SDC PDS Review

KEM Encounter Data: 2018-08-14 to 2019-07-28

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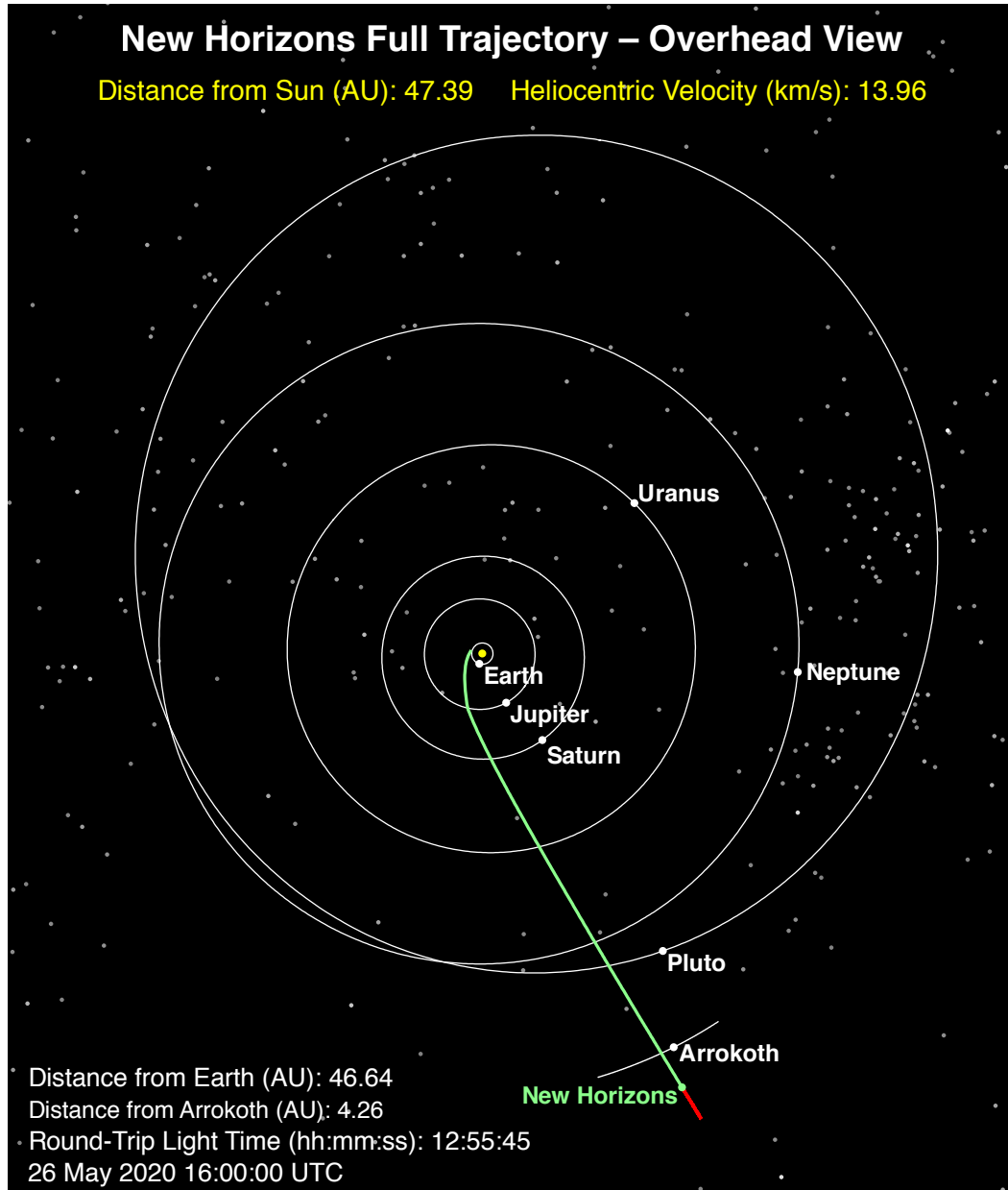May 28, 2020

