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Solar particle fluxes
Project: SOLARMAXIMUM
Solar Maximum 2012-2015

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[Integral and differential proton spectra](#)

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Solar particle model: SAPPHIRE 1 in n year event peak flux

No magnetic shielding

Event frequency: 1 in 100 years

Ion range: H – U

Solar proton fluxes for the [spacecraft trajectory](#) and outside the magnetosphere

Energy (MeV)	Flux at spacecraft		Model flux at 1.0 AU	
	Integral (m ⁻² sr ⁻¹ s ⁻¹)	Differential (m ⁻² sr ⁻¹ s ⁻¹ MeV ⁻¹)	Integral (m ⁻² sr ⁻¹ s ⁻¹)	Differential (m ⁻² sr ⁻¹ s ⁻¹ MeV ⁻¹)
0.10	3.891E+10	2.678E+11	3.891E+10	2.678E+11
0.11	3.643E+10	2.296E+11	3.643E+10	2.296E+11
0.12	3.429E+10	1.995E+11	3.429E+10	1.995E+11
0.14	3.077E+10	1.555E+11	3.077E+10	1.555E+11
0.16	2.798E+10	1.253E+11	2.798E+10	1.253E+11
0.18	2.570E+10	1.035E+11	2.570E+10	1.035E+11
0.20	2.381E+10	8.707E+10	2.381E+10	8.707E+10
0.22	2.220E+10	7.450E+10	2.220E+10	7.450E+10
0.25	2.018E+10	6.044E+10	2.018E+10	6.044E+10
0.28	1.853E+10	5.021E+10	1.853E+10	5.021E+10
0.32	1.673E+10	4.021E+10	1.673E+10	4.021E+10
0.35	1.561E+10	3.465E+10	1.561E+10	3.465E+10
0.40	1.406E+10	2.775E+10	1.406E+10	2.775E+10
0.45	1.281E+10	2.281E+10	1.281E+10	2.281E+10
0.50	1.176E+10	1.910E+10	1.176E+10	1.910E+10
0.55	1.088E+10	1.625E+10	1.088E+10	1.625E+10
0.63	9.725E+09	1.290E+10	9.725E+09	1.290E+10
0.71	8.793E+09	1.054E+10	8.793E+09	1.054E+10
0.80	7.937E+09	8.591E+09	7.937E+09	8.591E+09

0.90	7.161E+09	6.998E+09	7.161E+09	6.998E+09
1.00	6.523E+09	5.826E+09	6.523E+09	5.826E+09
1.10	5.987E+09	4.935E+09	5.987E+09	4.935E+09
1.20	5.530E+09	4.241E+09	5.530E+09	4.241E+09
1.40	4.790E+09	3.228E+09	4.790E+09	3.228E+09
1.60	4.217E+09	2.539E+09	4.217E+09	2.539E+09
1.80	3.761E+09	2.054E+09	3.761E+09	2.054E+09
2.00	3.387E+09	1.700E+09	3.387E+09	1.700E+09
2.20	3.075E+09	1.430E+09	3.075E+09	1.430E+09
2.50	2.695E+09	1.126E+09	2.695E+09	1.126E+09
2.80	2.391E+09	9.103E+08	2.391E+09	9.103E+08
3.20	2.070E+09	7.089E+08	2.070E+09	7.089E+08
3.50	1.874E+09	5.994E+08	1.874E+09	5.994E+08
4.00	1.611E+09	4.622E+08	1.611E+09	4.622E+08
4.50	1.405E+09	3.665E+08	1.405E+09	3.665E+08
5.00	1.240E+09	2.979E+08	1.240E+09	2.979E+08
5.50	1.105E+09	2.469E+08	1.105E+09	2.469E+08
6.30	9.322E+08	1.881E+08	9.322E+08	1.881E+08
7.10	7.992E+08	1.468E+08	7.992E+08	1.468E+08
8.00	6.825E+08	1.146E+08	6.825E+08	1.146E+08
9.00	5.812E+08	8.946E+07	5.812E+08	8.946E+07
10.00	5.014E+08	7.110E+07	5.014E+08	7.110E+07
11.00	4.373E+08	5.775E+07	4.373E+08	5.775E+07
12.00	3.848E+08	4.777E+07	3.848E+08	4.777E+07
14.00	3.046E+08	3.365E+07	3.046E+08	3.365E+07
16.00	2.469E+08	2.471E+07	2.469E+08	2.471E+07
18.00	2.037E+08	1.882E+07	2.037E+08	1.882E+07
20.00	1.706E+08	1.453E+07	1.706E+08	1.453E+07
22.00	1.448E+08	1.148E+07	1.448E+08	1.148E+07
25.00	1.153E+08	8.370E+06	1.153E+08	8.370E+06
28.00	9.362E+07	6.249E+06	9.362E+07	6.249E+06
32.00	7.268E+07	4.377E+06	7.268E+07	4.377E+06
35.00	6.102E+07	3.446E+06	6.102E+07	3.446E+06
40.00	4.666E+07	2.385E+06	4.666E+07	2.385E+06
45.00	3.660E+07	1.693E+06	3.660E+07	1.693E+06
50.00	2.932E+07	1.246E+06	2.933E+07	1.246E+06
55.00	2.390E+07	9.444E+05	2.390E+07	9.444E+05
63.00	1.777E+07	6.166E+05	1.777E+07	6.166E+05
71.00	1.368E+07	4.234E+05	1.368E+07	4.234E+05
80.00	1.051E+07	2.907E+05	1.051E+07	2.907E+05
90.00	8.097E+06	1.999E+05	8.097E+06	1.999E+05
100.00	6.403E+06	1.430E+05	6.403E+06	1.430E+05
110.00	5.173E+06	1.055E+05	5.173E+06	1.055E+05

