

**The Top 30 SEP Events of Solar Cycle 23**  
**(Based on the fluence of >30 MeV protons measured by GOES)**

	<b>Start Year</b>	<b>Start Date</b>	<b>Latitude (1)</b>	<b>Longitude (1)</b>	<b>Peak X-ray Intensity (2)</b>	<b>Peak Proton Intensity (3)</b>	<b>Proton Fluence &gt;10 MeV (4)</b>	<b>Proton Fluence &gt;30 MeV (4)</b>
1	2000	7.14.00	22	7	5	2.40E+04	1.65E+10	4.31E+09
2	2001	11.4.01	6	18	1	3.17E+04	1.52E+10	3.40E+09
3	2000	11.08.00	10	75	0.7	1.48E+04	1.08E+10	3.19E+09
4	2003	10.28.03	-16	-8	17	2.95E+04	1.17E+10	3.07E+09
5	2001	9.24.01	-16	-23	2	1.29E+04	7.41E+09	1.22E+09
6	2001	11.22.01	-15	34	0.9	1.89E+04	8.11E+09	8.48E+08
7	2002	4.21.02	-14	84	1	2.52E+03	2.86E+09	6.80E+08
8	2005	1.17.05	15	25	4	4.00E+03	2.69E+09	6.50E+08
9	2003	10.29.03	-15	2	10	1.57E+03	2.16E+09	5.34E+08
10	2005	1.20.05	14	61	7	1.68E+03	8.27E+08	4.10E+08
11	2006	12.05.06	-6	-71	6.5	1.98E+03	2.02E+09	3.65E+08
12	1998	4.20.98	-43	90	0.1	1.70E+03	1.62E+09	3.50E+08
13	2005	9.7.05	-6	-89	17	1.88E+03	1.96E+09	3.00E+08
14	2003	1.2.03	-20	56	8	3.53E+02	1.43E+09	1.95E+08
15	2006	12.13.06	-6	23	3.4	6.98E+02	4.62E+08	1.67E+08
16	1997	11.6.97	-18	63	9	4.90E+02	5.39E+08	1.63E+08
17	2001	4.15.01	-20	85	14	1.35E+03	5.12E+08	1.45E+08
18	2001	4.2.01	18	82	20	2.15E+03	6.61E+08	9.70E+07
19	2001	8.16.01		140		4.93E+02	2.77E+08	9.70E+07
20	2001	10.01.01	-22	91	0.9	2.36E+03	9.62E+08	8.50E+07
21	2002	8.24.02	-8	81	3	3.17E+02	3.40E+08	5.30E+07
22	1998	8.24.98	30	-7	1	6.70E+02	5.65E+08	4.69E+07
23	2000	11.25.00	7	-50	2	1.00E+02	4.90E+08	4.59E+07
24	2001	4.18.01	-20	120		3.21E+02	1.93E+08	4.48E+07
25	2004	11.7.04	9	17	2	4.95E+02	5.15E+08	4.40E+07
26	1998	9.30.98	23	81	0.2	1.20E+03	5.64E+08	4.38E+07
27	2003	11.4.03	-19	83	28	1.00E+02	2.11E+08	3.17E+07
28	1998	11.14.98	28	90	0.01	3.10E+02	1.39E+08	3.16E+07
29	2001	4.10.01	-23	9	2	3.55E+02	2.67E+08	2.56E+07
30	1998	5.02.98	-15	15	1	1.50E+02	5.86E+07	1.85E+07

(1) Cane et al. (2006)

(2) Logarithmic scale where an X1 event = 1.0; see <http://umbra.nascom.nasa.gov/SEP/>

(3) Determined from hourly GOES data

(4) See NOAA list at <http://umbra.nascom.nasa.gov/SEP/>