

NOAA Space Weather Prediction Center

Solar Proton Events Affecting the Earth Environment

1976 - Present

Begin Time Yr M/D (UTC)	Maximum Time Yr M/D (UTC)	>10 MeV Maximum (pfu)	Region	Location	Flare Maximum (UTC)	Type II Radio Emission	Type IV	Linear Speed	Imagery/Misc
2005	0835	20	13536	N04E73	2203	Yes	Yes	N/A	DST
2024 01/29 0615	2024 01/29 1805	137	13559	N26E73	M6.7/Sf 01/29 0438	Yes	No	N/A	C2 Wind Waves
2024 02/09 1530	2024 02/09 2355	187	13575	Beyond SW limb	X3.3 02/09 1314	Yes	Yes	N/A	N/A
2024 02/12 0805	2024 02/13 1605	118	13576	S16W30	C9.6/Sf 02/12 0554	No	Yes	N/A	N/A
2024 03/23 0815	2024 03/23 1820	956	13614	N27E08	X1.1/2F 03/23 0133	Yes	No	N/A	Assymetric halo Flux Plot
2024 05/10 1335	2024 05/10 1745	208	13664	S17W36	X3.9 05/10 0654	Yes	Yes	N/A	N/A
2024 05/11 0210	2024 05/11 0910	116	13664	S17W44	X5.8 05/11 0123	Yes	Yes	N/A	This event followed shortly after the previous had fallen below 10pfu
2024 06/08 0255	2024 06/08 0800	1030	13696	S17W58	M9.7 06/08 0149	Yes	Yes	N/A	N/A Flux Plot
2024 07/23 0300	2024 07/23 1040	24	N/A	Farsided event	N/A	No	No	N/A	Farside full halo
2024 09/09 1640	2024 09/09 2250	34	13806	S08W81	M1.0 09/09 0332	Yes	No	N/A	Flux Plot
2024 09/17 0735	2024 09/17 1050	33	13825	S16E20	C9.6 09/16 2357	Yes	Yes	N/A	Flux Plot
2024 10/09 0505	2024 10/10 1515	1810	13848	N12W11	X1.8 10/09 0156	Yes	Yes	N/A	Flux Plot
2024 10/26 1910	2024 10/28 0350	364	13873	S11E56	X1.8 10/26 0719	Yes	Yes	N/A	Flux Plot

Please Note: Proton fluxes are integral 5-minute averages for energies >10 MeV, given in Particle Flux Units (pfu), measured by GOES spacecraft at Geosynchronous orbit: 1 pfu = 1 p cm-2 sr-1s-1. SESC defines the start of a proton event to be the first of 3 consecutive data points with fluxes greater than or equal to 10 pfu. The end of an event is the last time the flux was greater than or equal to 10 pfu. This definition, motivated by SWPC customer needs, allows multiple proton flares and/or interplanetary shock proton increases to occur within one SWPC proton event. Additional data may be necessary to more completely resolve any individual proton event.

Different detectors, onboard different GOES spacecraft, have taken the data since 1976. These proton data were processed using various algorithms. To date, no attempt has been made to cross-normalize the resulting proton fluxes.

Flare associations are given, although data about individual coronal mass ejections (CMEs), available from SOHO only since 1996, are necessary fully to characterize each event. The CME video loops in the "Imagery/Misc" column are maintained at the [CDAW Data Center](#) by NASA and The Catholic University of America in cooperation with the Naval Research Laboratory. SOHO is a project of international cooperation between ESA and NASA. [CDAW Data Center](#). The hyperlinked flare maximum information is maintained by freeland@lmsal.com and is located at [Solarsoft](#).

For more information on SEP events, contact [Charles Carr](#) or [Rob Steenburgh](#) of the [NOAA Space weather Prediction Center](#).