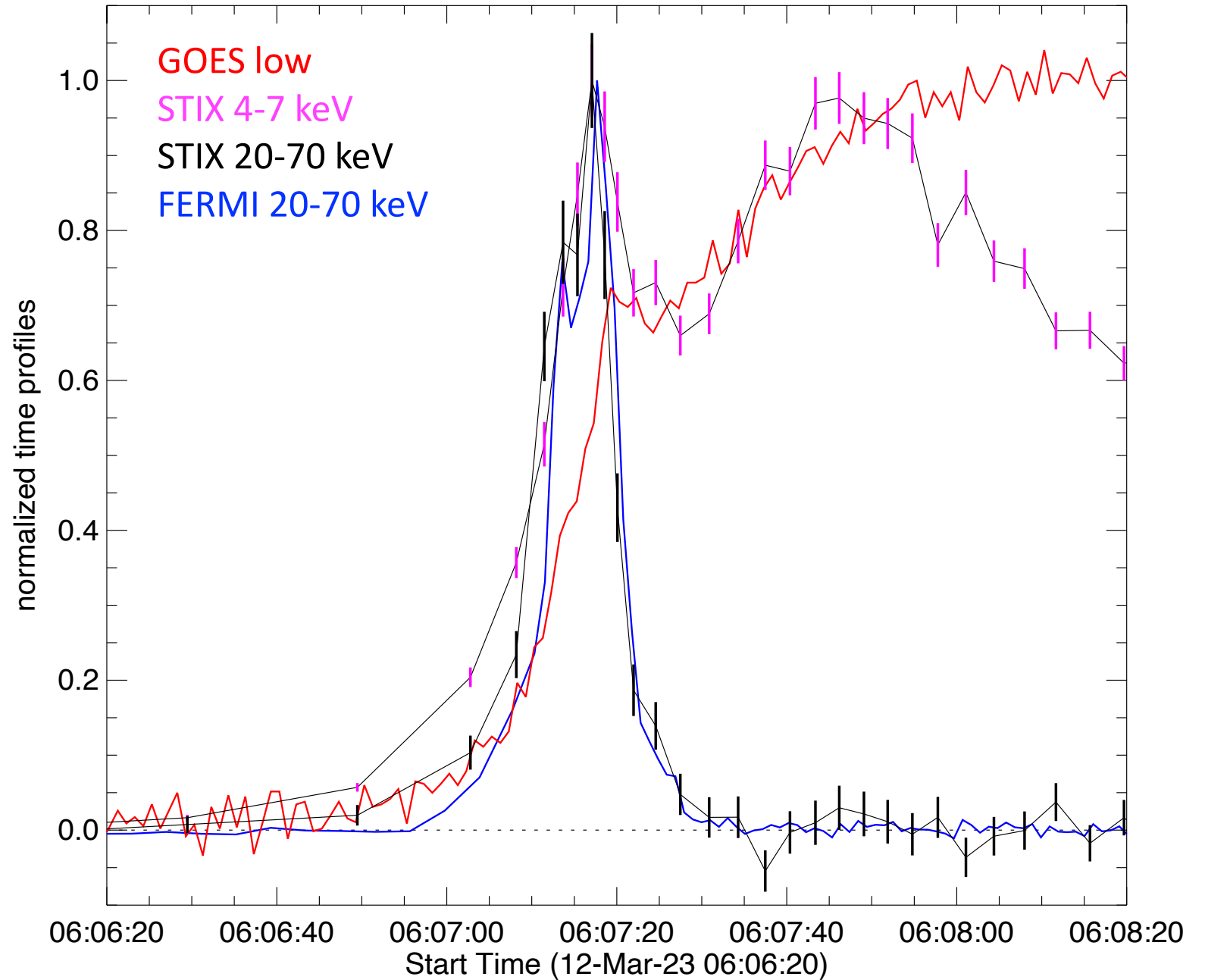
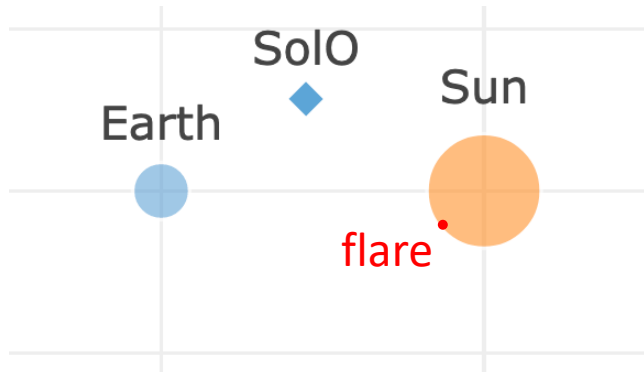
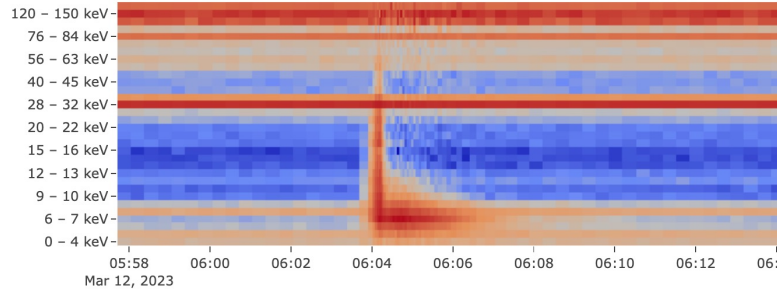
