

***Caveats and notes regarding use of STEREO/SIT Level-1
science data from IMPACT web site at UC Berkeley***

SEE IMPORTANT NOTICE BELOW REGARDING STEREO-SIT-A MATRIX RATE ANOMALY AFTER SEPTEMBER 23, 2018 INSTRUMENT TURN OFF.

The Suprathermal Ion Telescope (SIT) is described in: Mason, G. M., A. Korth, P. H. Walpole, M. I. Desai, T. T. von Rosenvinge, and S. A. Shuman, “The Suprathermal Ion Telescope (SIT) for the IMPACT / SEP investigation”, *Space Sci. Rev.*, DOI 10.1007/s11214-006-9087-9, April, 2007. These notes describe details and limitations of the Level-1 data posted on the STEREO/IMPACT web site.

- These files contain intensities of the following ion species over a number of different energy windows: H, 3He, 4He, C, O, NeS (= Ne + Mg + Si), Fe, and UH (nuclei with mass >80 AMU). Species are identified on board the spacecraft using lookup tables. Over the course of the mission, the table accuracy has been improved, and new tables uploaded to the spacecraft (see release notes below) Knowledge of the instrument efficiencies (primarily for H and He) has improved, and is used in reprocessing data on the ground.
- Units: particles/(s cm² sr MeV/nucleon)
- Time resolution: 60s (this is the maximum time resolution of the instrument)
- Ion species names and energy range for each intensity are given in the files and in the table below
- 1-sigma errors for each rate are based on counting statistics only: $1/\sqrt{N}$ where N is the number of counts for that box.
- Due to details of the final instrument configuration, some boxes are always empty; these boxes and their associated sigmas are filled with a value -1.0e31, or “NaN” in IDL. Some boxes are present in one instrument and not the other due to details of the instruments.
- “UH” rates are extremely low and are dominated by instrument background
- SIT level-1 intensities should not be used for data before 3/15/2007.

- SIT-B Carbon data below 320 keV/nucleon should not be used for data before 8/28/07.
- 3He data should not be used for data before 4/12/2007.
- 3He intensities of approximately <10% of the 4He intensity may be largely spillover of 4He and should not be trusted. To lessen spillover from 4He, the 3He rates capture only about 50% of the 3He, and should be used as a rough indicator only.
- in periods of very high intensity, e.g., comparable to the July 2000 “Bastille Day” event, or the 2003 “Halloween events”, saturation in instrument electronics may result in inaccurate intensities; these effects almost always result produce intensities that are lower than the actual intensities.
- for H and He, the efficiency of detection is <100%, and may vary in time due to exposure of the instrument to radiation. If changes in the efficiency are detected, the intensities will be re-calculated and new Level 1 files posted. Since detection of efficiency changes requires detailed comparison with other instruments, these changes may be several months, or even longer, after the data is collected. When such updates are done, the data affected will be posted in future releases of this document.
- Because of SIT’s low and possibly varying detection efficiency for H, is recommended that users use SEPT level-1 data for H intensities.
- BACKGROUND DURING QUIET PERIODS:
 - above ~1 MeV/nucleon all intensities are likely dominated by background during quiet periods. During modest intensity increases it is strongly recommended to see if hourly rates show an increase from background before including those rates in, e.g., spectral calculations.
 - background events in the telescopes produce background counts in the following boxes during quiet periods:

Species	SIT-A energy ranges affected (MeV/nucleon)	SIT-B energy ranges affected (MeV/nucleon)
H	0.91-1.81	0.64-1.81
3He	0.64 - 2.56	0.64 - 1.81
4He	0.16 - 0.226 0.64 - 1.81	0.64 - 1.81
C	0.16 - 0.32 0.64 - 2.56	0.64 - 1.81
O	0.16 - 0.32 0.64 - 2.56	0.64 - 1.81
NeS	0.16 - 0.32 0.64 - 2.56	0.45 - 1.81

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Fe	0.16 - 0.32 0.64 - 2.56	0.45 - 2.56
UH	All	All

SIT box descriptions.

UCB L1 Flux No.	title or species	Species box number	Nominal Emin (MeV/n)	Nominal Emax (MeV/n)
1	'H'	1	0.1600	0.2263
2	'H'	2	0.2263	0.3200
3	'H'	3	0.3200	0.4525
4	'H'	4	0.4525	0.6400
5	'H'	5	0.6400	0.9051
6	'H'	6	0.9051	1.2800
7	'H'	7	1.2800	1.8102
8	'H'	8	1.8102	2.5600
9	'H'	9	2.5600	3.6204
10	'H'	10	3.6204	5.1200
11	'H'	11	5.1200	7.2408
12	'H'	12	7.2408	10.2400
13	' ³ He'	1	0.1600	0.2263
14	' ³ He'	2	0.2263	0.3200
15	' ³ He'	3	0.3200	0.4525
16	' ³ He'	4	0.4525	0.6400
17	' ³ He'	5	0.6400	0.9051
18	' ³ He'	6	0.9051	1.2800
19	' ³ He'	7	1.2800	1.8102
20	' ³ He'	8	1.8102	2.5600
21	' ³ He'	9	2.5600	3.6204
22	' ³ He'	10	3.6204	5.1200
23	' ⁴ He'	1	0.0400	0.0566
24	' ⁴ He'	2	0.0566	0.0800
25	' ⁴ He'	3	0.0800	0.1131
26	' ⁴ He'	4	0.1131	0.1600
27	' ⁴ He'	5	0.1600	0.2263
28	' ⁴ He'	6	0.2263	0.3200
29	' ⁴ He'	7	0.3200	0.4525
30	' ⁴ He'	8	0.4525	0.6400
31	' ⁴ He'	9	0.6400	0.9051
32	' ⁴ He'	10	0.9051	1.2800
33	' ⁴ He'	11	1.2800	1.8102
34	' ⁴ He'	12	1.8102	2.5600
35	' ⁴ He'	13	2.5600	3.6204

36	'4He'	14	3.6204	5.1200
37	'4He'	15	5.1200	7.2408
38	'4He'	16	7.2408	10.2400
39	'C'	1	0.0283	0.0400
40	'C'	2	0.0400	0.0566
41	'C'	3	0.0566	0.0800
42	'C'	4	0.0800	0.1131
43	'C'	5	0.1131	0.1600
44	'C'	6	0.1600	0.2263
45	'C'	7	0.2263	0.3200
46	'C'	8	0.3200	0.4525
47	'C'	9	0.4525	0.6400
48	'C'	10	0.6400	0.9051
49	'C'	11	0.9051	1.2800
50	'C'	12	1.2800	1.8102
51	'C'	13	1.8102	2.5600
52	'C'	14	2.5600	3.6204
53	'C'	15	3.6204	5.1200
54	'C'	16	5.1200	7.2408
55	'C'	17	7.2408	10.2400
56	'O'	1	0.0400	0.0566
57	'O'	2	0.0566	0.0800
58	'O'	3	0.0800	0.1131
59	'O'	4	0.1131	0.1600
60	'O'	5	0.1600	0.2263
61	'O'	6	0.2263	0.3200
62	'O'	7	0.3200	0.4525
63	'O'	8	0.4525	0.6400
64	'O'	9	0.6400	0.9051
65	'O'	10	0.9051	1.2800
66	'O'	11	1.2800	1.8102
67	'O'	12	1.8102	2.5600
68	'O'	13	2.5600	3.6204
69	'O'	14	3.6204	5.1200
70	'O'	15	5.1200	7.2408
71	'O'	16	7.2408	10.2400
72	'NeS'	1	0.0400	0.0566
73	'NeS'	2	0.0566	0.0800
74	'NeS'	3	0.0800	0.1131
75	'NeS'	4	0.1131	0.1600
76	'NeS'	5	0.1600	0.2263

77	'NeS'	6	0.2263	0.3200
78	'NeS'	7	0.3200	0.4525
79	'NeS'	8	0.4525	0.6400
80	'NeS'	9	0.6400	0.9051
81	'NeS'	10	0.9051	1.2800
82	'NeS'	11	1.2800	1.8102
83	'NeS'	12	1.8102	2.5600
84	'NeS'	13	2.5600	3.6204
85	'NeS'	14	3.6204	5.1200
86	'NeS'	15	5.1200	7.2408
87	'NeS'	16	7.2408	10.2400
88	'Fe'	1	0.0283	0.0400
89	'Fe'	2	0.0400	0.0566
90	'Fe'	3	0.0566	0.0800
91	'Fe'	4	0.0800	0.1131
92	'Fe'	5	0.1131	0.1600
93	'Fe'	6	0.1600	0.2263
94	'Fe'	7	0.2263	0.3200
95	'Fe'	8	0.3200	0.4525
96	'Fe'	9	0.4525	0.6400
97	'Fe'	10	0.6400	0.9051
98	'Fe'	11	0.9051	1.2800
99	'Fe'	12	1.2800	1.8102
100	'Fe'	13	1.8102	2.5600
101	'Fe'	14	2.5600	3.6204
102	'UH'	1	0.04	0.0800
103	'UH'	2	0.08	0.1600
104	'UH'	3	0.16	0.3200
105	'UH'	4	0.32	0.6400
106	'UH'	5	0.64	1.2800
107	'UH'	6	1.28	2.5600

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RELEASE AND OPERATIONS NOTES:

SIT-A and SIT-B level-1 intensities should not be used for data before 3/15/2007 due to changes in the flight lookup tables.

