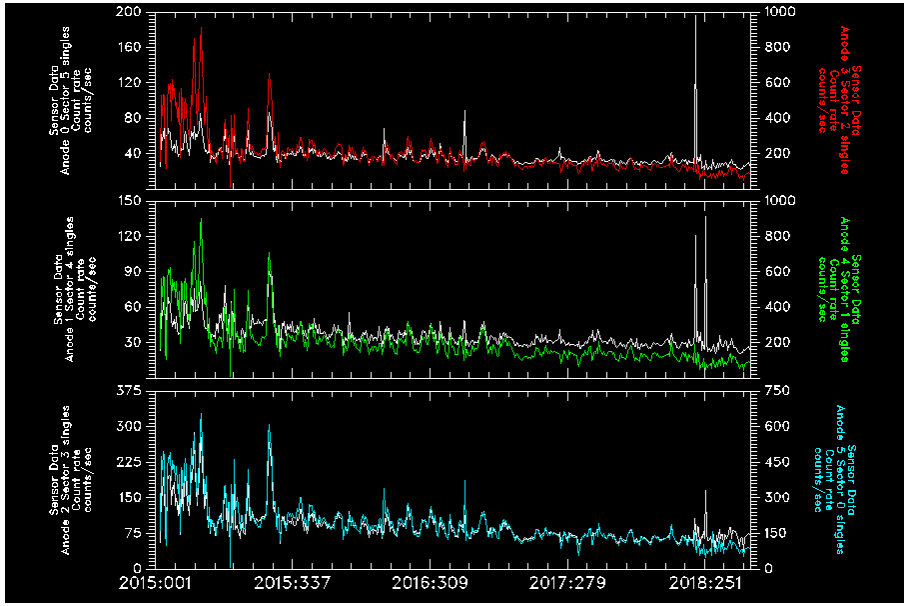


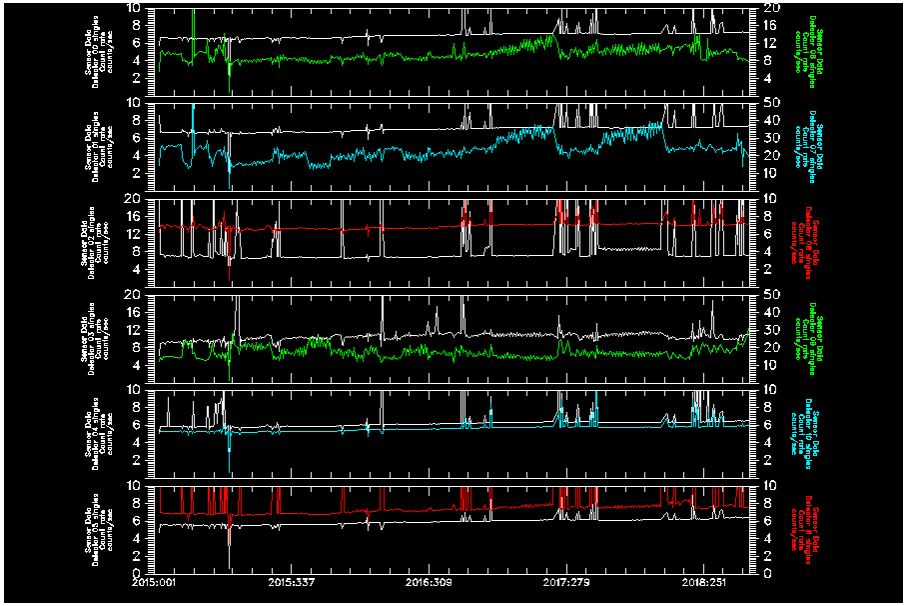


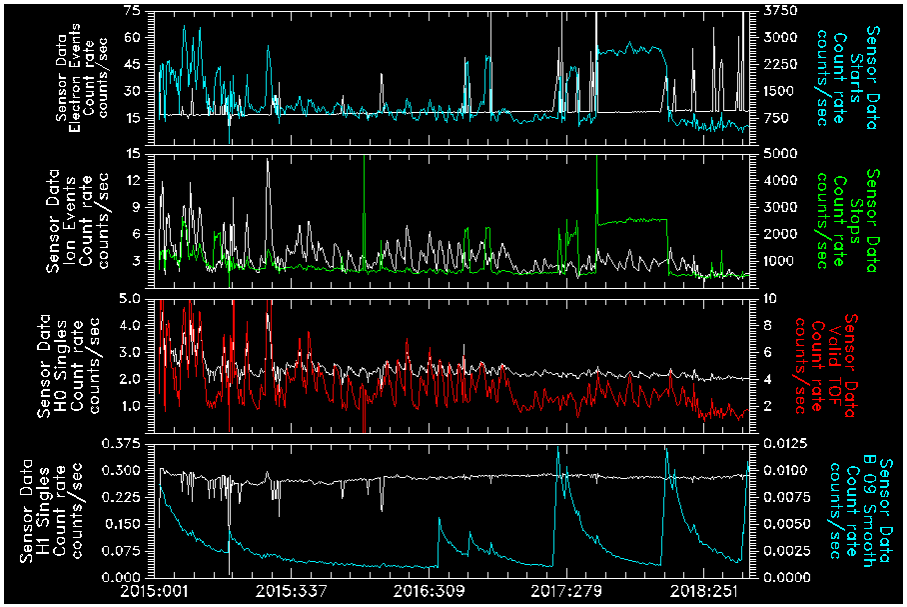


nh-x-pepssi-3-kemcruise1-v2.0/data
nh-x-pepssi-3-kem1-v1.0/data
Flux B Anode Singles, Detector Singles, & Events