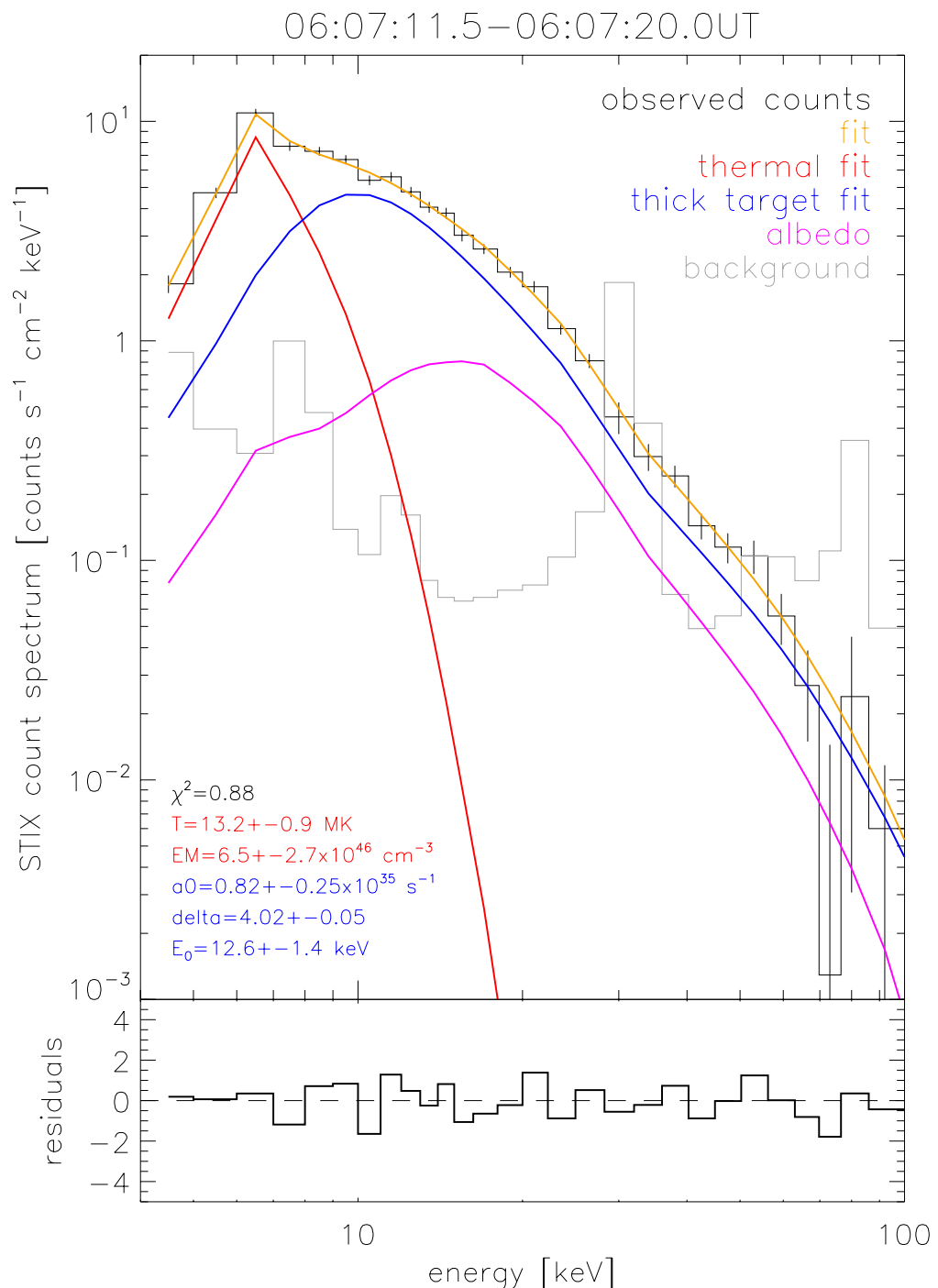
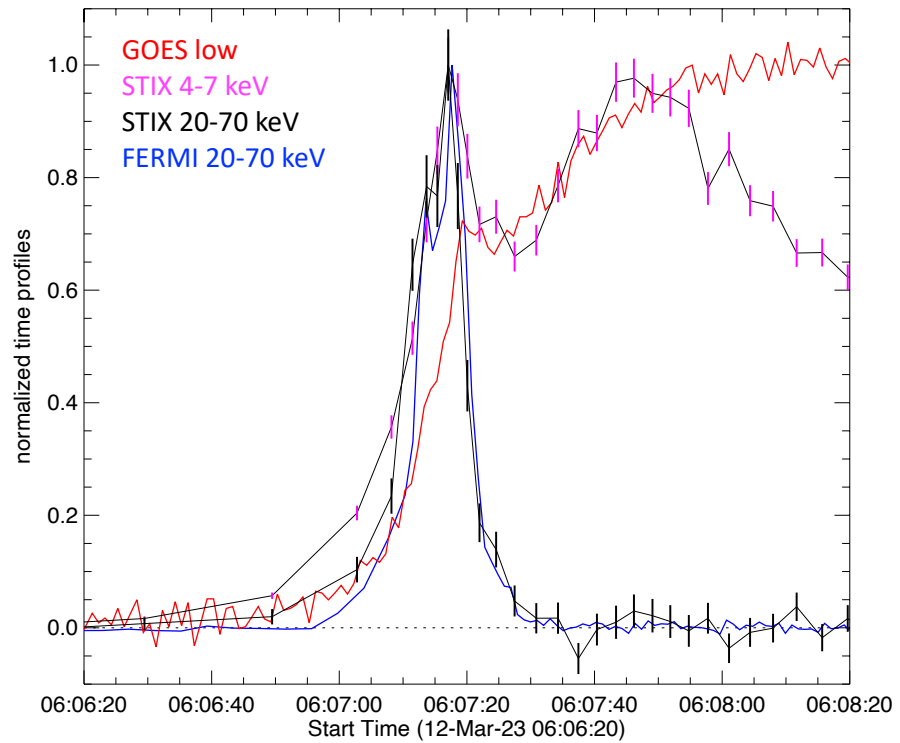


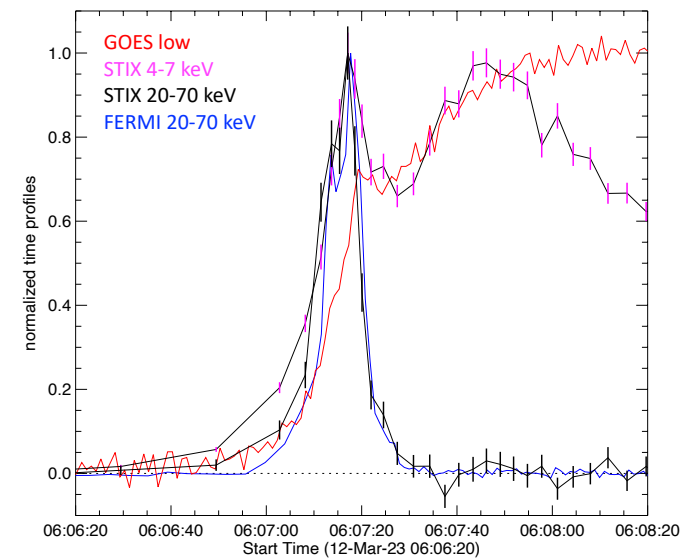
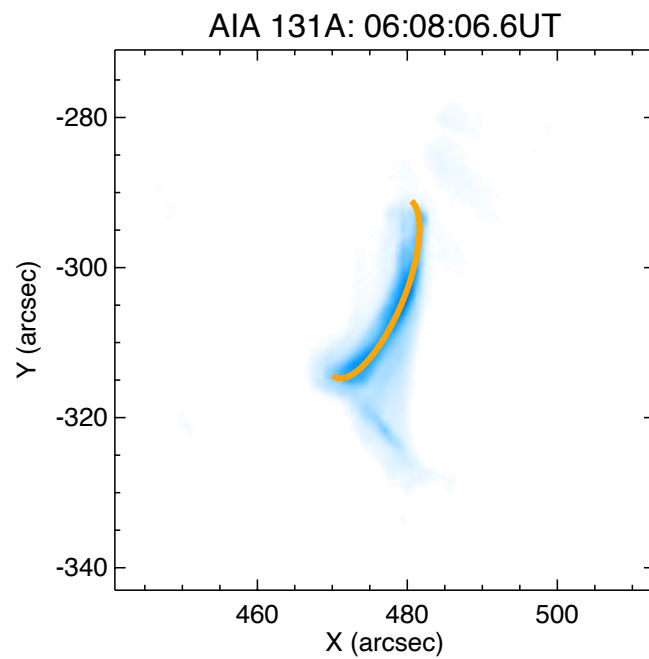
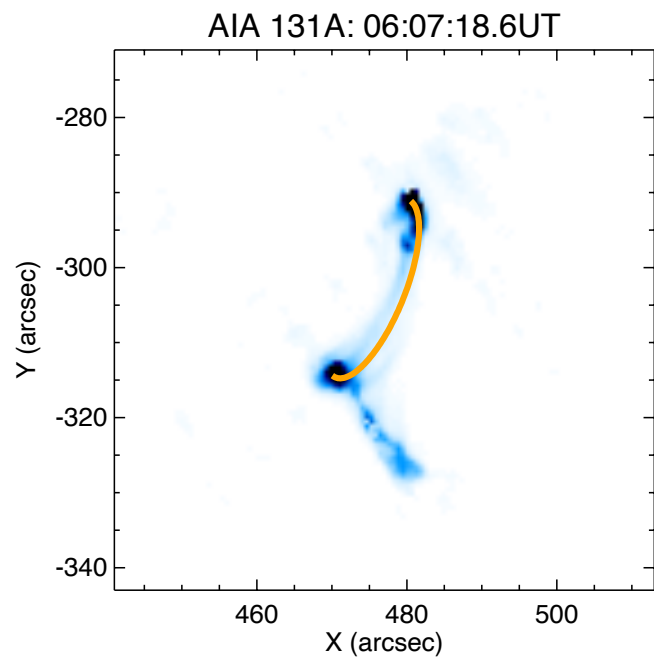
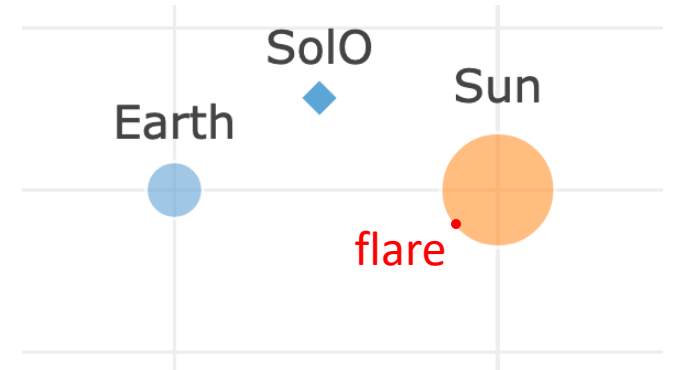
