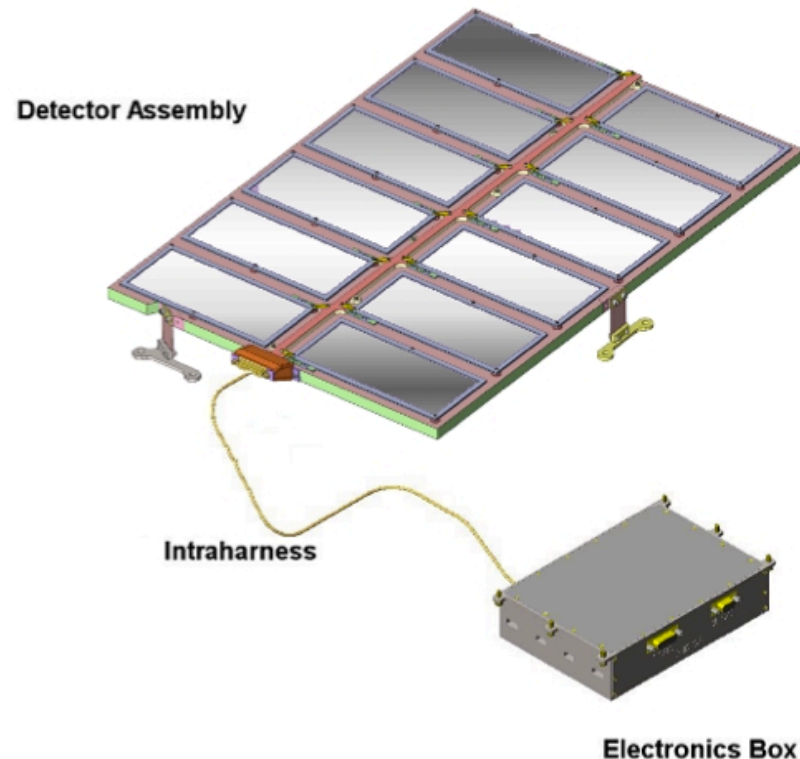


SDC PDS Review

Cruise Data: June 2007 to August 2014

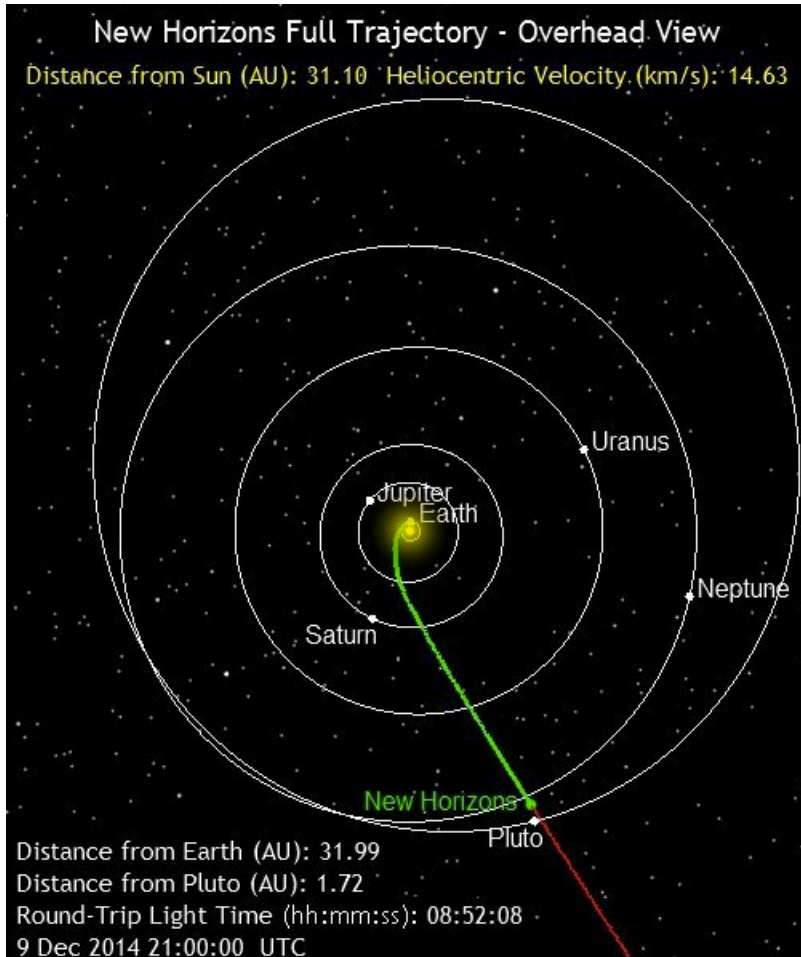
A. R. Poppe
UC Berkeley

SDC Instrument



SDC instrument:

