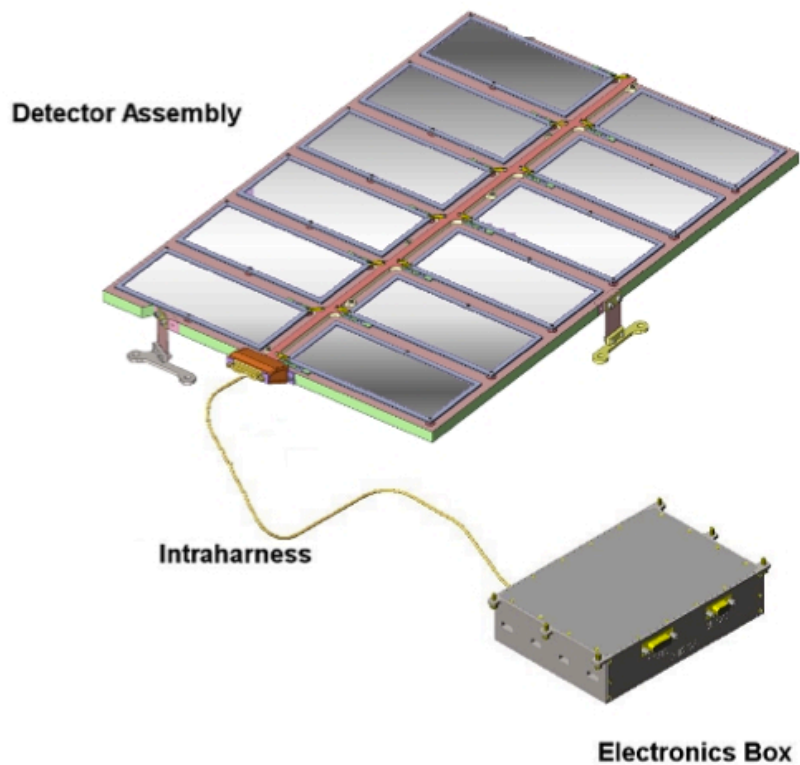


SDC PDS Review

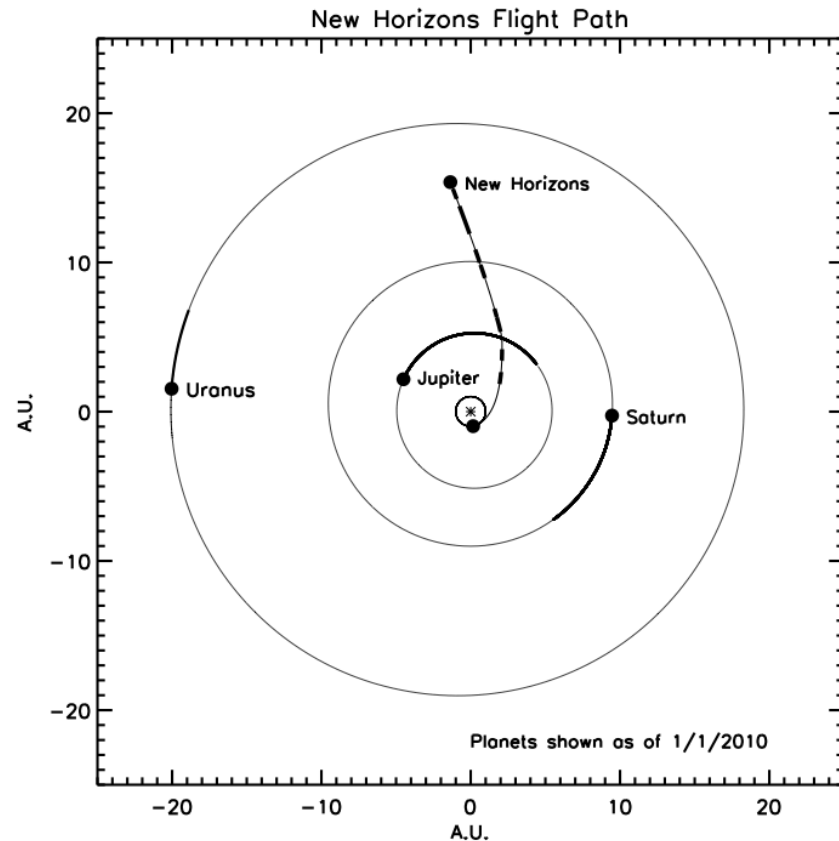
Cruise Data: June 2007 to July 2010

A. Poppe
UC Berkeley



SDC instrument:

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



SDC launch, jupiter, and cruise datasets cover 1/2006 to 7/2010, Earth to approximately the orbit of Uranus

Comments to SDC documentation:

1. in `sdc-3-plutocruise / catalog / sdc.cat`: Does there need to be some discussion of the failure of SDC channel 11?
2. in the `soc_inst_icd.pdf`, Section 13.3.2: SDC Calibration - Mass: The description here is out-of-date and has been superseded by research reported in James et al., 2010. This section should be updated to reflect the different calibration used for the SDC detectors.
3. In `sdc-3-plutocruise / document : "nh_mission_trajectory.*"` is not in the `docinfo.txt`.

SDC Pluto Cruise: Raw Data

Index	Extension	Type	Dimension	View				
<input type="checkbox"/> 0	Primary	Image	0	Header	Image	Table		
<input type="checkbox"/> 1	DATA	Binary	6 cols X 32 rows	Header	Hist	Plot	All	Select
<input type="checkbox"/> 2	HOUSEKEEPING_SDC	Binary	9 cols X 0 rows	Header	Hist	Plot	All	Select
<input type="checkbox"/> 3	HOUSEKEEPING_0X004	Binary	37 cols X 1 rows	Header	Hist	Plot	All	Select
<input type="checkbox"/> 4	HOUSEKEEPING_0X00D	Binary	8 cols X 1 rows	Header	Hist	Plot	All	Select
<input type="checkbox"/> 5	HOUSEKEEPING_0X00A	Binary	5 cols X 1 rows	Header	Hist	Plot	All	Select
<input type="checkbox"/> 6	THRUSTERS	Binary	28 cols X 0 rows	Header	Hist	Plot	All	Select

