

The UMASEP-based tools

- UMASEP is a scheme that is used in several tools. All these tools share the same Well-Connected Prediction (WCP) model:
 - The UMASEP/WCP model assumes that the correlated occurrence of a rise in SXR and a rise in a differential proton flux is an evidence that the region of the solar energy release and the S/C are magnetically connected.
 - If a magnetic connection is inferred, and the associated flare is large enough, the tool predicts the proton flux of the next few hours.
- Main characteristics of the UMASEP-based tools:

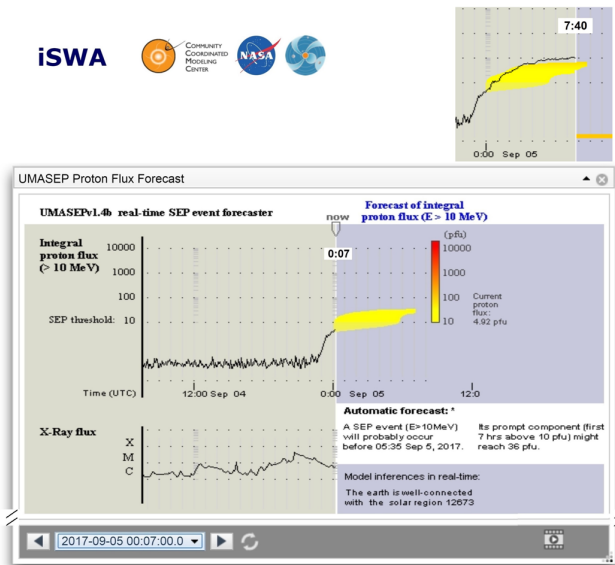
Real-time Tool	Integral Proton Flux Forecasted	Flare Class to Trigger Forecasts	Cadence of Forecast Outputs	Intensity Forecasts
UMASEP-10	>10 MeV	>C4 flares	5 min	First 7 hours
UMASEP-100	>100 MeV	>M3.5 flares	5 min	First 3 hours
HESPERIA UMASEP-500	>500 MeV GLE events	>M4.7 flares	1 min	First hour

- During July-September, 2017, these tools were functioning in real-time. UMASEP-10 predictions were recorded in NASA/iSWA.

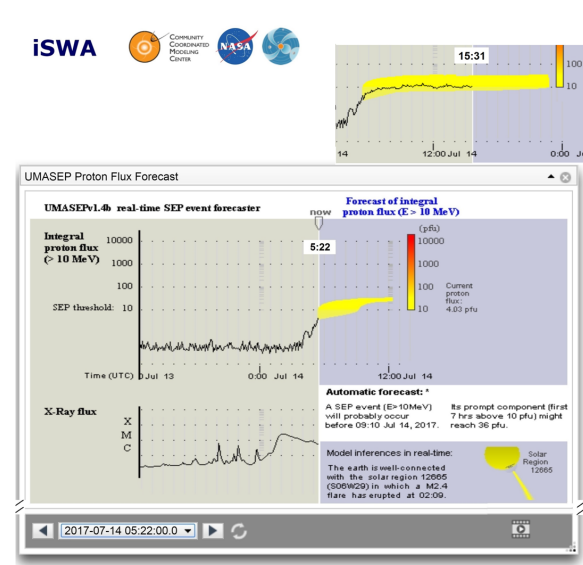
Real-time forecasts of the UMASEP-based tools for the events on July 14 and September 5, 2017

UMASEP-10 predictions recorded by NASA/iSWA:

July 14



September 5

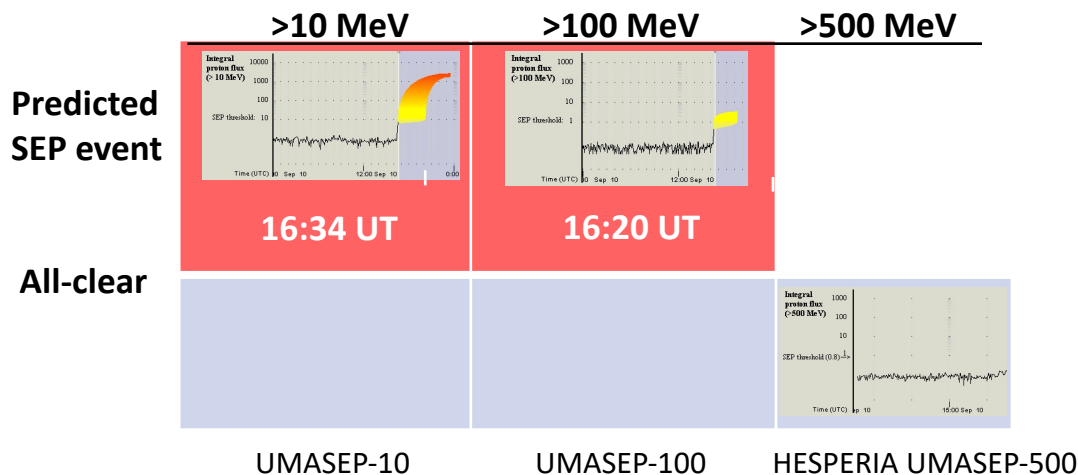


UMASEP-100 and HESPERIA UMASEP-500:

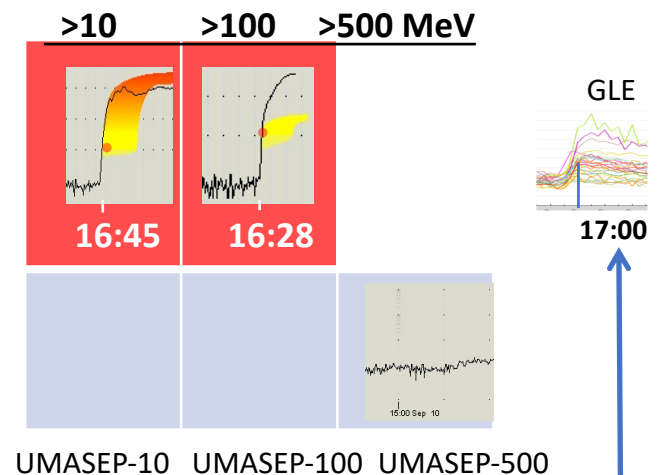
During July 14 and September 5, no >100 MeV / >500 MeV events took place; UMASEP-100 and HESPERIA UMASEP-500 successfully issued “all-clear” forecasts.

Real-time forecasts of UMASEP-based tools for the event on September 10, 2017

Real-time Forecasts



Forecasts vs. Observations



- On September 10, no >500 MeV SEP event took place (the proton flux did not surpass 0.8 pfu, established in the H2020 European HESPERIA project using GOES HEPAD data of 1986-2016); however, a faint GLE took place.
- HESPERIA UMASEP-500 successfully predicted “all-clear” >500 MeV fluxes; however, it missed the GLE event.

Summary of the real-time forecasting performance

Date	Event	Tool	Prediction Result	Warning Time	Error of the Forecasted Intensities (log-10 scale of pfu)
14 July 2017	>10 MeV	UMASEP-10	Hit	3 h 38 min	0.53
5 September 2017	>10 MeV	UMASEP-10	Hit	33 min	-0.44
10 September 2017	>10 MeV	UMASEP-10	Hit	11 min	0.48
	>100 MeV	UMASEP-100	Hit	8 min	1.3
	GLE	HESPERIA UMASEP-500	Miss	-	-

Discussion questions

- How did your optimized run results differ from the initial run?
 - The predictions were issued in real-time; therefore, there was no optimization for the July-September events.
- What aspects of the event does your model capture well, and what aspects were more difficult to capture?
 - This system does not predict the intensity-time profile.
- What are the next steps for your modeling technique?

Predictions for
September 10, 2017:

