SEPMOD+ENLIL
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Description

SEPMOD+ENLIL predicts the time profile of SEP flux by simulating particle transport along the magnetic field connected from the ICME shock to Earth or another observer.

Inputs

ENLIL

Magnetogram: From the NSO/GONG network.

CME Parameters: From SOHO/LASCO once analyzed by M2M and entered into the DONKI database.

SEPMOD

CME Shock Radial Distance: From ENLIL once the run is submitted to the DONKI database.

Magnetic Connectivity to Observer: From ENLIL once the run is submitted to the DONKI database.

Outputs

SEP Intensity Time Profile: Predictions for >10 MeV and >100 MeV protons at a 1 hour and 2.5 hour time resolution and 7 day forecast window. Only the 2.5 hour time resolution results are used in the SEP Scoreboard.

Forecast Lag Time

Inputs: About 45 minutes for CME parameters to be entered into DONKI (if M2M staffed, about 8-16 hours if not staffed)

Run Time: About 20-25 minutes to get SEPMOD results once ENLIL starts.

Interpretation and Caveats

Early Predictions: Due to the inner boundary of ENLIL being 21.5 R_S, SEPMOD predictions typically do not include the onset of the event. The first few points of the predicted time profile will resemble an event onset, but this should not be interpreted as so.

Updated Runs: If M2M reruns SEPMOD+ENLIL, the new results will be displayed on the SEP Scoreboard as "SEPMOD (latest)". The old results will be displayed as "SEPMOD (older)", and the symbols will be greyed out.

Heat Map: The heat map will retain the peak intensity value for the entire forecast window even if the time of the peak is outside the time range of the current Scoreboard display.

ESP: SEPMOD predictions include an ESP phase. A spike in the time profile may be seen at the beginning of the ESP phase to account for the increased particles.

Flare Option: SEPMOD has an option to estimate particles accelerated by the flare source. This option is turned off in the SEP Scoreboard version.

Time Profile Drop-outs: The time profile will occasionally show drop-outs. This is due to ENLIL predicting no magnetic connectivity from the shock to Earth.

Additional Links

iSWA Data Tree

CCMC SEPMOD Description

CCMC ENLIL Description

Validation

	Categorical				Start Time	Onset Peak Time	Duration	Onset Peak Intensity			Intensity Time Profile		
	H	FAR	TSS	HSS	ME	ME	ME	MLE	MALE	R	MLE	MALE	R
SEPMOD >10	0.44	0	NAN	0	7.92	7.94	-32.79	-1.05	1.18	0.61	-3.31	3.32	0.45
SEPMOD >100	0.45	0	0.45	0.17	8.17	9.96	8.63	-1.10	1.32	0.02	-3.25	3.29	0.48