SDC Instrument

Detector Assembly

Intraharness
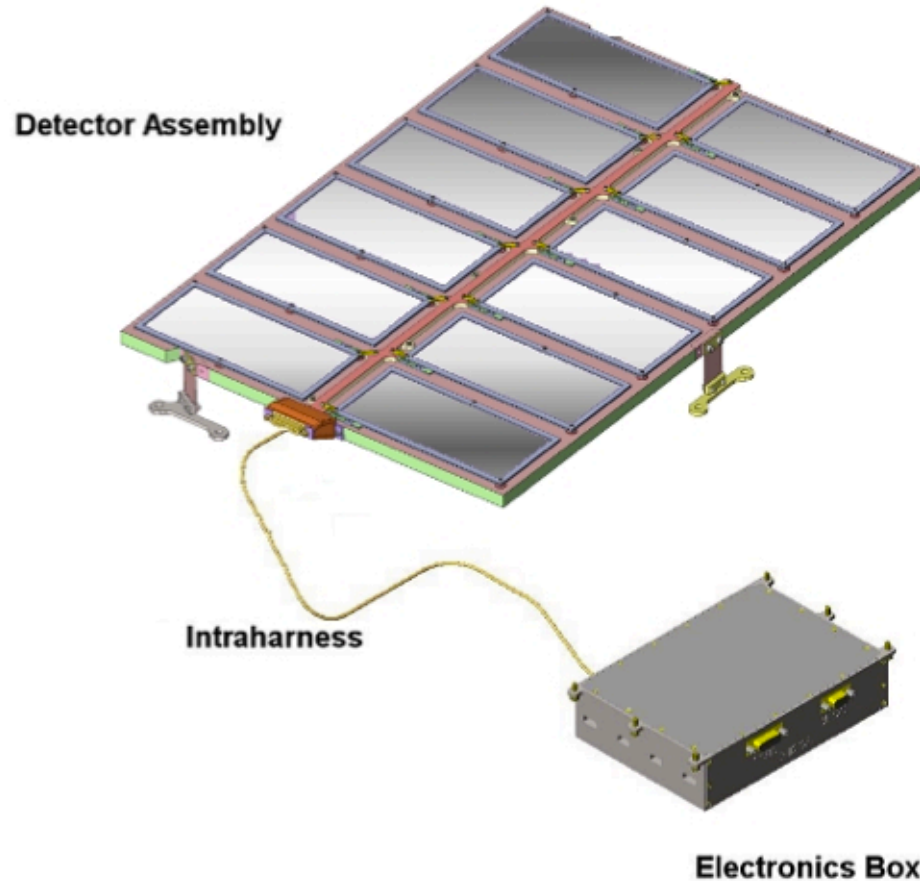
Electronics Box

SDC instrument:
- 14 detectors: 12 science (with 1 defunct), 2 reference
- electronics box for signal processing, telemetry/commands

Current Release

New Horizons Full Trajectory – Overhead View

Distance from Sun (AU): 47.39   Heliocentric Velocity (km/s): 13.96

Uranus

Neptune

Earth

Jupiter

Saturn

Pluto

Arrokoth

New Horizons

Distance from Earth (AU): 46.64
Distance from Arrokoth (AU): 4.26
Round-Trip Light Time (hh:mm:ss): 12:55:45
26 May 2020 16:00:00 UTC

Current dataset:

- KEM Encounter
- Aug 2018 to July 2019

KEM Encounter

KEM Encounter: SDC Raw Data

Index	Extension	Type	Dimension	View				
☐ 0	Primary	Image	0	Header	Image		Table	
☐ 1	DATA	Binary	6 cols X 32 rows	Header	Hist	Plot	All	Select
☐ 2	HOUSEKEEPING_SDC	Binary	9 cols X 0 rows	Header	Hist	Plot	All	Select
☐ 3	HOUSEKEEPING_0X004	Binary	37 cols X 1 rows	Header	Hist	Plot	All	Select
☐ 4	HOUSEKEEPING_0X00D	Binary	8 cols X 1 rows	Header	Hist	Plot	All	Select
☐ 5	HOUSEKEEPING_0X00A	Binary	5 cols X 1 rows	Header	Hist	Plot	All	Select
☐ 6	THRUSTERS	Binary	28 cols X 0 rows	Header	Hist	Plot	All	Select