120.00	4.254E+06	7.987E+04	4.254E+06	7.987E+04
140.00	3.002E+06	4.873E+04	3.002E+06	4.873E+04
160.00	2.213E+06	3.171E+04	2.213E+06	3.171E+04
180.00	1.688E+06	2.167E+04	1.688E+06	2.167E+04
200.00	1.322E+06	1.540E+04	1.322E+06	1.540E+04
220.00	1.058E+06	1.129E+04	1.058E+06	1.129E+04
250.00	7.821E+05	7.429E+03	7.821E+05	7.429E+03
280.00	5.967E+05	5.116E+03	5.967E+05	5.116E+03
320.00	4.320E+05	3.287E+03	4.320E+05	3.287E+03
350.00	3.470E+05	2.438E+03	3.470E+05	2.438E+03
400.00	2.492E+05	1.557E+03	2.492E+05	1.557E+03
450.00	1.853E+05	1.044E+03	1.853E+05	1.044E+03
500.00	1.416E+05	7.283E+02	1.416E+05	7.283E+02
550.00	1.106E+05	5.242E+02	1.106E+05	5.242E+02
630.00	7.736E+04	3.265E+02	7.736E+04	3.265E+02
710.00	5.613E+04	2.141E+02	5.613E+04	2.141E+02
800.00	4.050E+04	1.397E+02	4.050E+04	1.397E+02
900.00	2.917E+04	9.120E+01	2.917E+04	9.120E+01
1000.00	2.163E+04	6.194E+01	2.163E+04	6.194E+01

Proton exposure factors

Energy (MeV)	Mission average	Mission segment 1
0.10	1.0000	1.0000
0.11	1.0000	1.0000
0.12	1.0000	1.0000
0.14	1.0000	1.0000
0.16	1.0000	1.0000
0.18	1.0000	1.0000
0.20	1.0000	1.0000
0.22	1.0000	1.0000
0.25	1.0000	1.0000
0.28	1.0000	1.0000
0.32	1.0000	1.0000
0.35	1.0000	1.0000
0.40	1.0000	1.0000
0.45	1.0000	1.0000
0.50	1.0000	1.0000
0.55	1.0000	1.0000
0.63	1.0000	1.0000
0.71	1.0000	1.0000
0.80	1.0000	1.0000

0.90	1.0000	1.0000
1.00	1.0000	1.0000
1.10	1.0000	1.0000
1.20	1.0000	1.0000
1.40	1.0000	1.0000
1.60	1.0000	1.0000
1.80	1.0000	1.0000
2.00	1.0000	1.0000
2.20	1.0000	1.0000
2.50	1.0000	1.0000
2.80	1.0000	1.0000
3.20	1.0000	1.0000
3.50	1.0000	1.0000
4.00	1.0000	1.0000
4.50	1.0000	1.0000
5.00	1.0000	1.0000
5.50	1.0000	1.0000
6.30	1.0000	1.0000
7.10	1.0000	1.0000
8.00	1.0000	1.0000
9.00	1.0000	1.0000
10.00	1.0000	1.0000
11.00	1.0000	1.0000
12.00	1.0000	1.0000
14.00	1.0000	1.0000
16.00	1.0000	1.0000
18.00	1.0000	1.0000
20.00	1.0000	1.0000
22.00	1.0000	1.0000
25.00	1.0000	1.0000
28.00	1.0000	1.0000
32.00	1.0000	1.0000
35.00	1.0000	1.0000
40.00	1.0000	1.0000
45.00	1.0000	1.0000
50.00	1.0000	1.0000
55.00	1.0000	1.0000
63.00	1.0000	1.0000
71.00	1.0000	1.0000
80.00	1.0000	1.0000
90.00	1.0000	1.0000
100.00	1.0000	1.0000
110.00	1.0000	1.0000