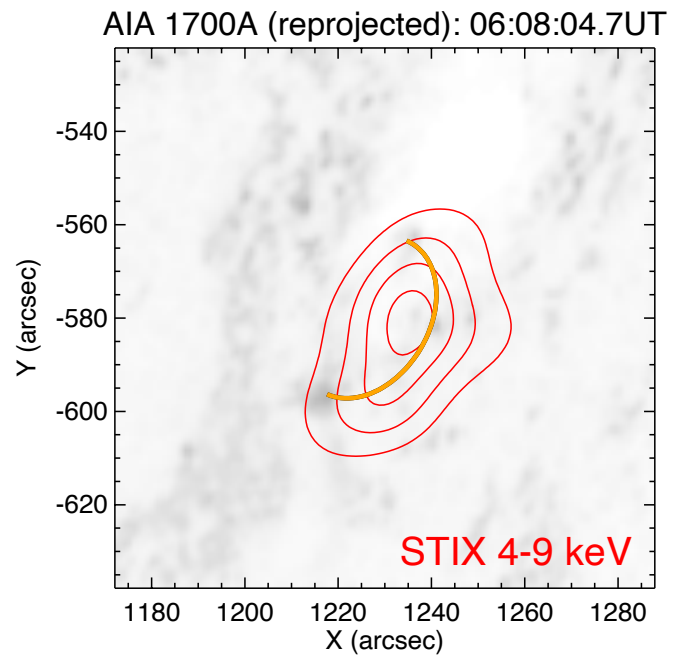
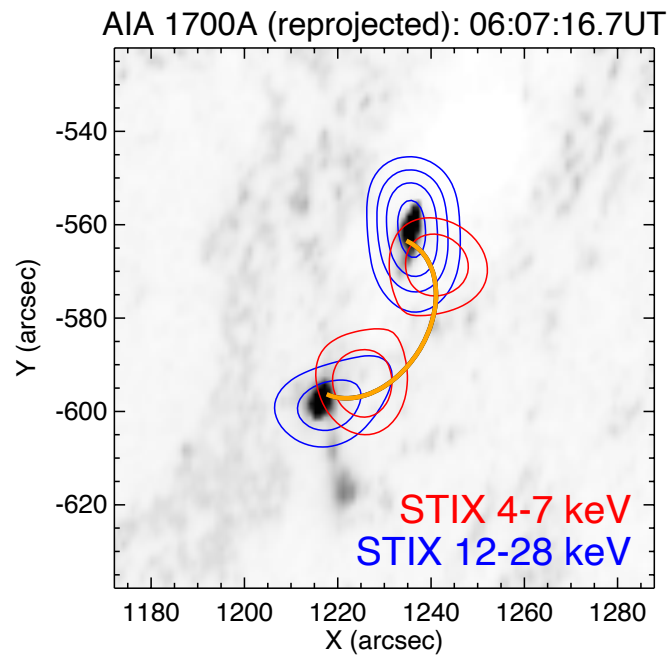
PSP/FIELDS radio events and
their association with STIX flares
in addition:
RADYN simulations of an early impulsive flare