(PEPSSI6_3FluxB_AnodeSingles_2015001_20190010.gif, PEPSSI6_3FluxB_DetectorSingles_2015001_20190010.gif, PEPSSI6_3FluxB_Events_2015001_20190010.gif)

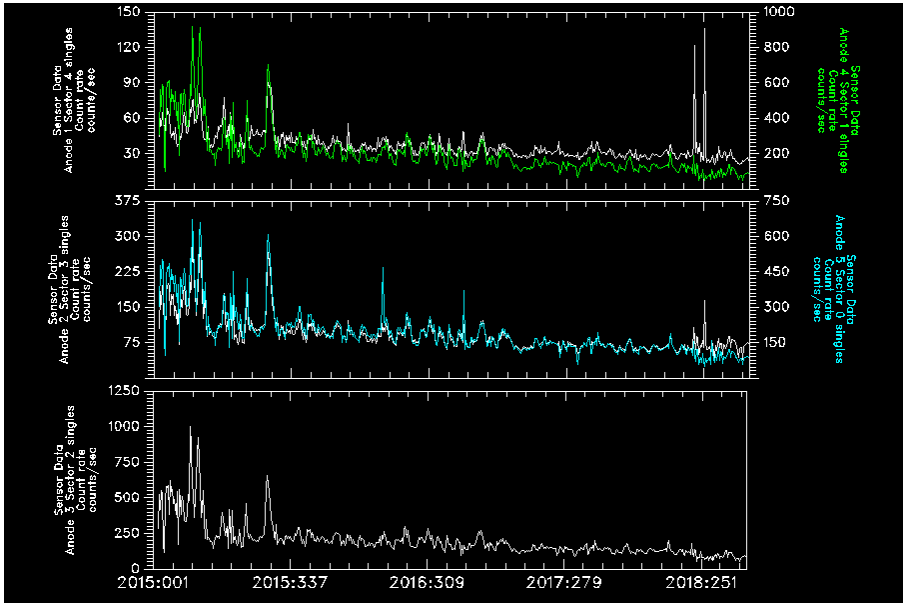


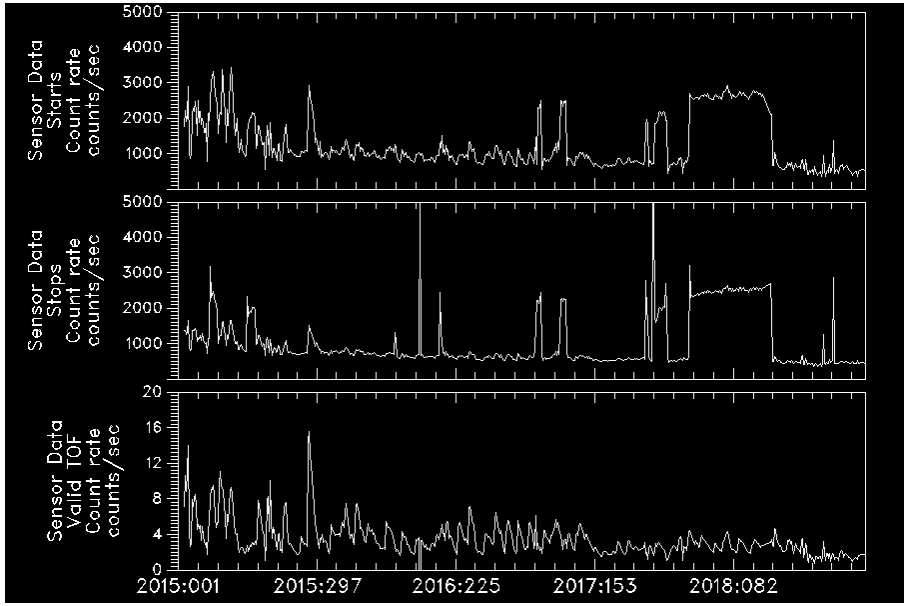




nh-x-pepssi-3-kemcruise1-v2.0/data
nh-x-pepssi-3-kem1-v1.0/data
Flux Anode Singles & Start-Stop-Valid

(PEPSSI6_3Flux_AnodeSingles_2015001_20190010.gif, PEPSSI6_3Flux_SSV_2015001_20190010.gif)





nh-x-pepssi-2-kemcruise1-v2.0/data
nh-x-pepssi-2-kem1-v1.0/data

The level 2 data were not processed and plotted for this review - only the level 3 data were processed and plotted. This was done in order to compare PEPSSI data with SWAP data.

PEPSSI Review Summary

The PEPSSI data sets appear to be in good shape – there are many parameters to review and very difficult to review everything. However, the data that were reviewed look good, and in my opinion, the PEPSSI data sets are ready for public consumption. However, there are some minor issues/clarifications (indicated in this review) that should be addressed before release.