Total Columns: 6
Total Rows : 32

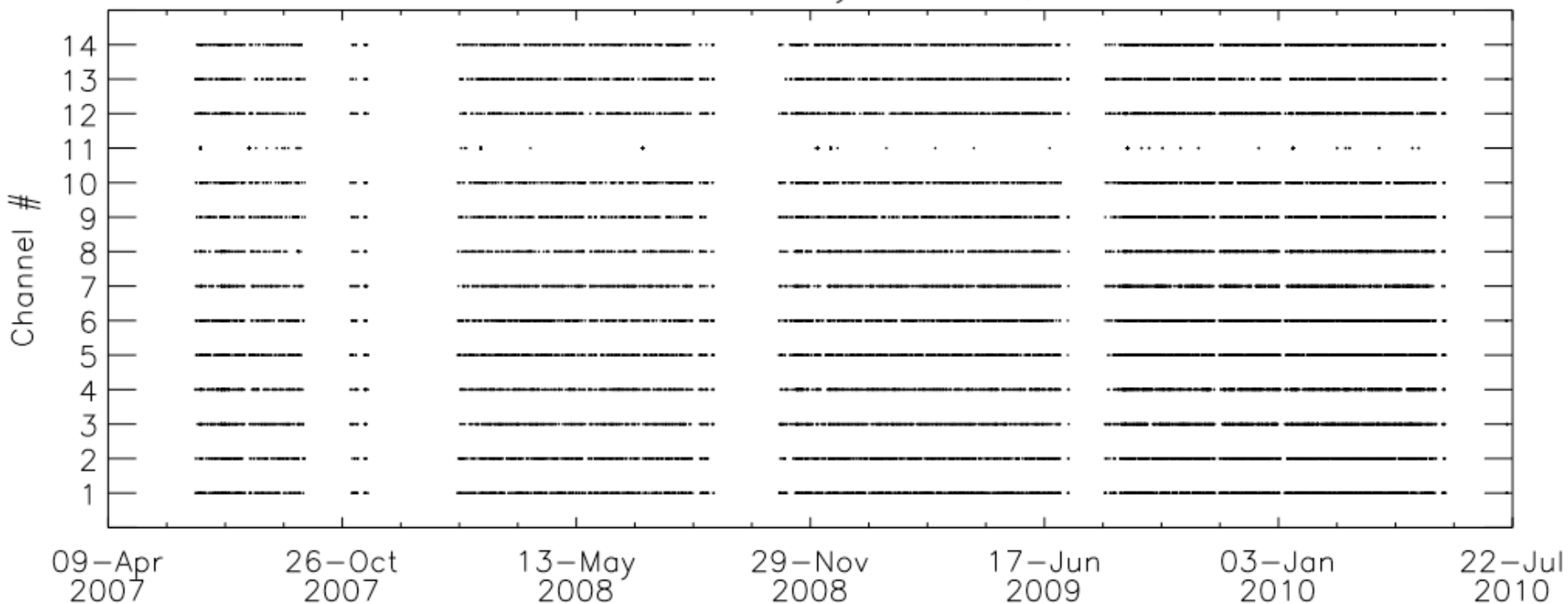
Selected columns for display

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

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

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

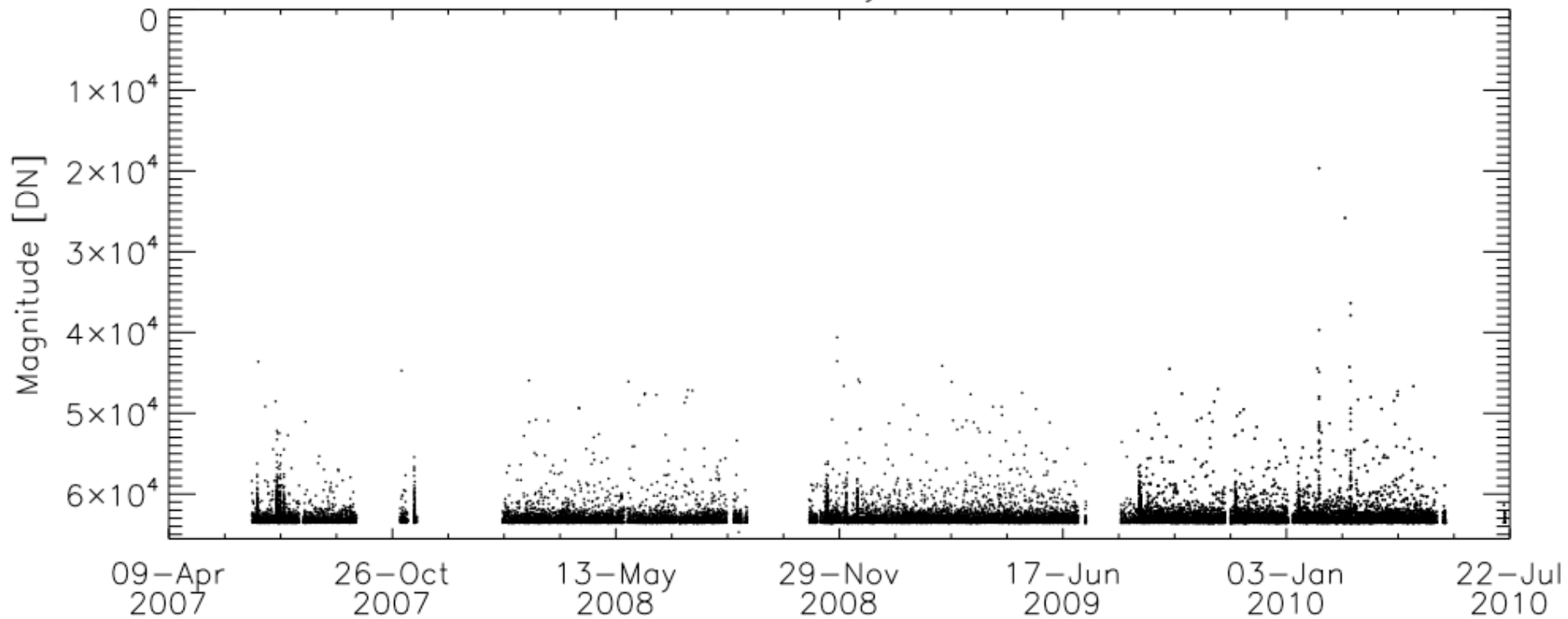
SDC Cruise Data by Channel, Time