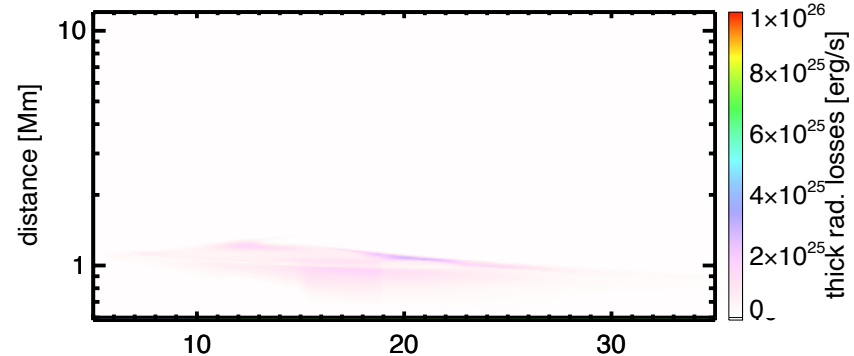
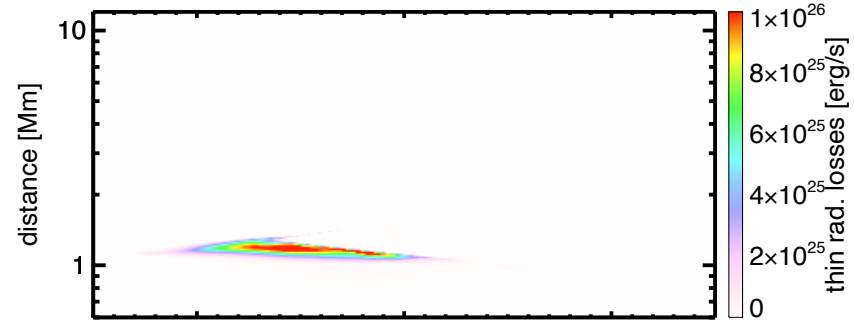
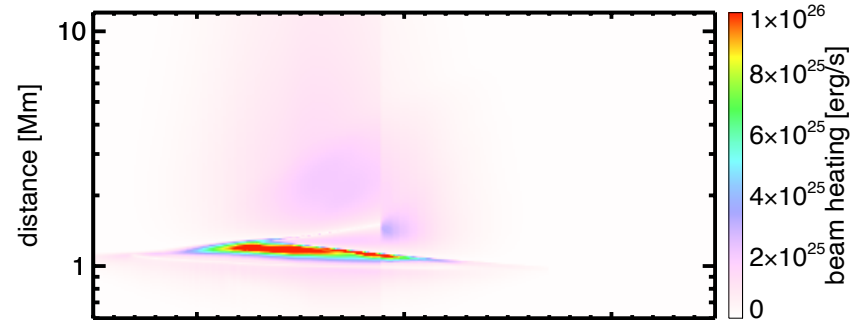
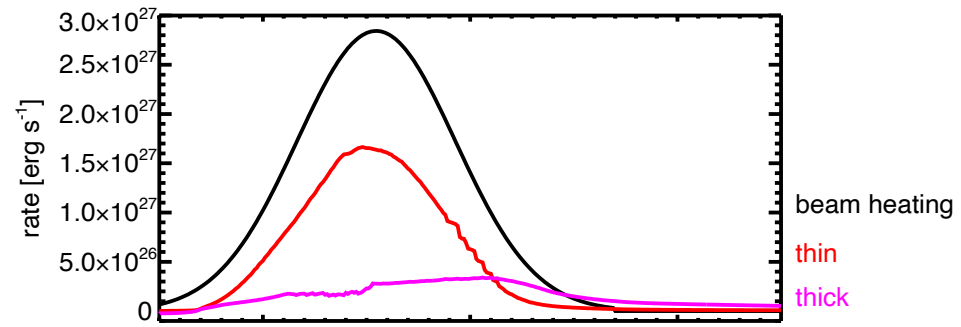
Säm Krucker, FHNW & UC Berkeley

