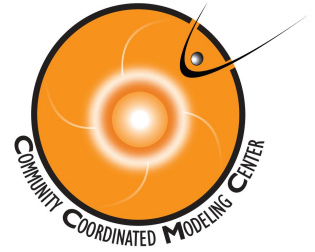




Continuous Probabilistic:  
 SWPC  
 UK Met Office  
 MAG4 (Falconer)  
 FORSPEF (NOA)  
 SPRINTS

Continuous Profile:  
 PREDICCS (UNH)



CSWEPA MAS+EPREM  
 (PSI and UNH)  
 EPREM+ENLIL (UNH + Odstricil)  
 iPATH (Li)

SEPMOD (Luhmann)  
 SPARX (Dalla, Marsh)  
 SWMF FLAMPA (UMich)  
 Zhang Model (FIT)



Flare:  
 AFRL PPS  
 COMESEP SEPForecast (BIRA)  
 FORSPEF (NOA)  
 SPARX (Dalla, Marsh)

Flare and CME:  
 COMESEP SEPForecast  
 FORSPEF (NOA)  
 SOLPENCO (Arans)

Flare and proton flux:  
 UMASEP (Núñez)

CME:  
 Richardson SEP formula  
 St. Cyr (Mauna Loa CME)

Electron flux:  
 REleASE

Flare, Radio, H-alpha:  
 SWPC PPM

Flare, Radio:  
 Laurenza Model

Radio:  
 AER SEP Model (Winter)

# Predicting solar energetic particles: community campaign

Scene-setters: Marlon Núñez & Janet Luhmann

All contributing slides available at: <https://drive.google.com/open?id=1ZMdcSEA0rVJFLX8041vSQjjuq8tqXrP>

## Physics-based

- Dmitry Borovikov – SWMF
- Silvia Dalla – SPARX
- Junxiung Hu - iPATH
- Janet Luhmann – SEPMOD
- Ming Zhang - Zhang model

## Forecasting Challenges

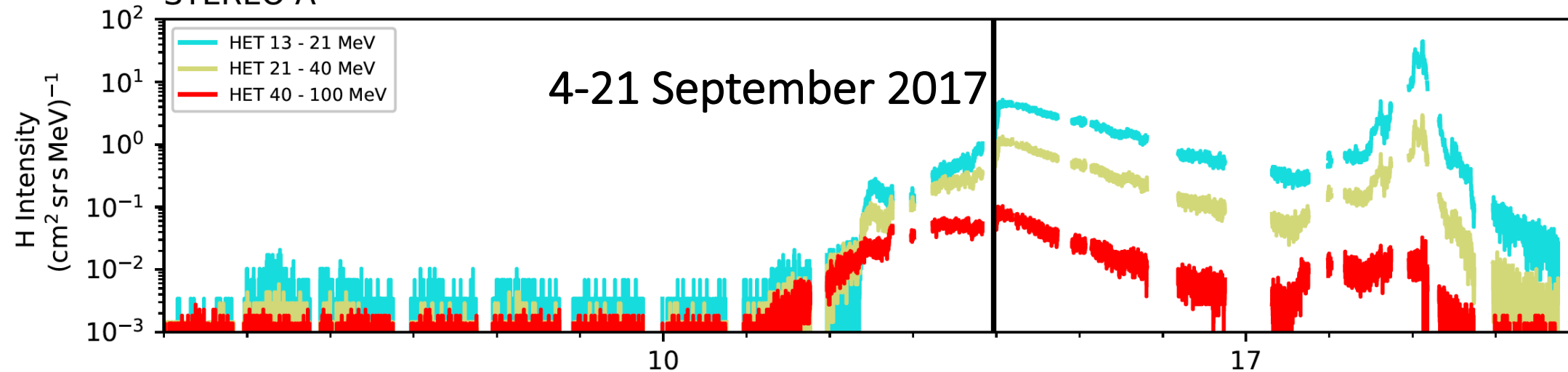
- *Christina Cohen (ran out of time)*
- *Katie Whitman (ran out of time)*

## Empirical(ish)

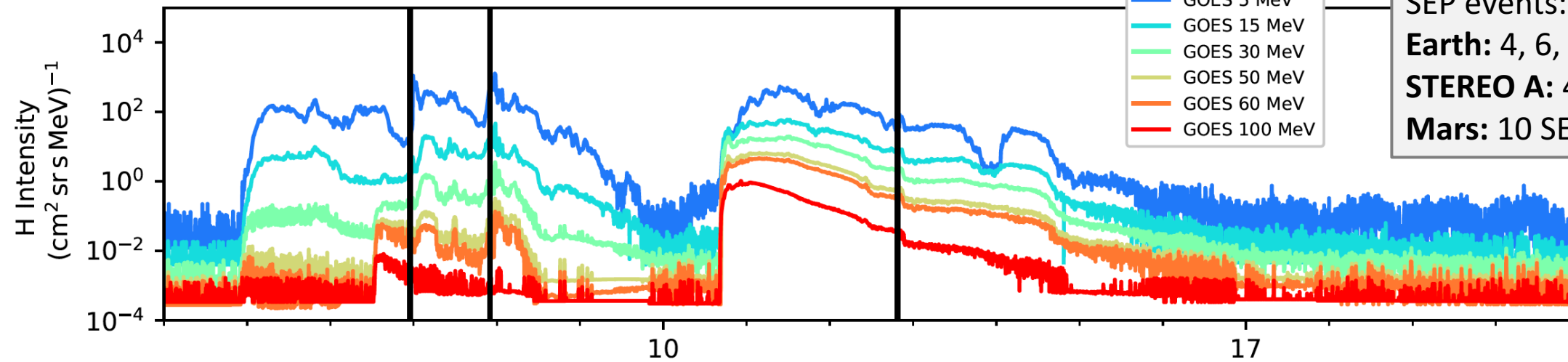
- Stephen White & Steve Kahler - AFRL PPS
- Arik Posner – REleASE
- Hazel Bain – PROTONS & SWPC operational forecast
- Marlon Núñez - UMASEP-10
- *Ian Richardson – Richardson formula*
- *Alex Engell & David Falconer - MAG4 and SPRINTS*
- *Athanasios Papaioannou – FORSPEF*
- *Mark Dierckxsens - SEPForecast*
- *Mike Marsh - UK Met Office operational probabilistic forecast*
- *Monica Laurenza - ESPERTA*