Total Columns: 6
Total Rows : 32

Selected columns for display

■ Copy Number
■ Channel ID
■ Zero Fill
■ Threshold
■ Magnitude
■ Time Stamp

Display Table

Select All

Clear All

Cancel

Help

Includes SDC raw scientific data, SDC housekeeping (engineering telemetry), New Horizons spacecraft housekeeping (0x004, 0x00D, 0x00A), and New Horizons thruster firing fata

The SDC raw scientific data includes channel (detector) number, data threshold, data magnitude, and time stamp

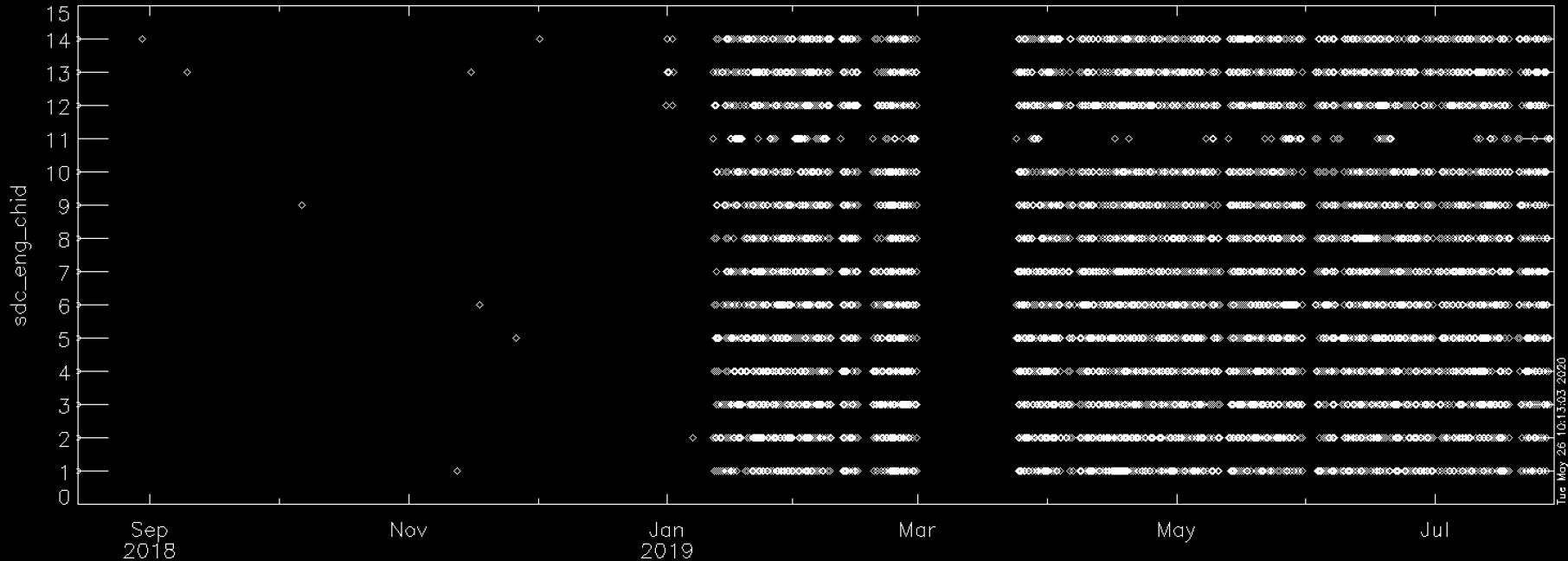# KEM Encounter: SDC Raw Data
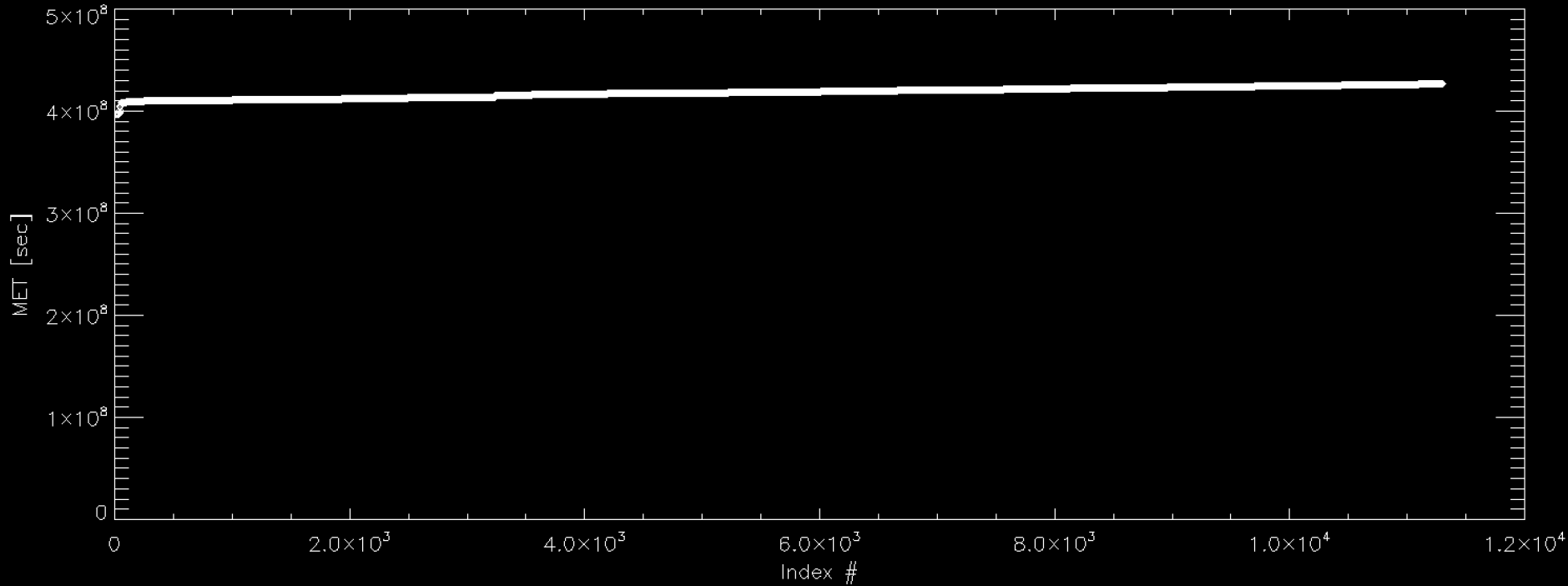
Plot of Mission Elapsed Time vs. entry looks good