Early impulsive flare SOL2023-03-12T06









Seconds
2023 Mar 12 06:07:

Input to RADYN:

$$a_0 = 0.82 \pm 0.25 \times 10^{35} \text{ s}^{-1}$$

$$\Delta = 4.02 \pm 0.05$$

$$E_0 = 12.6 \pm 1.4 \text{ keV}$$

+

loop length + footpoint area

+

pre-flare loop parameters

Input to RADYN:

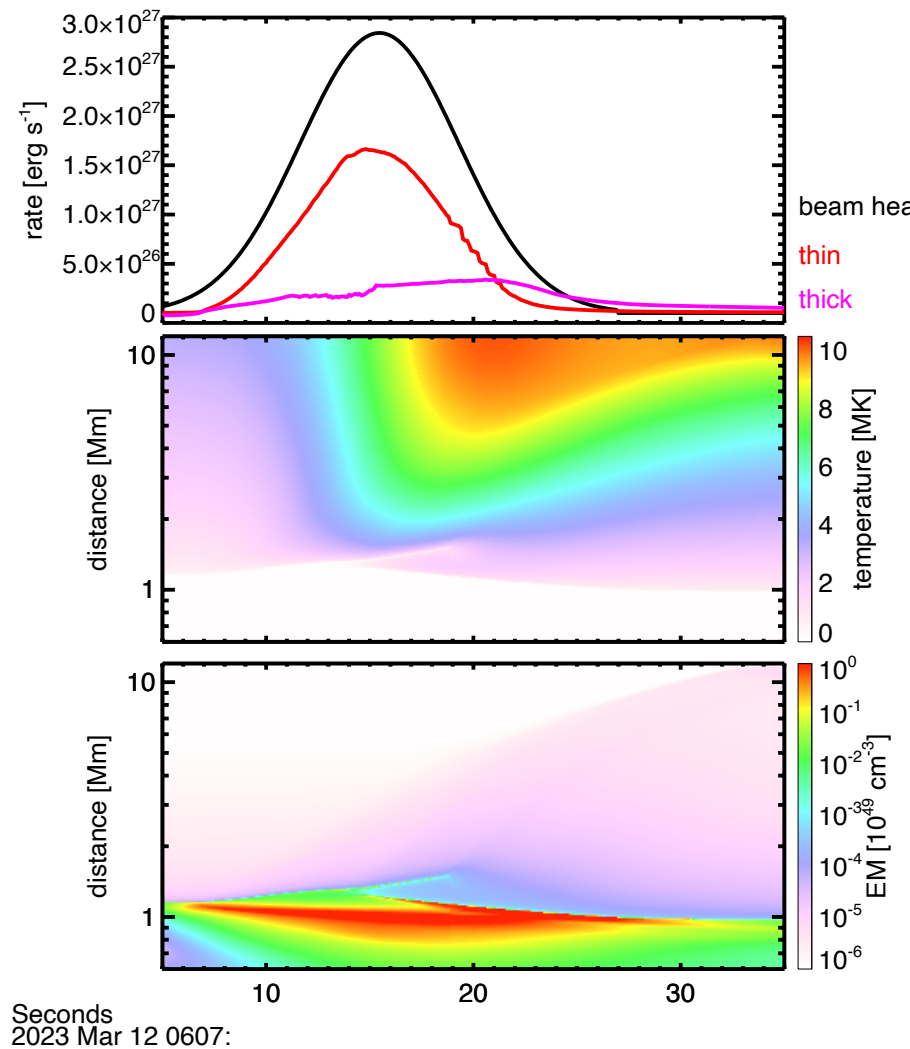
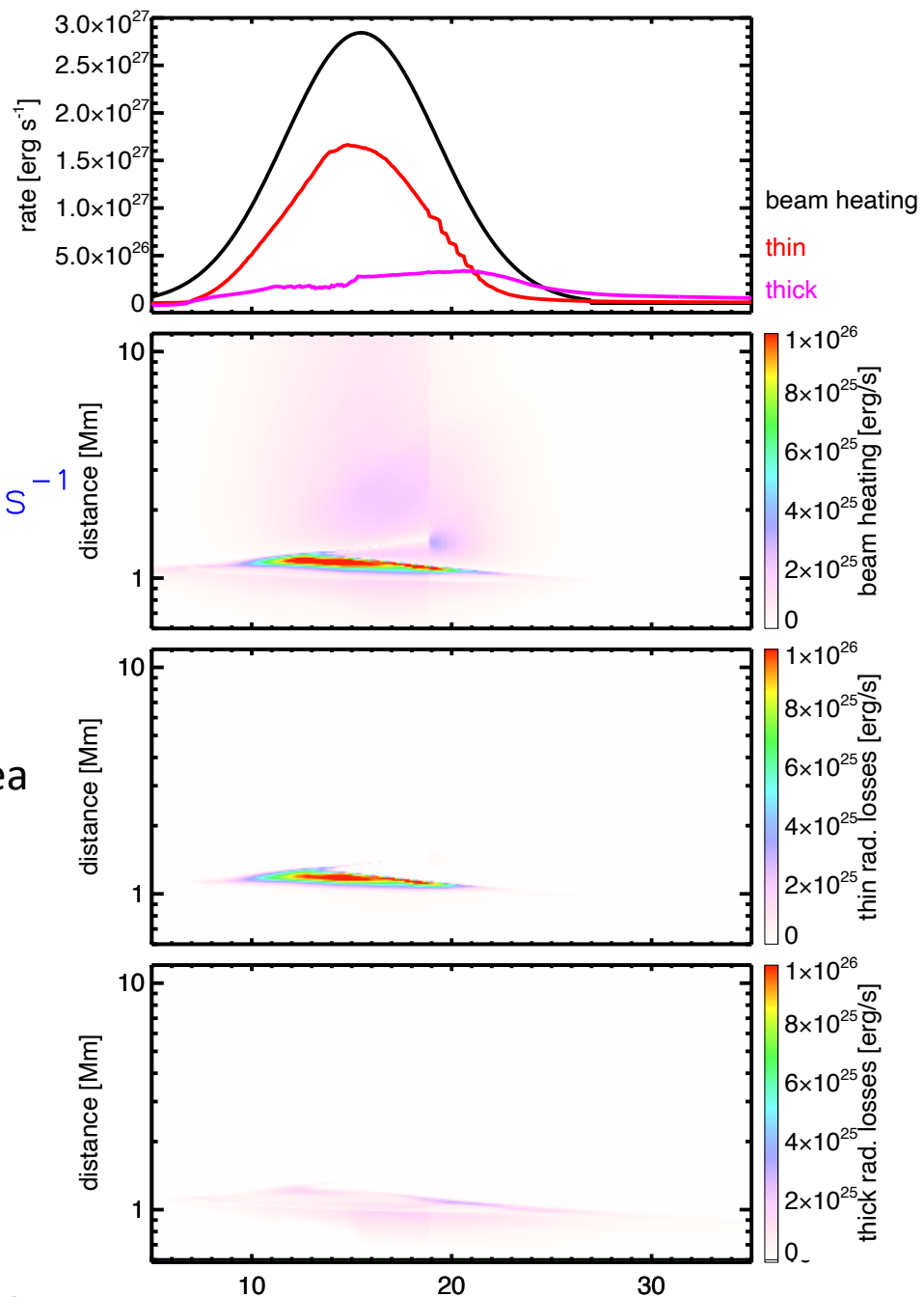
$a_0 = 0.82 \pm 0.25 \times 10^{35} \text{ s}^{-1}$