# STEREO A

4-21 September 2017

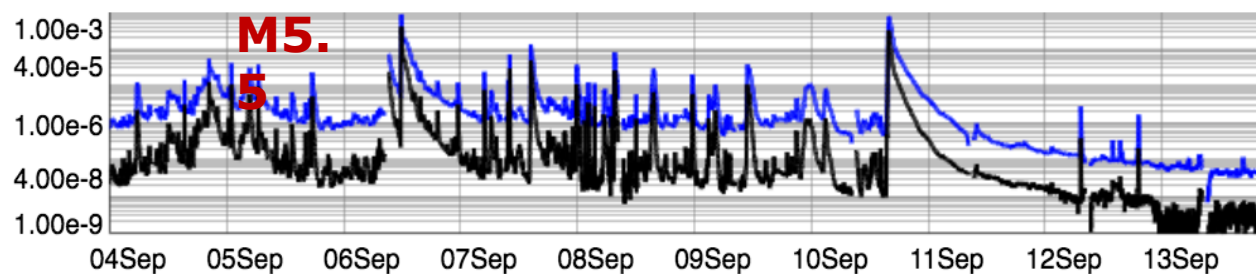


# GOES

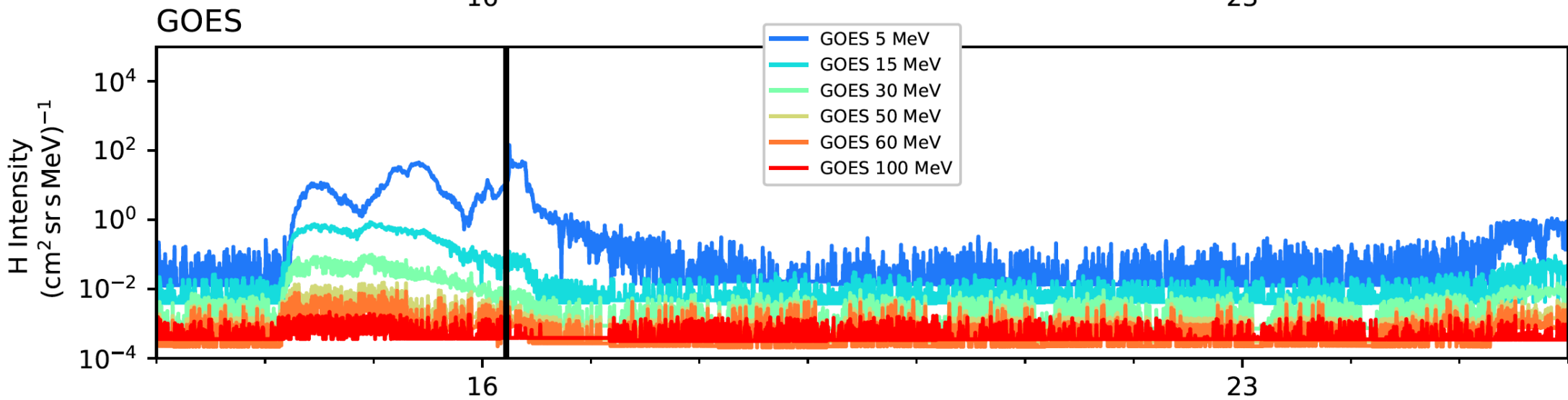
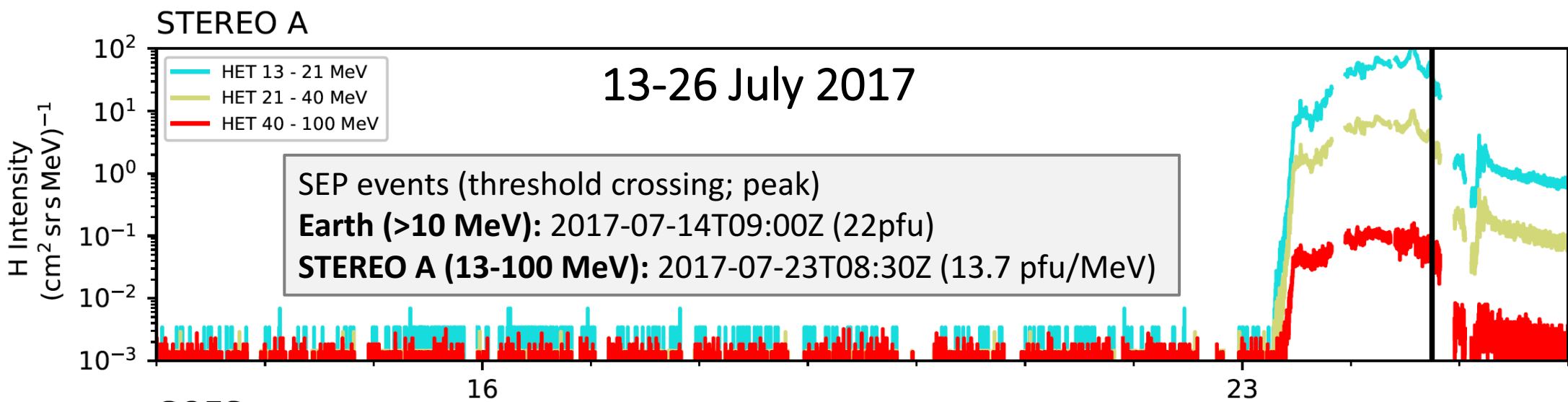


SEP events:  
**Earth:** 4, 6, 10 SEP 2017  
**STEREO A:** 4, 11, 18 SEP 2017  
**Mars:** 10 SEP 2017

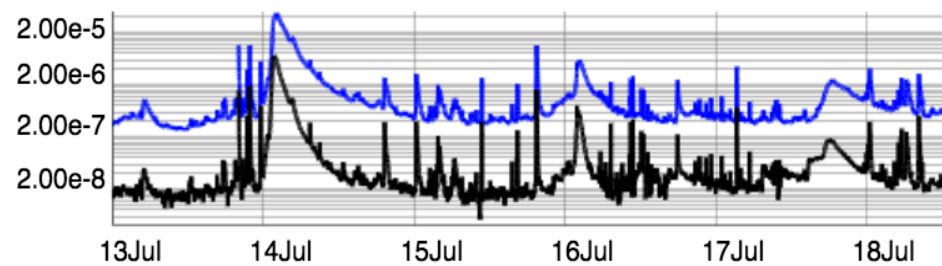
Start Time 4-sep-2017 00:00 (UTC)