Total number of events: 11,302

Time period covers: Aug 15, 2018 – Jul 28, 2019

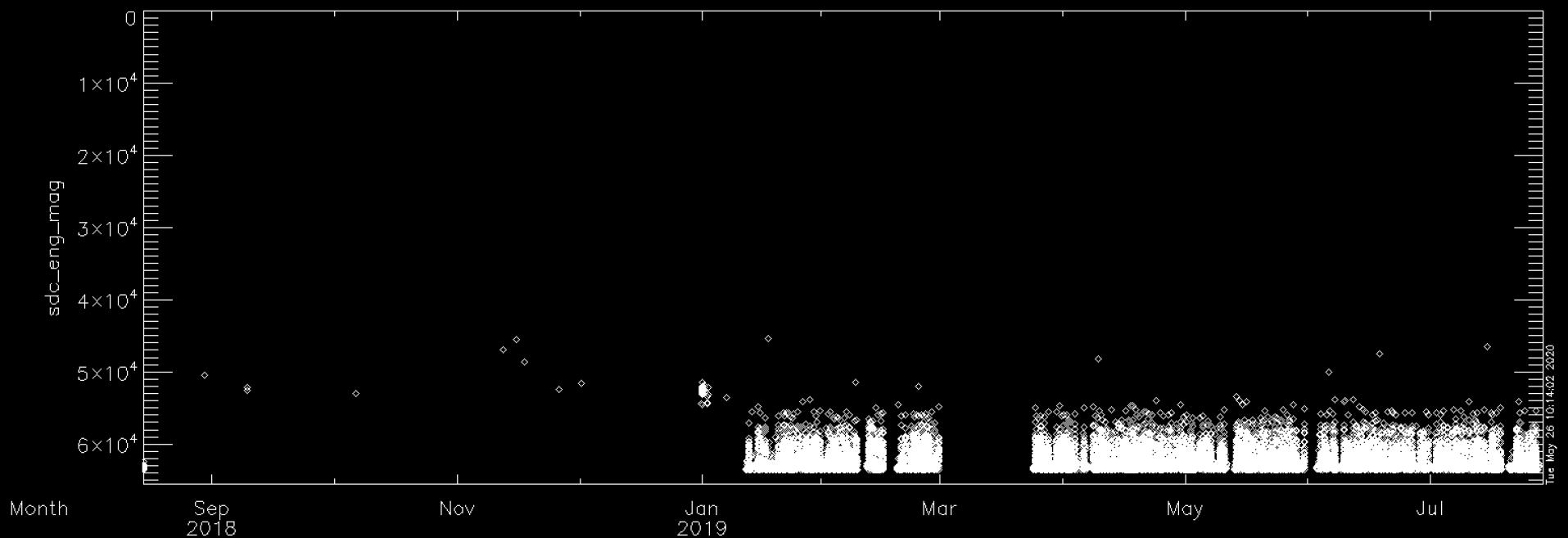# KEM Encounter: SDC Raw Data

Channel ID# versus Time looks good
    Very few hits leading up to Jan 1 encounter as expected from high thresholds

Total number of events: 11,302

Time period covers: Aug 15, 2018 – Jul 28, 2019

KEM Encounter: SDC Raw Data

Magnitude versus Time looks good
    Very few hits leading up to Jan 1 encounter as expected from high thresholds

Total number of events: 11,302

Time period covers: Aug 15, 2018 – Jul 28, 2019

KEM Encounter: SDC Calibrated Data

Index	Extension	Type	Dimension	View				
☐ 0	Primary	Image	0	Header	Image		Table	
■ 1	CALIBRATED_DATA	Binary	10 cols X 32 rows	Header	Hist	Plot	All	Select

**Total Columns: 10**
Total Rows   : 32

Selected columns for display

- ■ UTC_TIME
- ■ MET
- ■ CHANNEL
- ■ CHARGE
- ■ MASS
- ■ MASS_THRSH
- ■ M_SIGPLUS
- ■ M_SIGMINUS
- ■ QUALITY_FLAG
- ■ IMP_VEL

Display Table

Select All

Clear All

Cancel

Help

Includes SDC calibrated scientific data

The SDC calibrated scientific data includes time, channel, charge, mass, mass threshold, error bars, quality flag, and theoretical SDC-dust relative impact velocity