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



Three main data periods released by SDC:

- Launch: March 2006 – Dec 2006, mainly testing and checkout of instrument
- Jupiter: Dec 2006 – June 2007, small chunk of data taken post-Jupiter fly-by (note SDC was not on during close approach of Jupiter)
- Pluto-cruise: June 2007 – July 2014, main period of scientific data collection by SDC between the orbits of Jupiter and Pluto

SDC launch, jupiter, and cruise datasets cover 1/2006 to 7/2014, Earth to approximately the orbit of Neptune

SDC 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

Display Table

Select All

Clear All

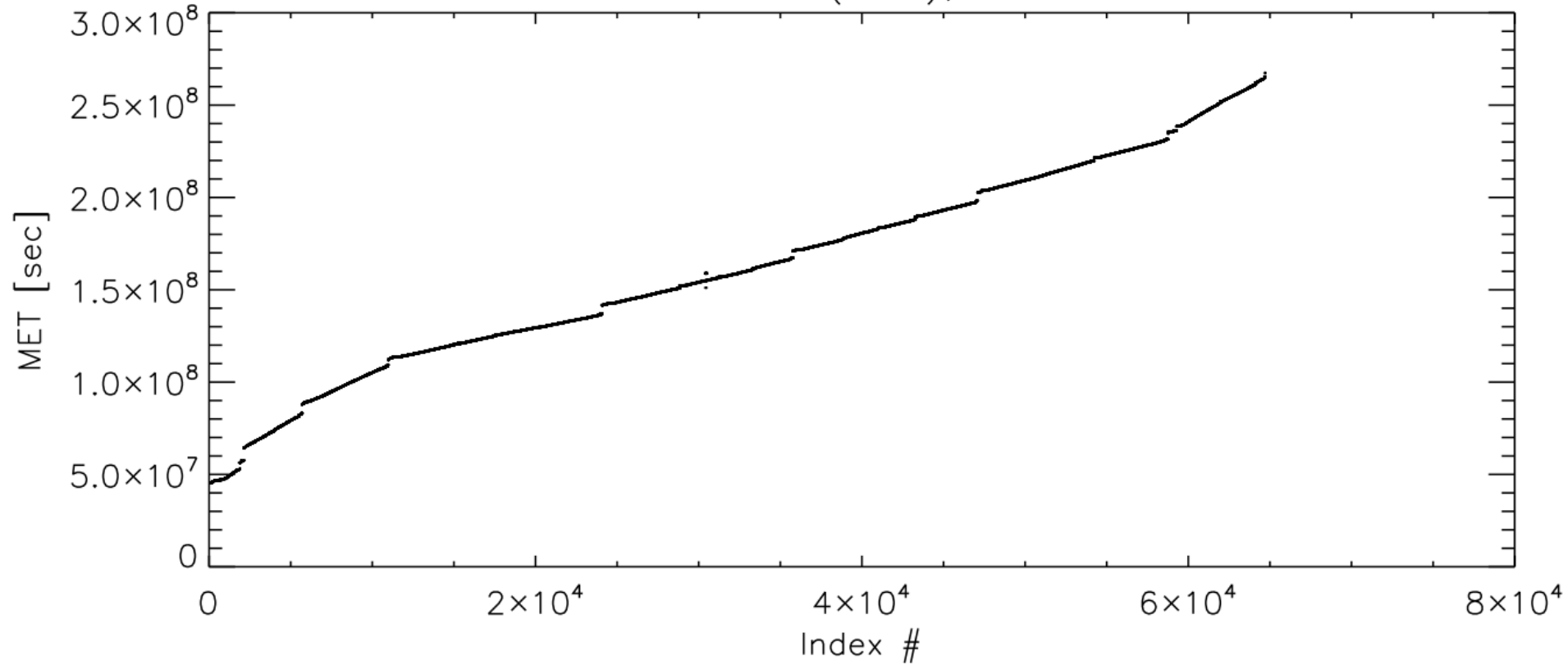
Cancel

Help

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

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

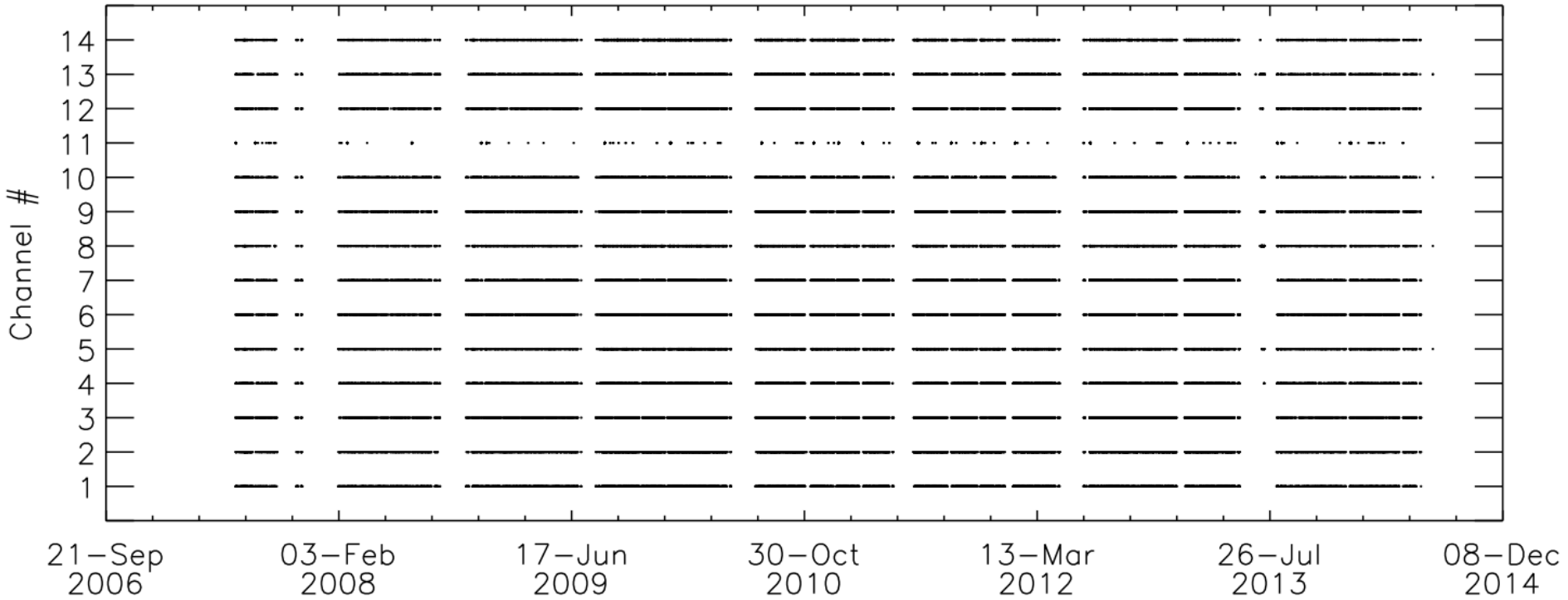
SDC Cruise Data (Raw), MET vs. Index



Plot of Mission Elapsed Time vs entry looks good

Rate increase noted at about event #58,000 but that could be actual “science”