	CME start time (UT)	Radial speed (km/s)	HEEQ longitude (°)	HEEQ latitude (°)	Half-width (°)
1	2017-09-04 20:36	1,325	4	-8	52
2	2017-09-04 19:39	830	23	-8	28
3	2017-09-06 12:24	1,850	24	-15	50
4	2017-09-06 13:09	1,180	99	-4	30
5	2017-09-09 16:48	480	100	-10	33
6	2017-09-09 23:12	700	105	5	41
7	2017-09-10 16:09	2,500	108	-9	90 <sup>a</sup>
8	2017-09-17 12:09	1,600	-155	-5	54

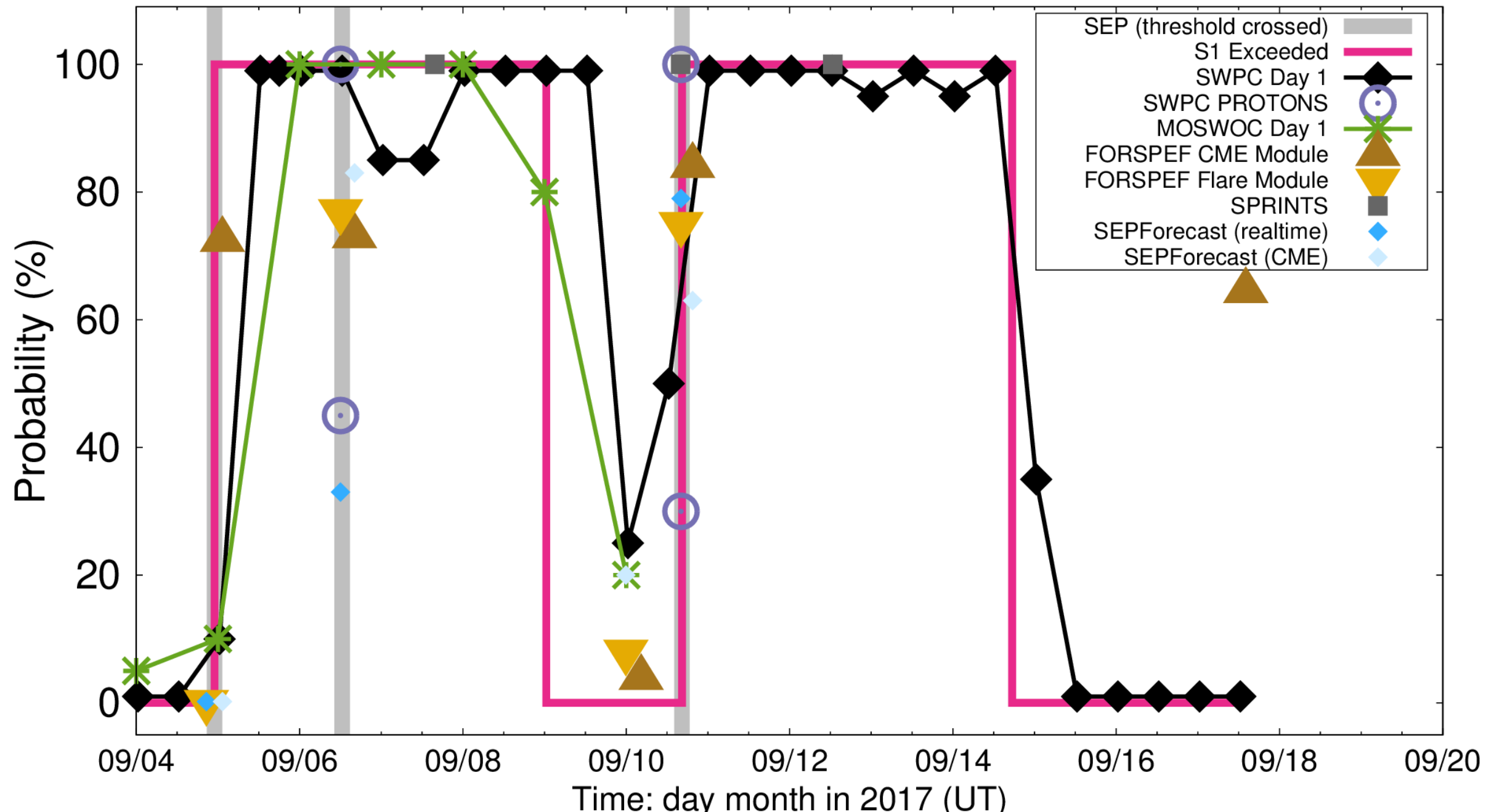


Start Time 13-Jul-2017 00:00 (UTC)