SDC cruise data taken in large chunks (9-11 months) each year

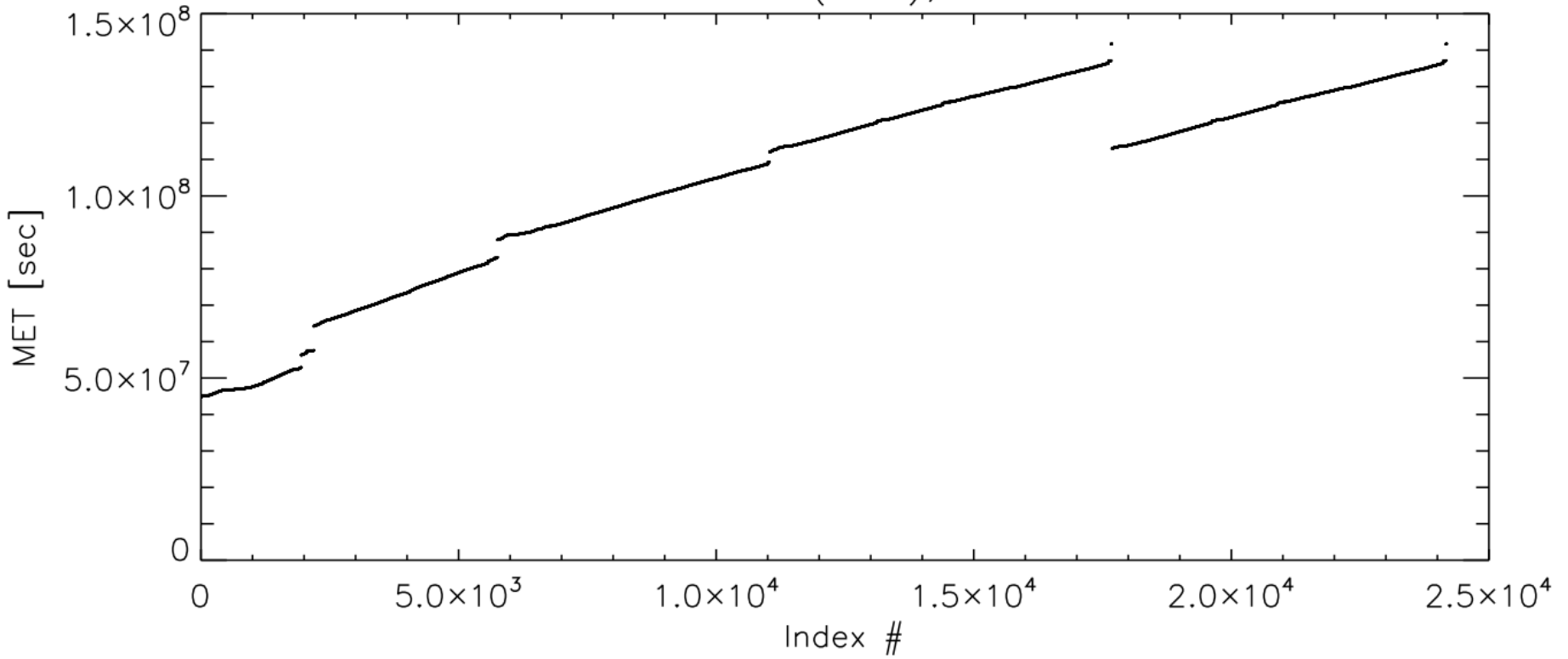
Note the failure of channel #11

SDC Cruise Data by Channel, Time



Note that the SDC magnitude scale is inversely proportional to the size of the impact (ranges from 65535 – 0 DN)

SDC Cruise Data (Raw), MET vs. Index



Duplicated data in plutocruise
raw dataset?