120.00	1.0000	1.0000
140.00	1.0000	1.0000
160.00	1.0000	1.0000
180.00	1.0000	1.0000
200.00	1.0000	1.0000
220.00	1.0000	1.0000
250.00	1.0000	1.0000
280.00	1.0000	1.0000
320.00	1.0000	1.0000
350.00	1.0000	1.0000
400.00	1.0000	1.0000
450.00	1.0000	1.0000
500.00	1.0000	1.0000
550.00	1.0000	1.0000
630.00	1.0000	1.0000
710.00	1.0000	1.0000
800.00	1.0000	1.0000
900.00	1.0000	1.0000
1000.00	1.0000	1.0000

Proton exposure times (hr)

Energy (MeV)	Mission total	<u>Mission segment 1</u>	
		Orbit exposure	Segment exposure
0.10	35040.00	8.00	35040.00
0.11	35040.00	8.00	35040.00
0.12	35040.00	8.00	35040.00
0.14	35040.00	8.00	35040.00
0.16	35040.00	8.00	35040.00
0.18	35040.00	8.00	35040.00
0.20	35040.00	8.00	35040.00
0.22	35040.00	8.00	35040.00
0.25	35040.00	8.00	35040.00
0.28	35040.00	8.00	35040.00
0.32	35040.00	8.00	35040.00
0.35	35040.00	8.00	35040.00
0.40	35040.00	8.00	35040.00
0.45	35040.00	8.00	35040.00
0.50	35040.00	8.00	35040.00
0.55	35040.00	8.00	35040.00
0.63	35040.00	8.00	35040.00
0.71	35040.00	8.00	35040.00

0.80	35040.00	8.00	35040.00
0.90	35040.00	8.00	35040.00
1.00	35040.00	8.00	35040.00
1.10	35040.00	8.00	35040.00
1.20	35040.00	8.00	35040.00
1.40	35040.00	8.00	35040.00
1.60	35040.00	8.00	35040.00
1.80	35040.00	8.00	35040.00
2.00	35040.00	8.00	35040.00
2.20	35040.00	8.00	35040.00
2.50	35040.00	8.00	35040.00
2.80	35040.00	8.00	35040.00
3.20	35040.00	8.00	35040.00
3.50	35040.00	8.00	35040.00
4.00	35040.00	8.00	35040.00
4.50	35040.00	8.00	35040.00
5.00	35040.00	8.00	35040.00
5.50	35040.00	8.00	35040.00
6.30	35040.00	8.00	35040.00
7.10	35040.00	8.00	35040.00
8.00	35040.00	8.00	35040.00
9.00	35040.00	8.00	35040.00
10.00	35040.00	8.00	35040.00
11.00	35040.00	8.00	35040.00
12.00	35040.00	8.00	35040.00
14.00	35040.00	8.00	35040.00
16.00	35040.00	8.00	35040.00
18.00	35040.00	8.00	35040.00
20.00	35040.00	8.00	35040.00
22.00	35040.00	8.00	35040.00
25.00	35040.00	8.00	35040.00
28.00	35040.00	8.00	35040.00
32.00	35040.00	8.00	35040.00
35.00	35040.00	8.00	35040.00
40.00	35040.00	8.00	35040.00
45.00	35040.00	8.00	35040.00
50.00	35040.00	8.00	35040.00
55.00	35040.00	8.00	35040.00
63.00	35040.00	8.00	35040.00
71.00	35040.00	8.00	35040.00
80.00	35040.00	8.00	35040.00
90.00	35040.00	8.00	35040.00
100.00	35040.00	8.00	35040.00

110.00	35040.00	8.00	35040.00
120.00	35040.00	8.00	35040.00
140.00	35040.00	8.00	35040.00
160.00	35040.00	8.00	35040.00
180.00	35040.00	8.00	35040.00
200.00	35040.00	8.00	35040.00
220.00	35040.00	8.00	35040.00
250.00	35040.00	8.00	35040.00
280.00	35040.00	8.00	35040.00
320.00	35040.00	8.00	35040.00
350.00	35040.00	8.00	35040.00
400.00	35040.00	8.00	35040.00
450.00	35040.00	8.00	35040.00
500.00	35040.00	8.00	35040.00
550.00	35040.00	8.00	35040.00
630.00	35040.00	8.00	35040.00
710.00	35040.00	8.00	35040.00
800.00	35040.00	8.00	35040.00
900.00	35040.00	8.00	35040.00
1000.00	35040.00	8.00	35040.00