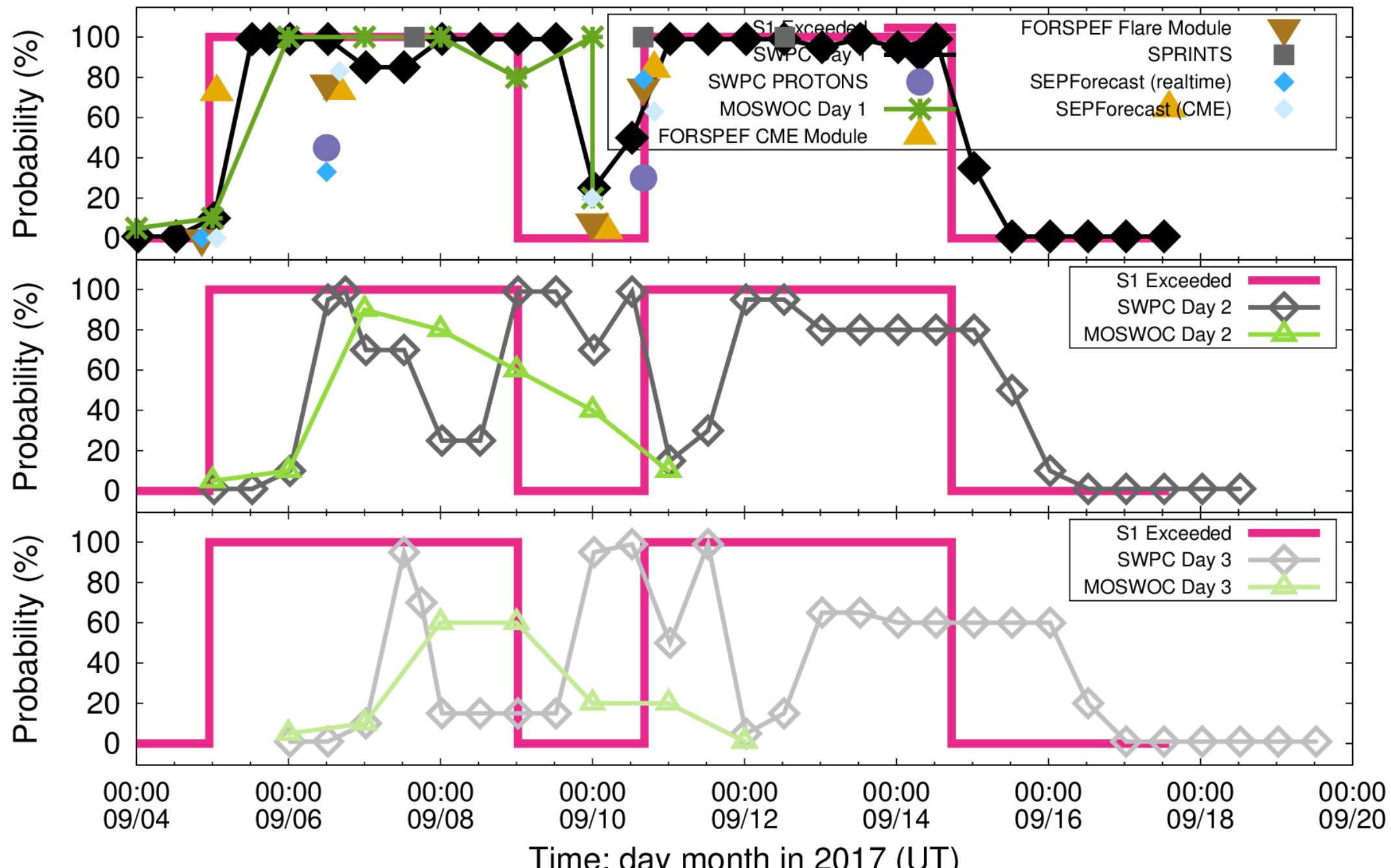


	CME start time (UT)	Radial speed (km/s)	HEEQ longitude (°)	HEEQ latitude (°)	Half-width (°)
1	2017-07-12 14:00	430	27	8	37
2	2017-07-14 01:36	1,300	38	-8	54
3	2017-07-23 01:36	1,080	149	15	36
4	2017-07-23 04:39	1,900	-165	-12	58
5	2017-07-28 05:36	880	-131	5	41

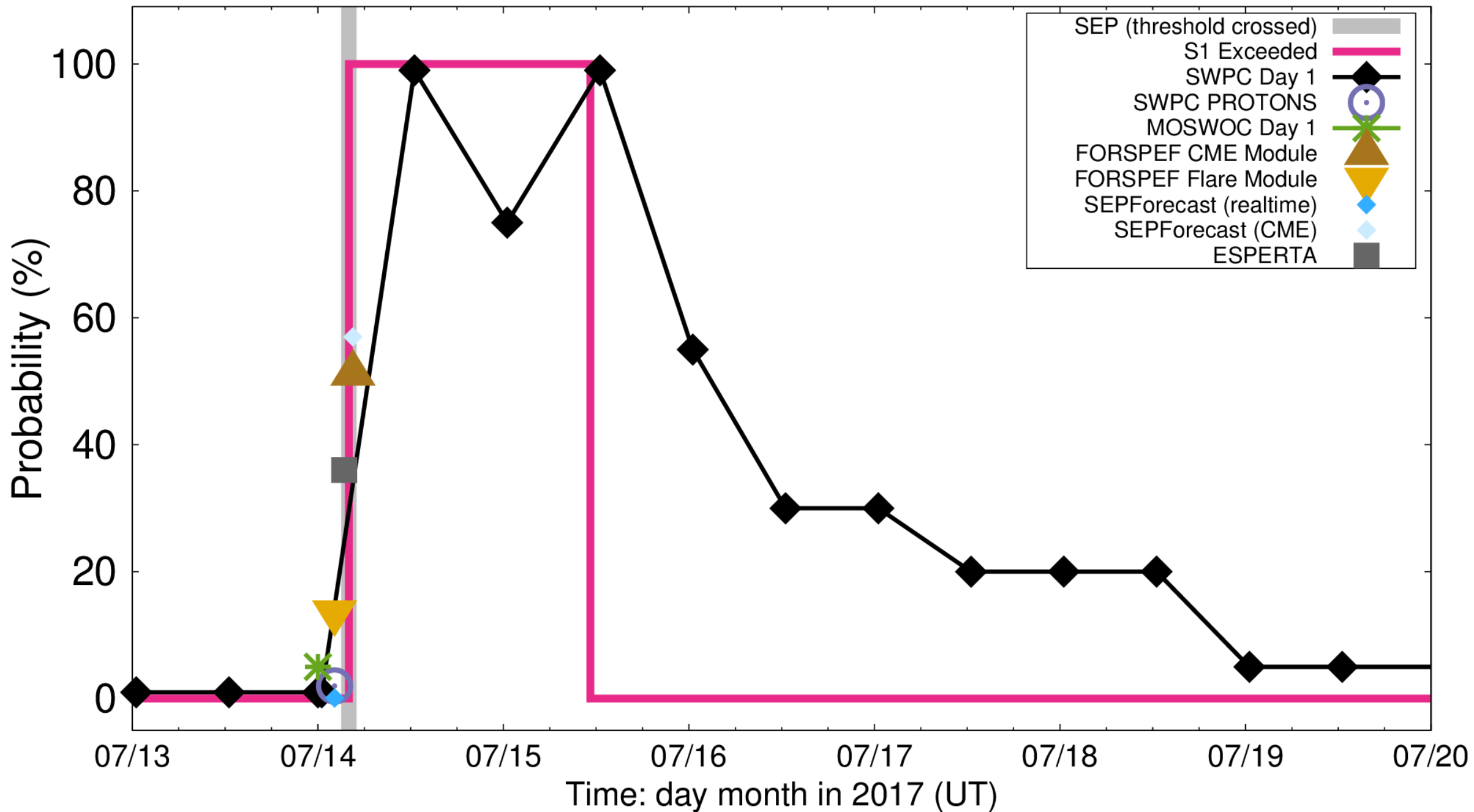
# Probabilistic S1 Forecasts - September 2017 (Earth\*)



Probabilistic S1 Forecasts - September 2017 (Earth)