Plot of Mission Elapsed Time vs entry seems to indicate duplicated data

SDC Pluto Cruise: Calibrated Data

Index	Extension	Type	Dimension	View				
<input type="checkbox"/> 0	Primary	Image	0	Header	Image	Table		
<input checked="" type="checkbox"/> 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

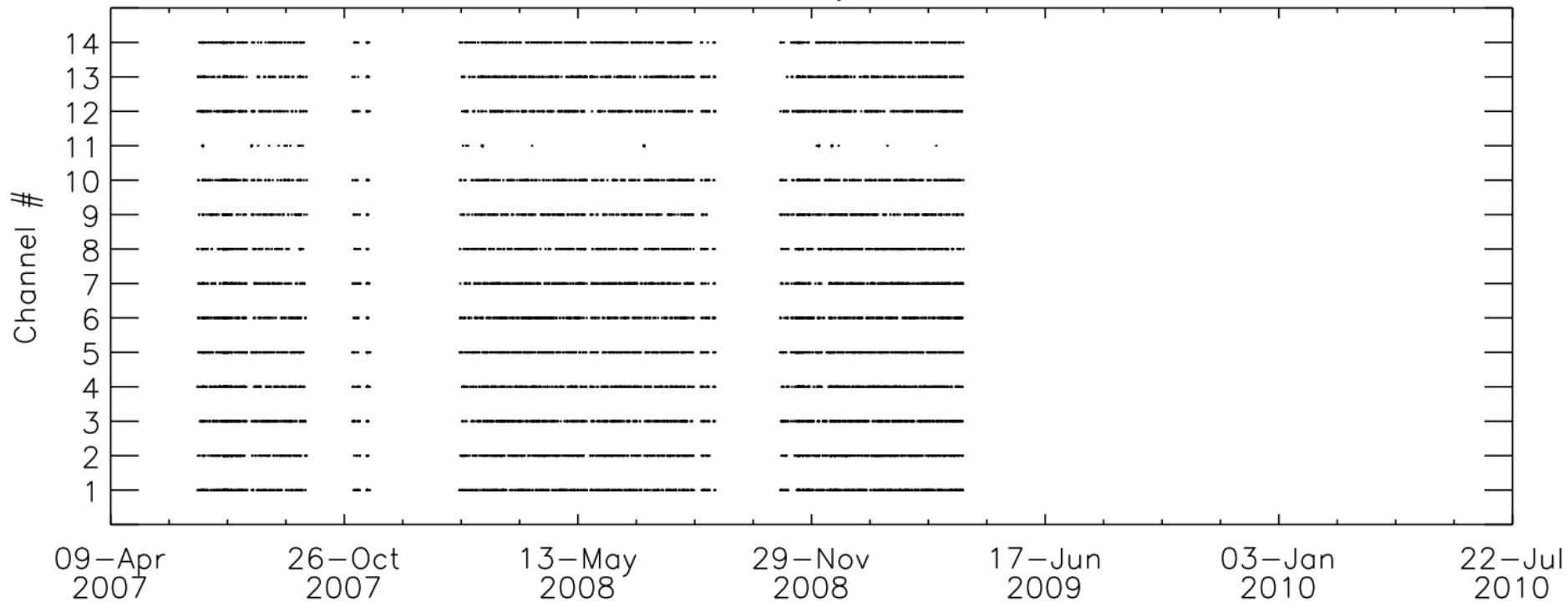
Cancel

Help

Includes SDC calibrated scientific data

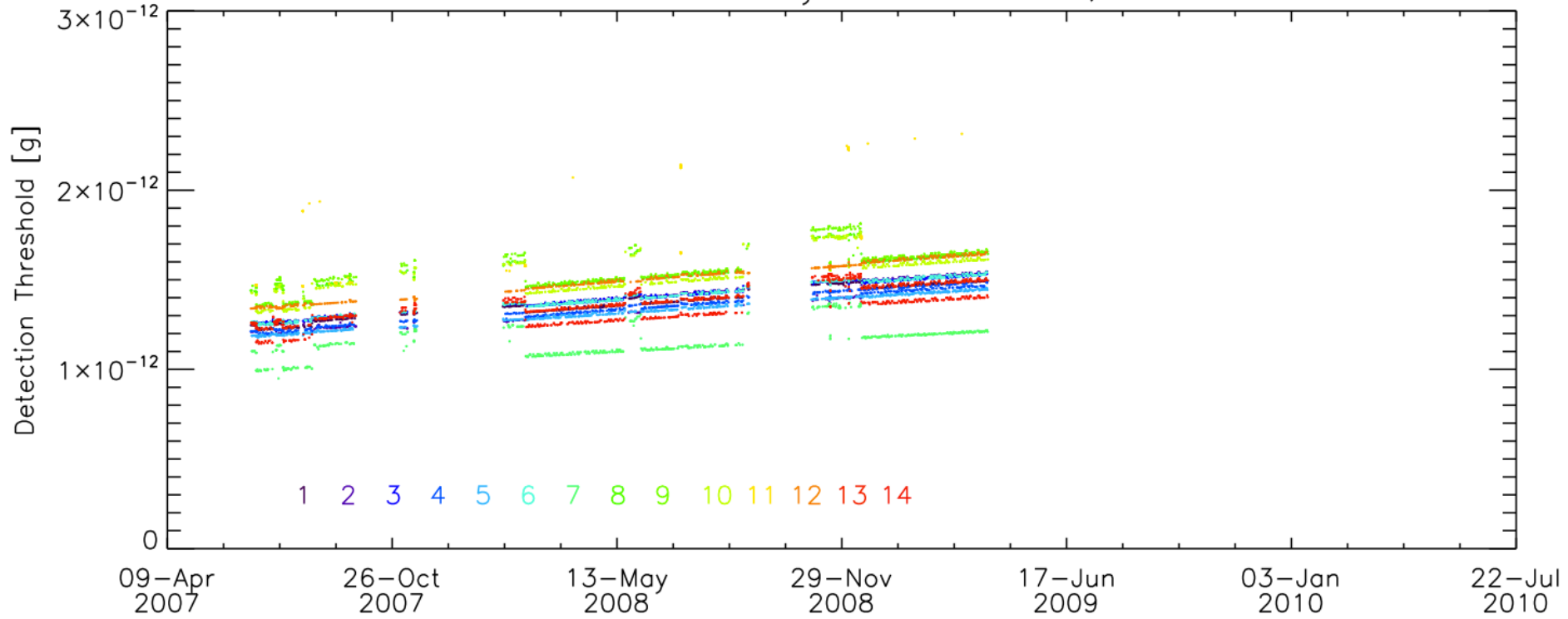
The SDC calibrated scientific data includes time, channel, charge, mass, mass threshold, error bars, quality flag, and theoretical SDC-dust relative impact velocity