SIT-A and SIT-B 3He intensities should not be used for data before 4/12/2007

8/28/07:
SIT-B Carbon intensities below 320 keV/nucleon should not be used for data before 8/28/07 2007-240 18:17 (Aug 29) -- SIT-B revised lookup tables reduce spillover of 4He into C track boxes below 320 keV/nucleon

5/15/2009:
2009-132 22:59 (May 12) - 2009-136 02:40 (May 16) SIT-B out of calibration due to S/C reset

8/10/2009:
2009-216 09:35 (Aug 4) - 2009-218 12:30 (Aug 6) SIT-A out of calibration due to S/C reset

11/15/2010:
2010-314 17:00 (Nov 10) -- loaded SIT-B revised lookup tables that improve accuracy of intensity boxes above ~1 MeV/nucleon

1/14/2011:
2011-008 21:25 (Jan 8) - 2011-013 19:11 (Jan 13) SIT-B out of calibration due to IMPACT power off

4/20/2011:
2011-110 14:00 (April 20) -- loaded SIT-A revised lookup tables that improve accuracy of intensity boxes above ~1 MeV/nucleon

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5/10/2011:

2011-125 17:04 (May 5) -- loaded SIT-B revised lookup tables that improve accuracy of track widths for rate boxes

Effective: Sept 2011

SIT A and SIT-B: entire mission data set reprocessed using efficiency file dated 2011_04_27 which updates previous efficiencies with improved estimates based on large solar particle events observed during 2010 and 2011 and using cross-calibration with the STEREO SEPT and LET instruments. Prior versions of the data set should be replaced with the new set.

9/23/2011:

2011-262-15:40 (Sept 19) to 2011-265-19:53 (Sept 22)-- SIT-A out of calibration due to IMPACT power off

posted 11/21/2012:

2012-205.0 (July 23) to 2012-207.0 (July 26) --
SIT-A out of calibration due to high intensities

posted 7/16/2014:

2014-187.71 (July 6) to 2014-195.65 (July 14) --
SIT-A out of calibration due to turn-off and HV ramp up for side lobe testing

posted 6/23/2015:

2012-149 00:00 (May 28) - 2012-149 12:00 (May 28) SIT-A out of calibration due high intensity levels saturating MCP response

posted 6/23/2015:

2012-205 05:00 (Jul 23) - 2012-206 06:00 (Jul 24) SIT-A out of calibration due high intensity levels saturating MCP response

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posted 6/23/2015:
2013-234 01:00 (Aug 22) - 2012-235 02:00 (Aug 23) SIT-A out of calibration due high intensity levels saturating MCP response

posted 6/23/2015:
2014-244 00:00 (Sep 1) - 2014-246 02:00 (Sep 3) SIT-B out of calibration due high intensity levels saturating MCP response

posted 7/16/2015:
2015-79.66 (Mar 20) to 2015-190.80 (July 9) --
SIT-A off off for solar conjunction

posted 7/21/2015:
2015-190.80 (July 9) to ~2023
THIS POST FROM THE SEP INSTRUMENT SUITE WEB PAGE APPLIES TO SIT:
Change in SEP Instrument Suite Viewing Directions: After solar conjunction, the two STEREO spacecraft have been rolled 180 degrees about the spacecraft-Sun line in order to allow the high gain antenna to remain pointing at Earth. Consequently, the nominal pointing directions of the SEP suite of instruments are now different. This will remain the case until the spacecraft pass by Earth again in 2023.

posted 8/27/2015:
2015-190.80 (July 9) to 2015-238.0 (August 26) (inclusive)
SIT-A matrix rates out of calibration due to lookup table load problem during post-conjunction weak uplink period; obsolete tables in use; He intensity is roughly a factor of 5 low.

posted 8/27/2015:
2014-268 00:00 (Sep 25) - 2014-272 00:00 (Sep 29) SIT-B out of calibration due high intensity levels saturating MCP response

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September 23, 2016: signal from STEREO-B spacecraft lost.

posted 11/13/2018:

SIT-A matrix box calculations showed errors following the reset and table loads following the Sept 23, 2018 turn off due to a single event upset in the SEP data system. SIT-A matrix rates should not be used after Sept 23, 2018. Plots for posting on the web, and ascii files were switched over to intensities calculated with PHA data.