# Probabilistic S1 Forecasts - July 2017 (Earth)



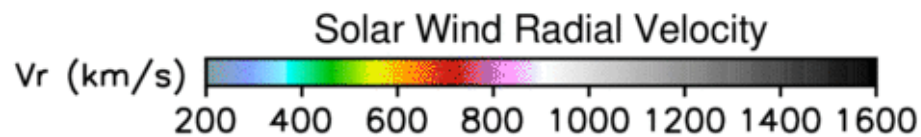
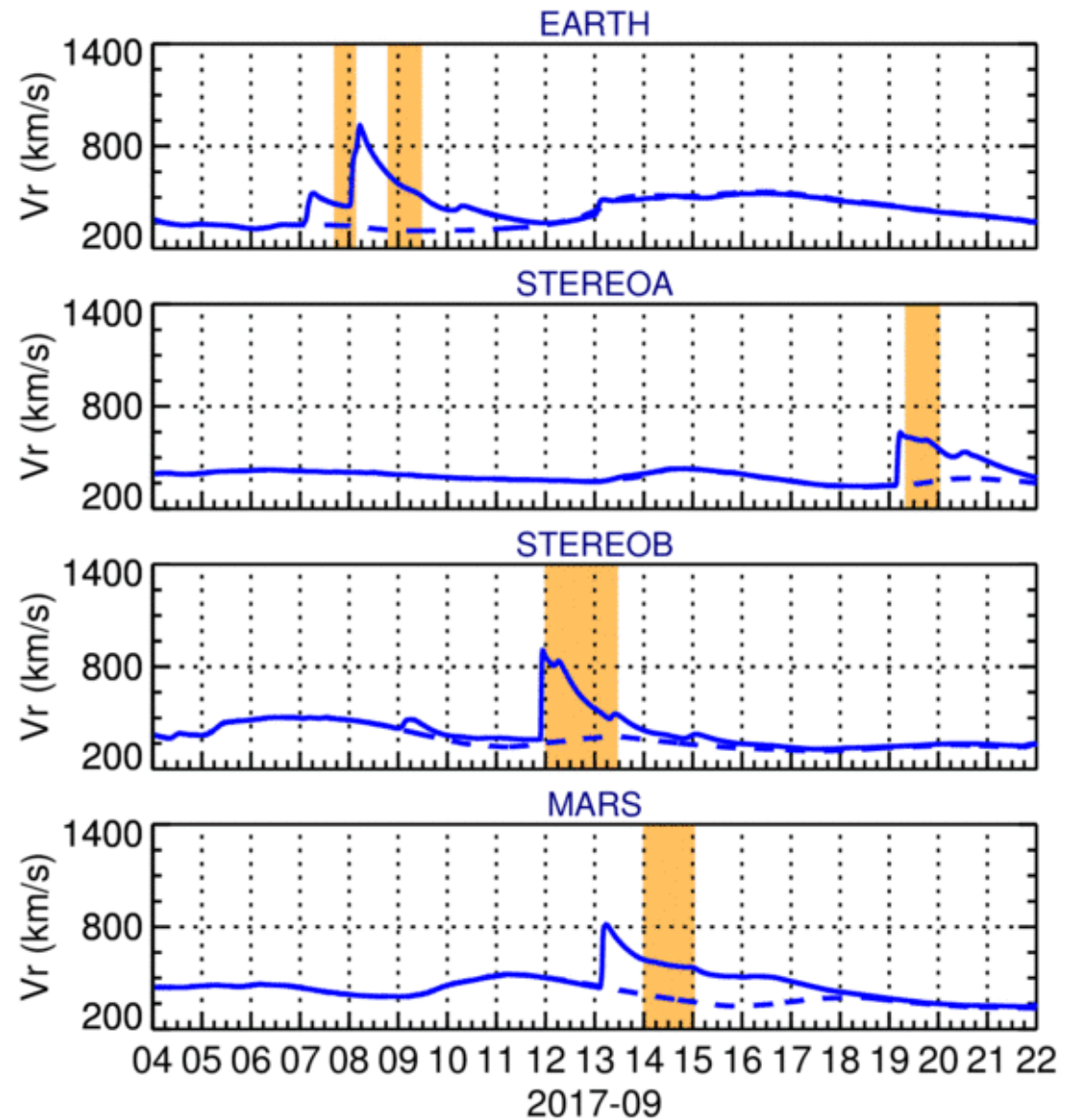
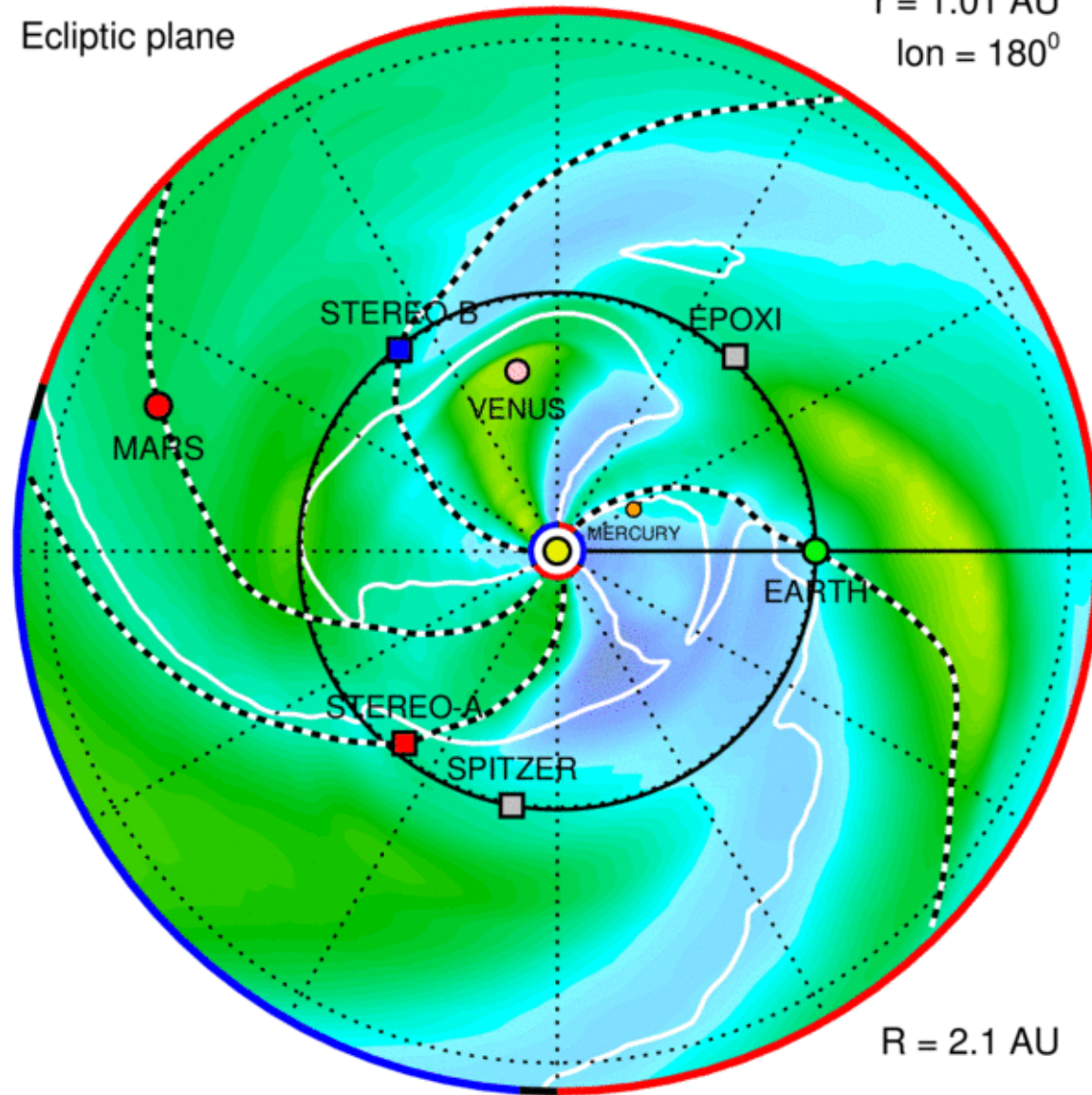