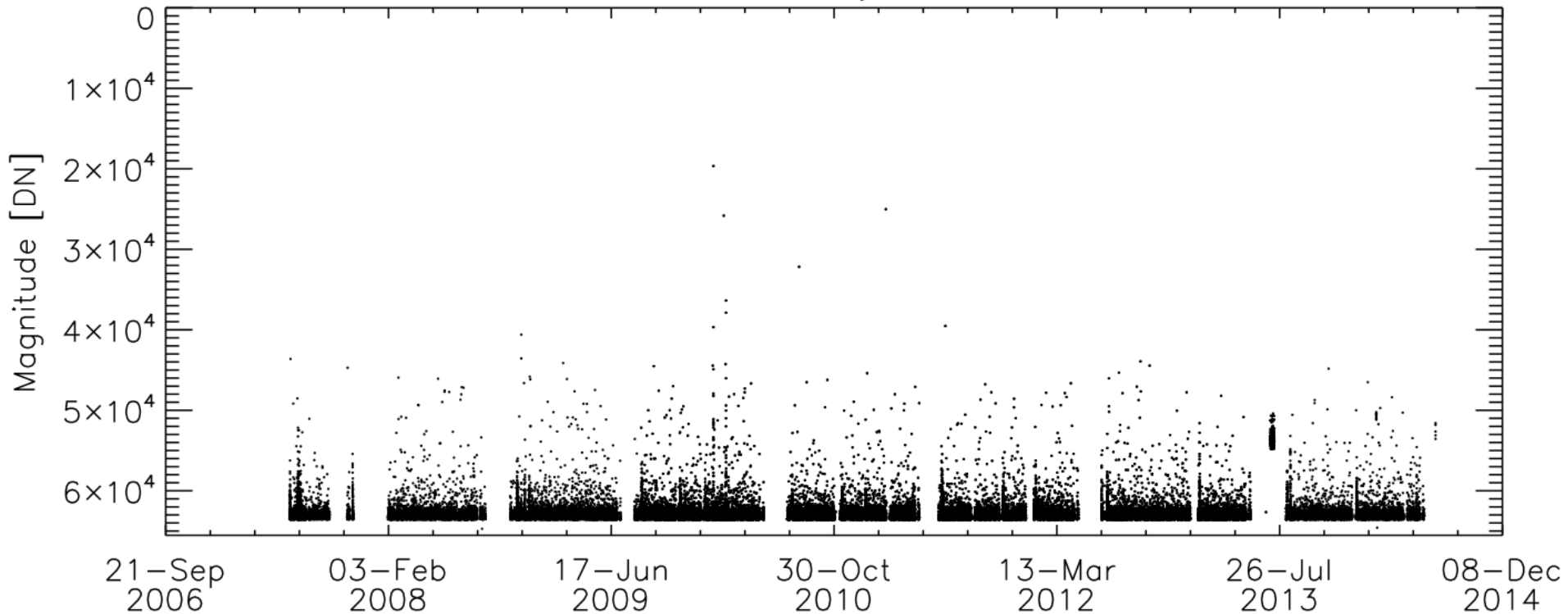
SDC Cruise Data by Channel, Time



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)

July 2013 event? Correlates with a Stimulus calibration

SDC 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

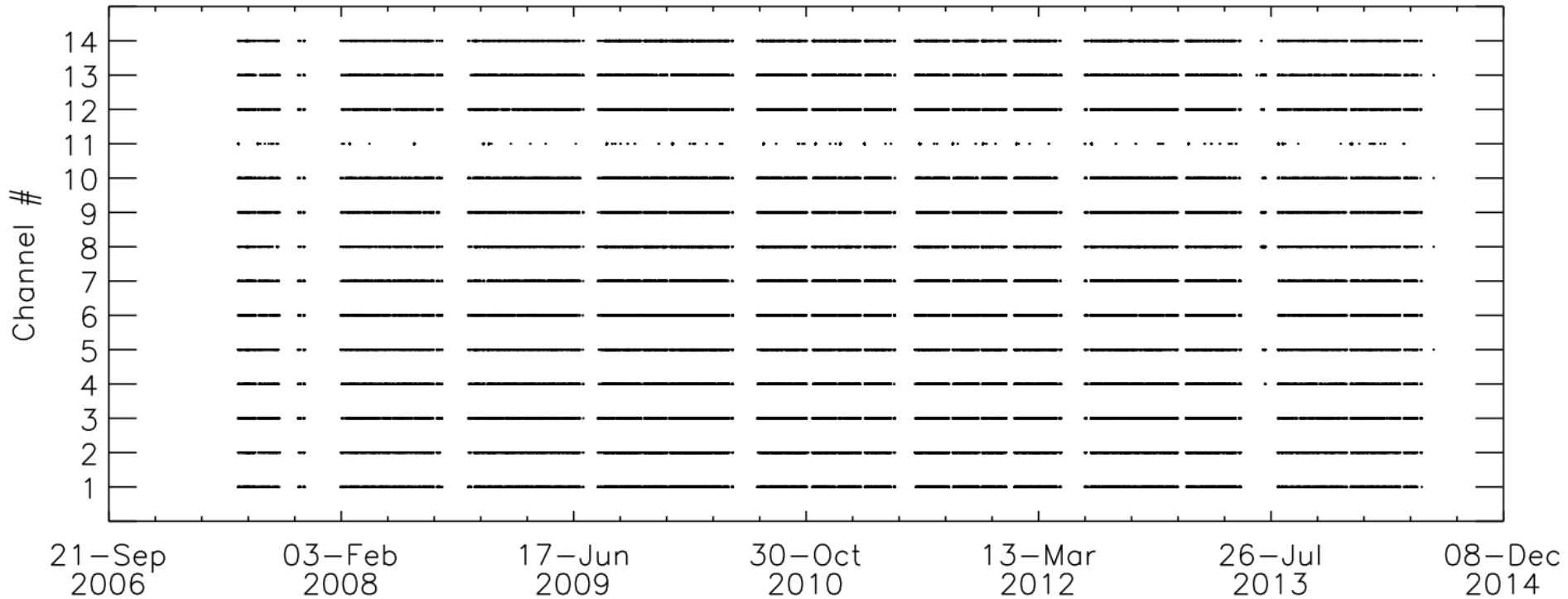
Cancel

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

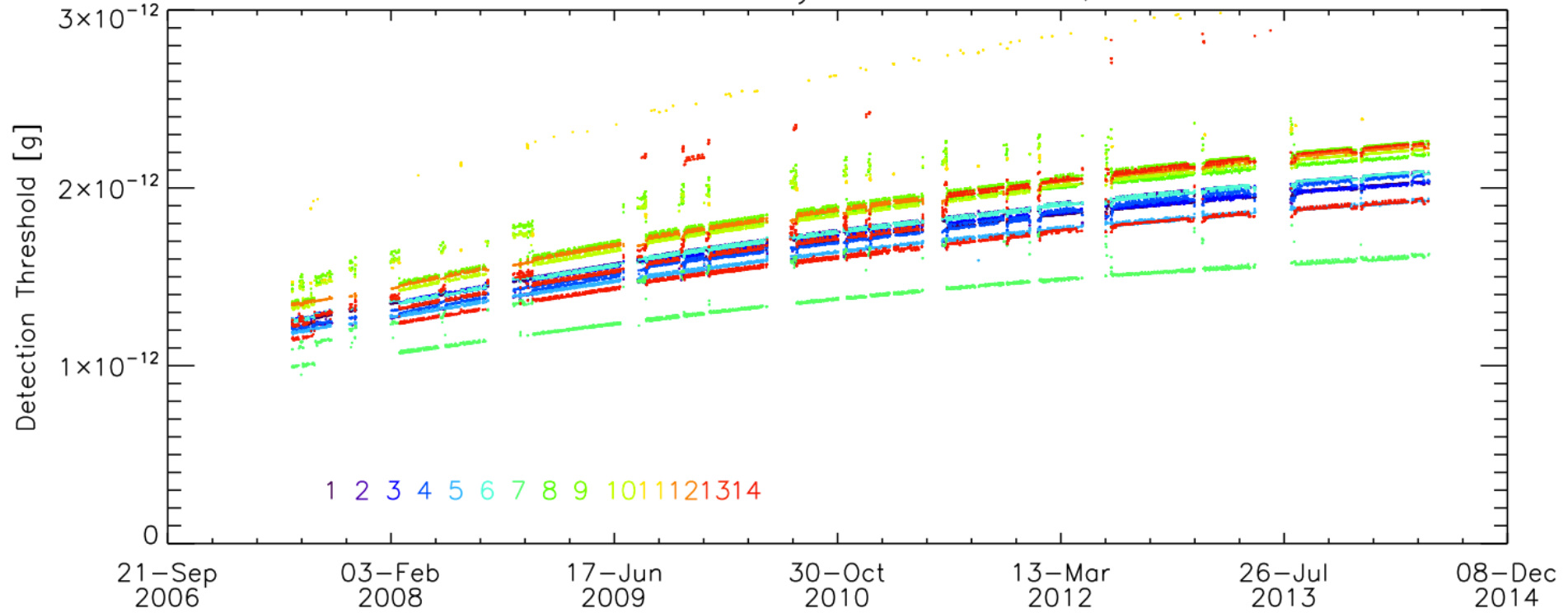
SDC Cruise Data by Channel, Time



Plot of Mission Elapsed Time vs entry looks good

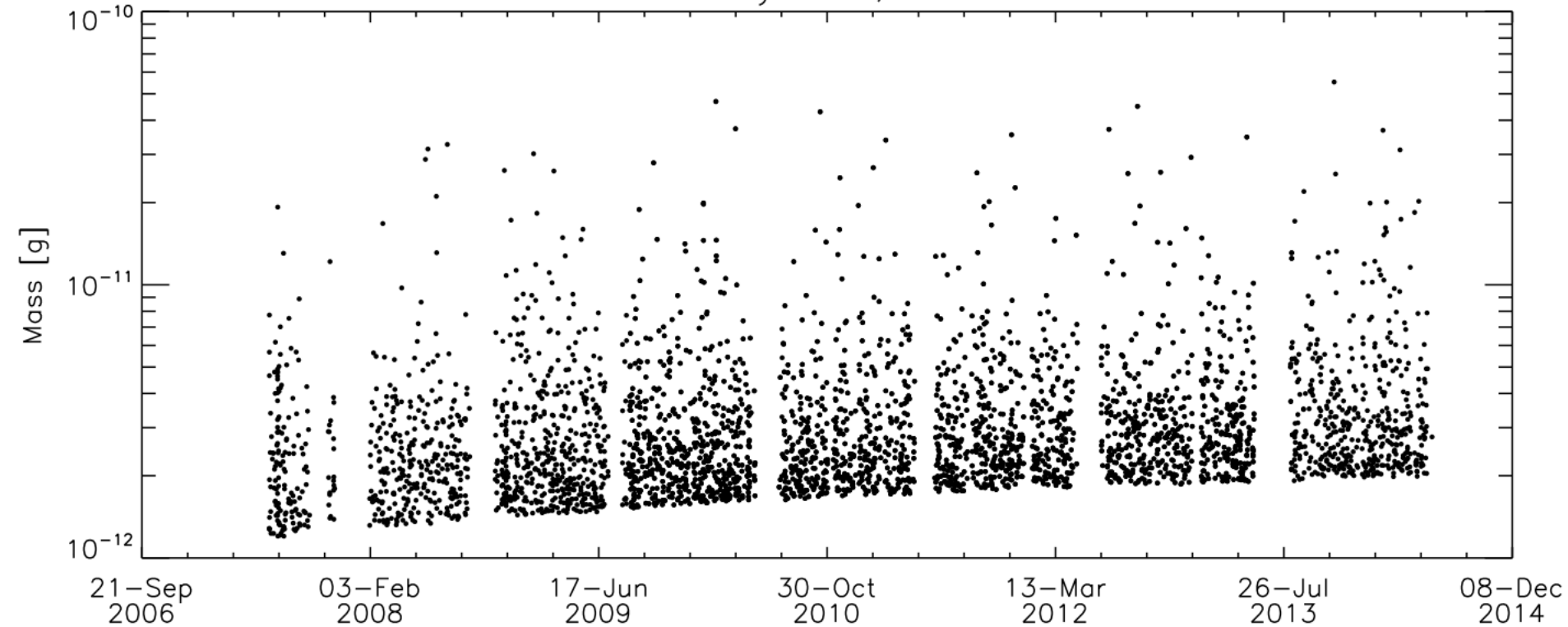
Again, note failure of Channel 11 (described in documentation)

SDC Cruise Data by Mass Threshold, Time



Plot of Detector Threshold versus Time looks good

SDC Cruise Data by Mass, Time – Channel 1



Plot of Channel 1 Event Magnitude versus Time looks good – although as noted in the previous review (January 2014) the dynamic range of the data seems limited to a small range (the instrument can detect from 10^{-12} to 10^{-9} g. The team noted this in the revised 'sdc.cat' file, but did not provide a specific explanation.

Completeness:

- Each time period (launch, jupiter, plutocruise) has a complete set of files and documentation (all comments from Jan 2014 review were adequately addressed)
- 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