KEM Encounter: SDC Calibrated Data
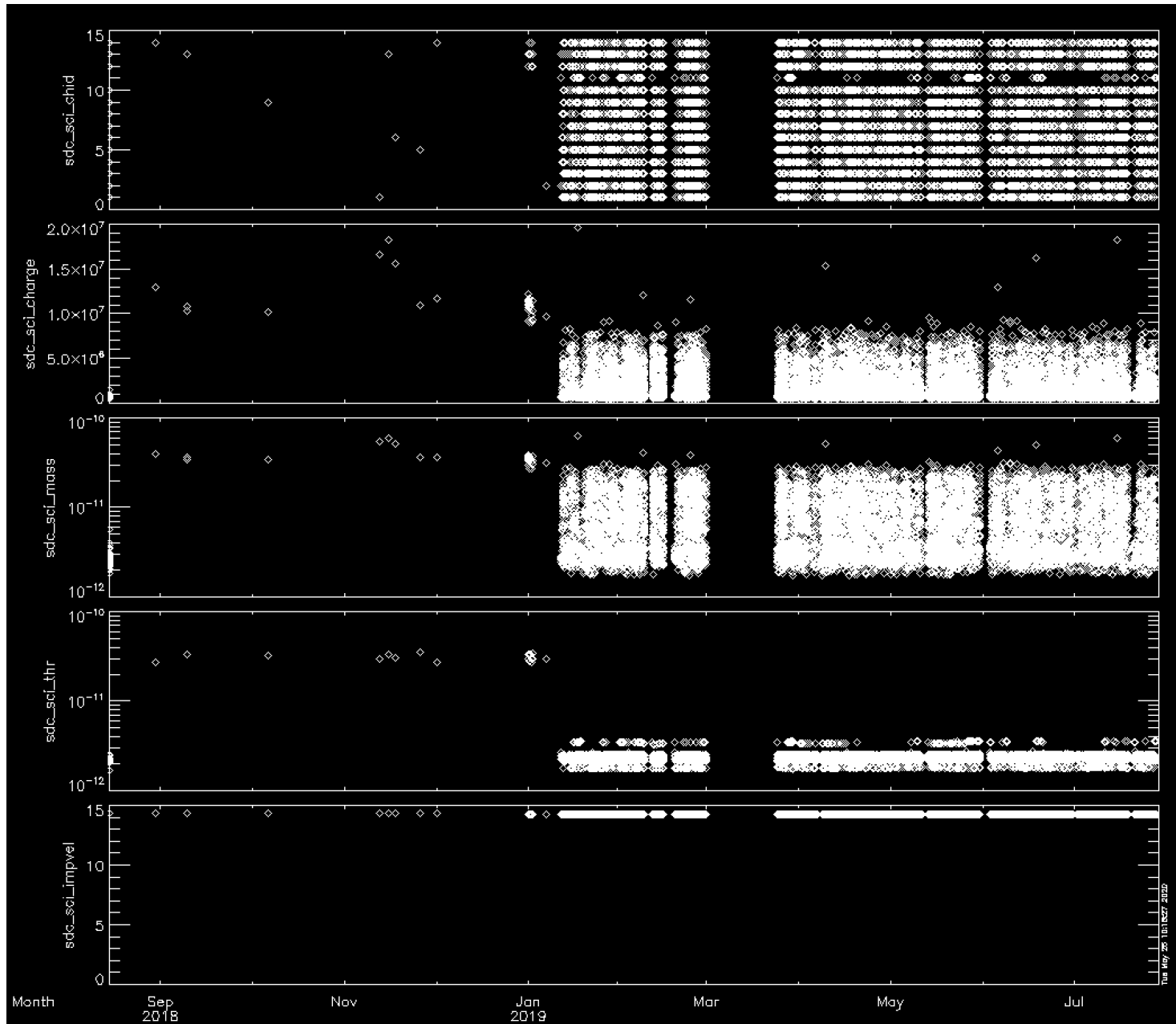
Issues:

- In the *document/* folder, there are a collection of variously formatted "ON/OFF" timing data files which allow the user to reconstruct hit rates from the data itself; **however: current files are only up to around February 2019**. **Should be updated.**

- In the *document/* folder, there is a figure 'nh_pos_vel_angle.png', which is only current up to ~2017; **should be updated**

- In the *document/* folder, there is an 'sdcram.csv' file which documents the angle between the SDC boresight and NH spacecraft velocity vectors; however, it is only current up to the end of 2017; **does this need to be updated as well?**

Completeness:

- The delivered dataset has a complete set of files and documentation
- Adequate completeness of each data record (i.e., one dust hit)

Intelligibility:

- Documentation is adequate and straightforward
- SDC data are intelligibly formatted through FITS files, both raw and calibrated
- Metadata are straightforward through ASCII implementation

Interpretability:

- Given the relatively simple nature of SDC operations, the data are straightforwardly interpretable; no issues noted here

Issues:
- See previous slide