2017-09-04T00:00

2017-09-04T00 + 0.00 days

Ecliptic plane

$r = 1.01$  AU  
 $\text{lon} = 180^\circ$



IMF line  
- - -

IMF polarity  
- [blue/red] +

HCS  
= = =

CME  
[white/orange]

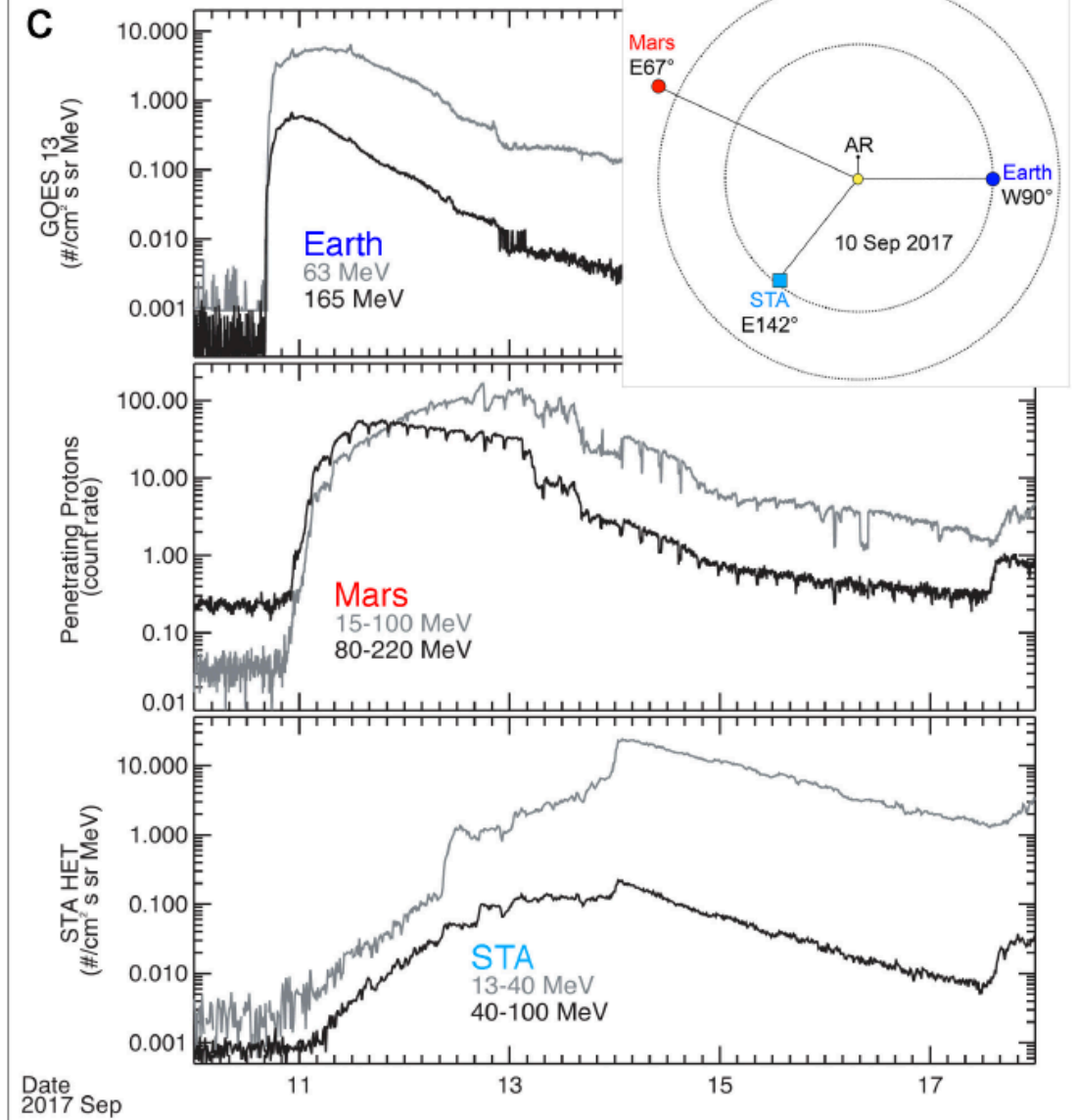
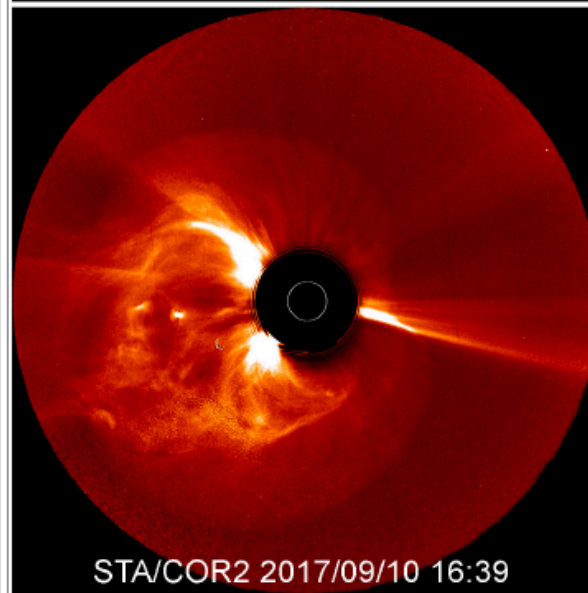
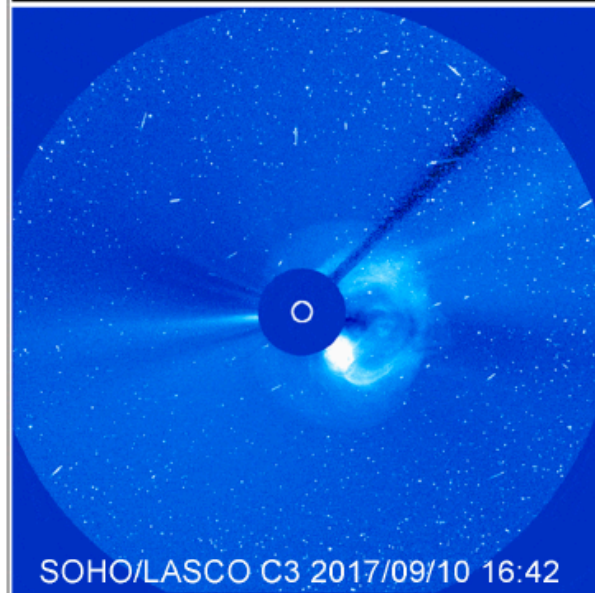
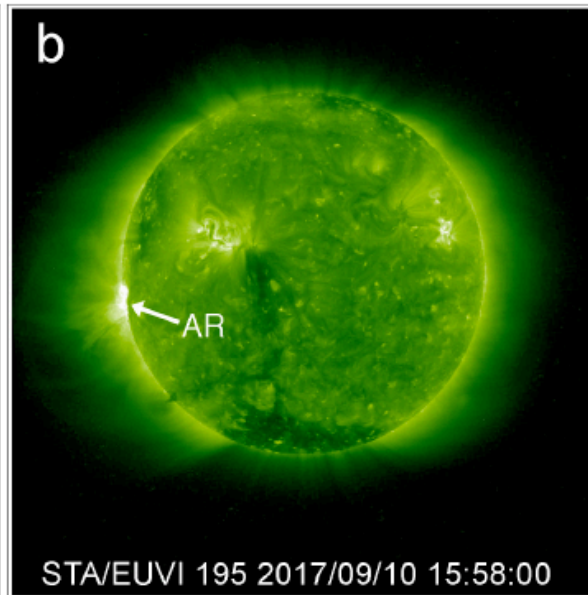
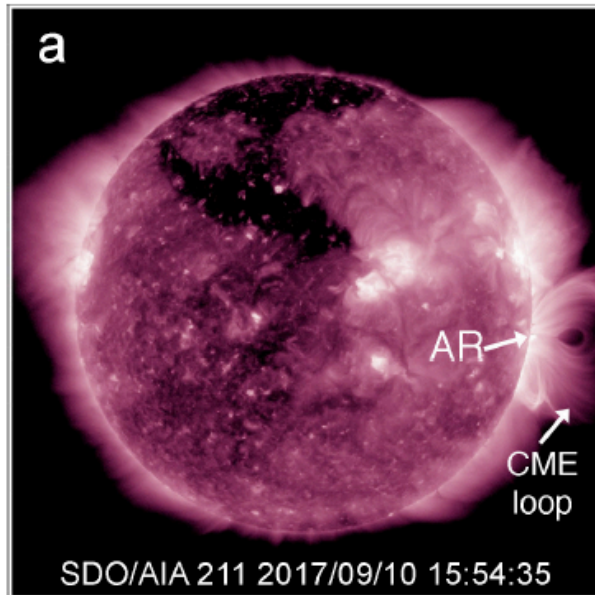
measured  
- - -