SDC Cruise Data by Channel, Time



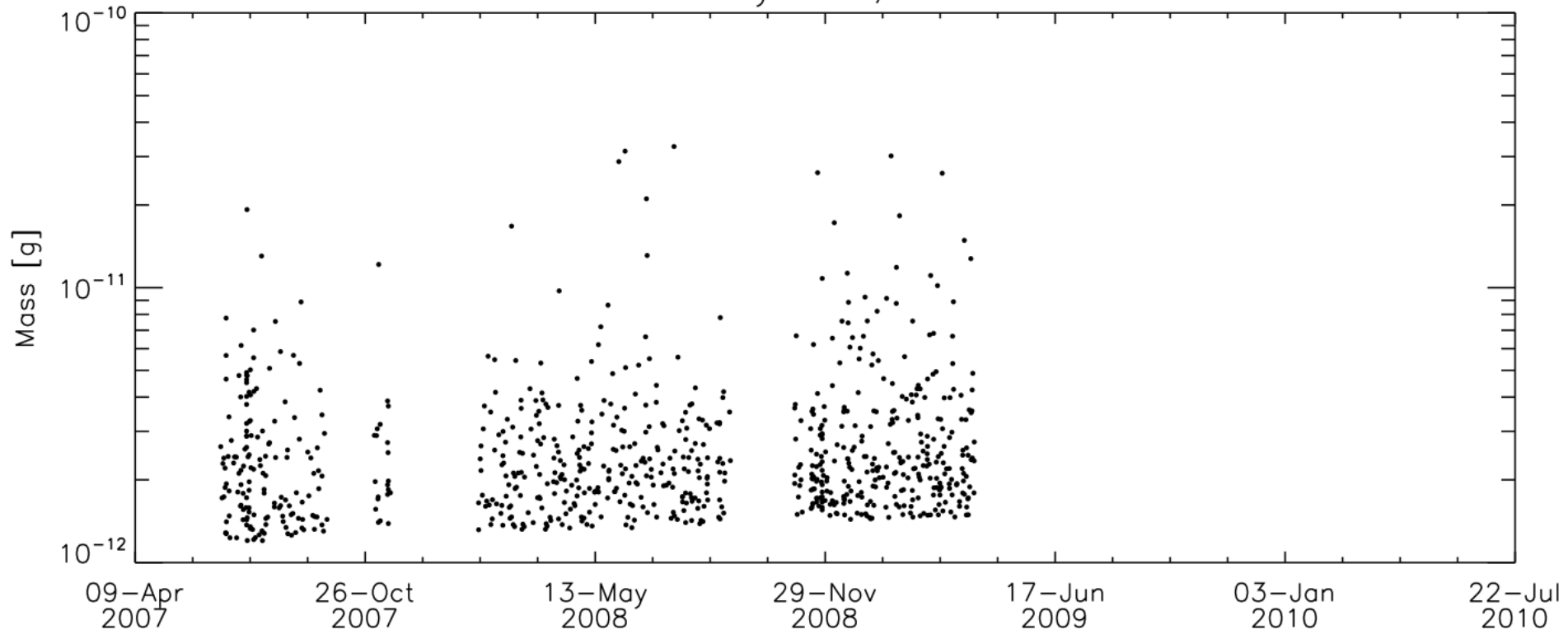
Missing data in plutocruise calibrated dataset?

SDC Cruise Data by Mass Threshold, Time



Missing data in plutocruise
calibrated dataset?

SDC Cruise Data by Mass, Time – Channel 1



Missing data in plutocruise
calibrated dataset?

Comments to SDC dataset:

1. in sdc-2-plutocruise / data: why is the timestamp negative in the engineering SDC FITS files? (**need to use /unsigned keyword in MRDFITS.pro on Mac OSX, IDL 7.1**)
2. In sdc-2-plutocruise / data: is there a large chunk of duplicate data store in the folders (mission day approximately 800 to 1100) – folder “data/20100723_014215”?
3. in sdc-3-plutocruise / data : Why do the data only extend through approximately April 2009? There are file folders that are labeled as 2010 data but I always get FITS EOF extension errors when trying to read them in both IDL and with FV.
4. Why is the number of events between plutocruise raw and plutocruise calibrated different (raw = 24,181, calibrated = 9164) – obviously related to both missing calibrated and duplicate raw data?
5. In SDC plutocruise document folder, the SDC on/off times table (sdc_on_off_times_v0077.tab) only contains data up to September 2007. This should be updated to the correct time period of the plutocruise data (June 07 to July 10).
6. In SDC plutocruise document folder, the nh_trajectory.tab only contains data up to September 2007.

Completeness:

- Some issues with respect to completeness: missing data, duplicate data, metadata provided for wrong time period
- Adequate completeness of each data record (ie., one dust hit)

Intelligibility:

- Documentation has some outdated sections and some minor typos to be fixed
- 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

Typos:

1. in all the .lbl files: "Celsius" is misspelled as "Celcius"
2. in sdc-3-plutocruise / catalog / dataset.cat: under "SDC Data Summary" paragraph, "were" is misspelled as "werre"
3. in sdc-3-plutocruise / catalog / sdc.cat: under "Introduction" 1st paragraph, "usually" is misspelled
4. in sdc-3-plutocruise / extras / extrinfo.txt: the file "sdc_cal_matrix_base.fit" is mistakenly labeled in the text file as "sdc_cal_matrix_base.dat"
5. in sdc-3-plutocruise / extras / extrinfo.txt: Under the description for sdcfit_pdsascii.py, "may" is misspelled as "my"
6. In dataset.cat: Under section "SDC Updates for LAUNCH, Data sets V2.0", paragraph: "New charge-velocity-mass calibration curve", the paragraph mistakenly refers to POPPEETAL2010 but the correct reference is JAMESETAL2010