simulated  
- - -



POV: Earth

POV: STEREO-A



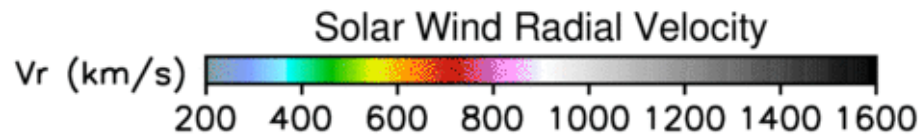
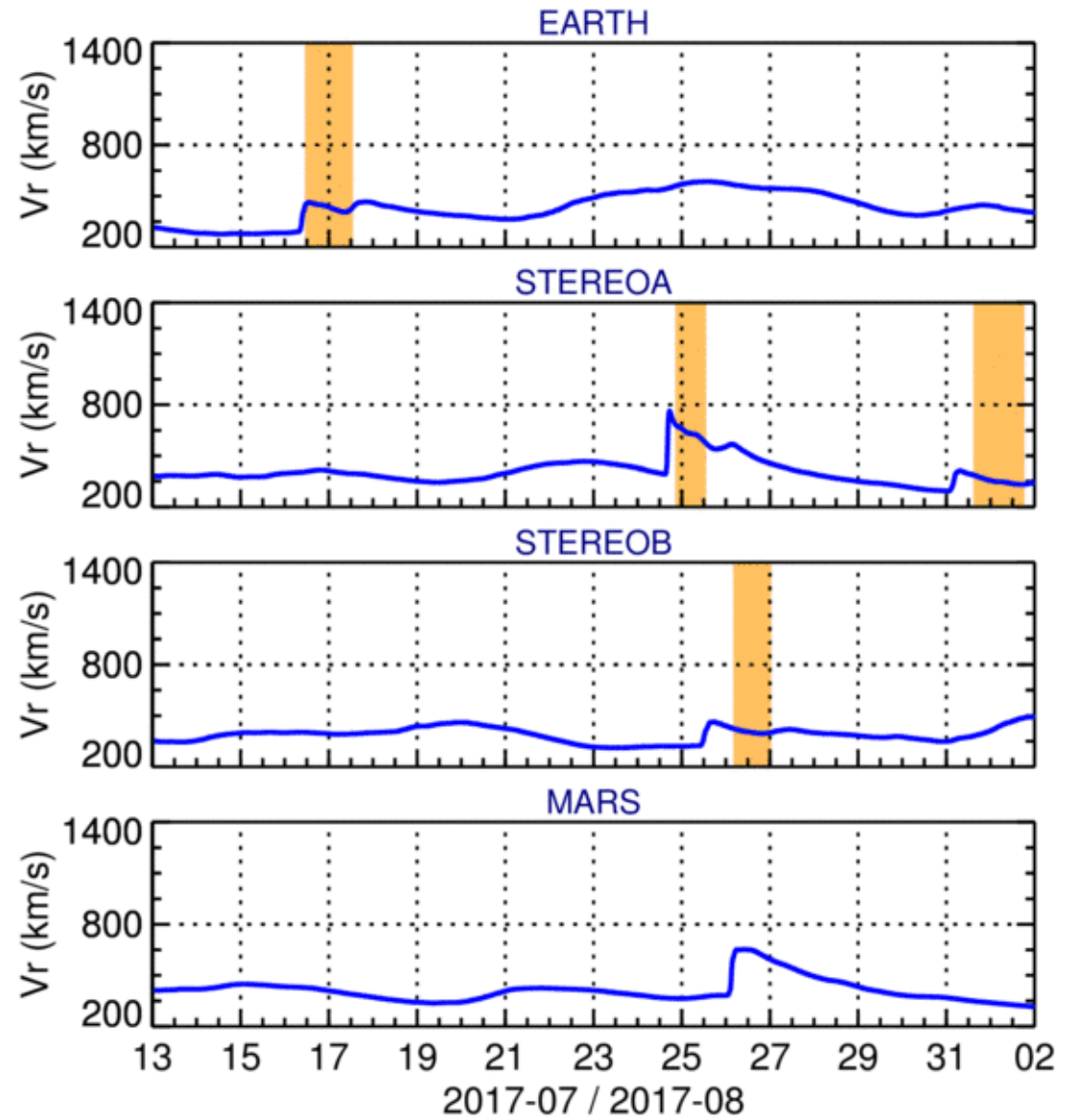
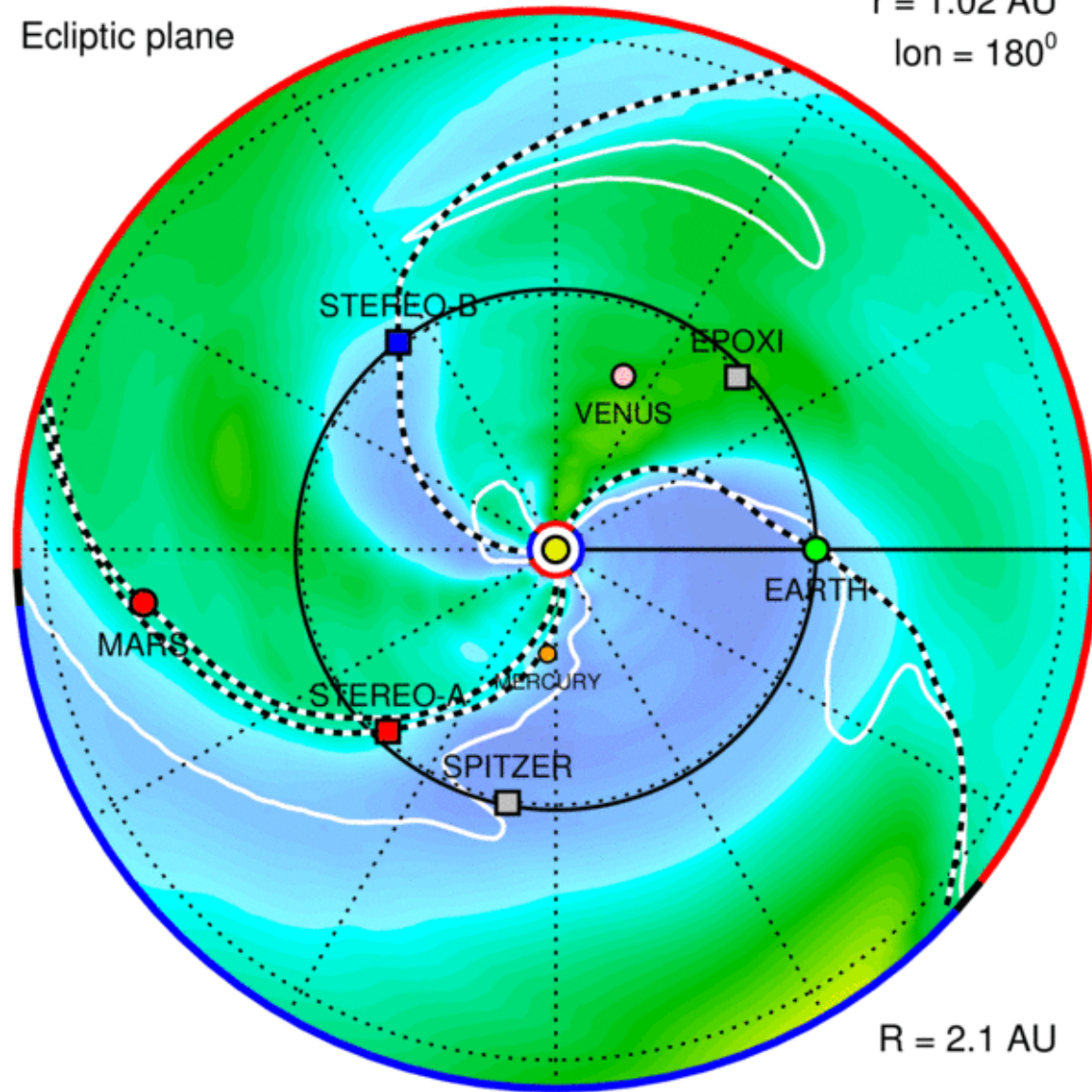
Lee et al. GRL, 2018 (accepted)

2017-07-13T00:00

2017-07-13T00 + 0.00 days

Ecliptic plane

$r = 1.02 \text{ AU}$   
 $\text{lon} = 180^\circ$



IMF line  
- - -

IMF polarity  
- [blue/red] +

HCS  
=

CME  
[white/orange]

measured  
— [red]

simulated  
— [blue]