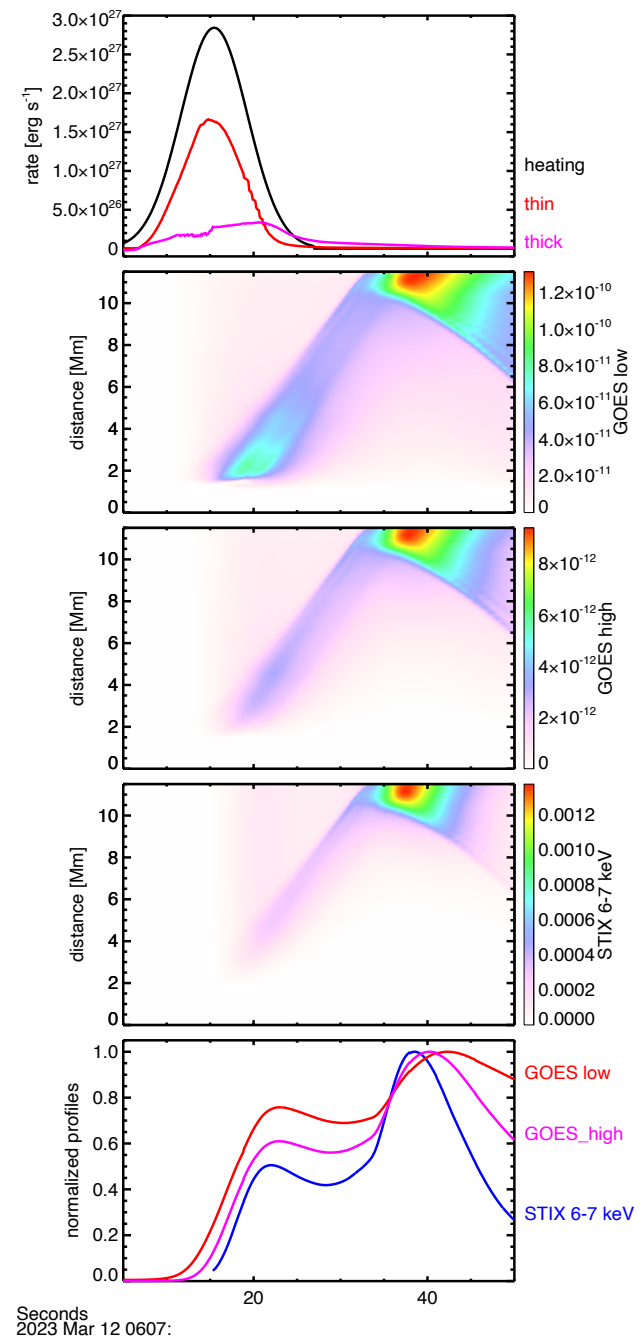
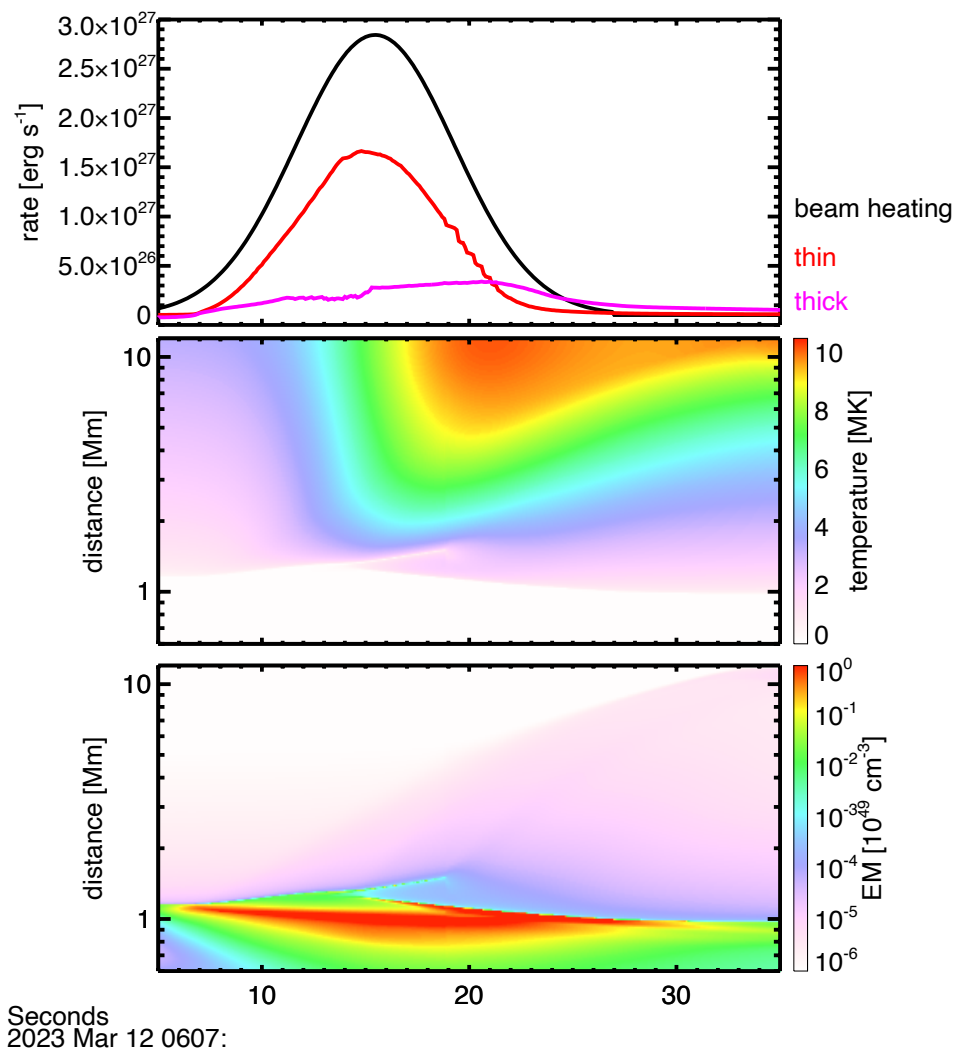
$\Delta = 4.02 \pm 0.05$

$E_0 = 12.6 \pm 1.4 \text{ keV}$

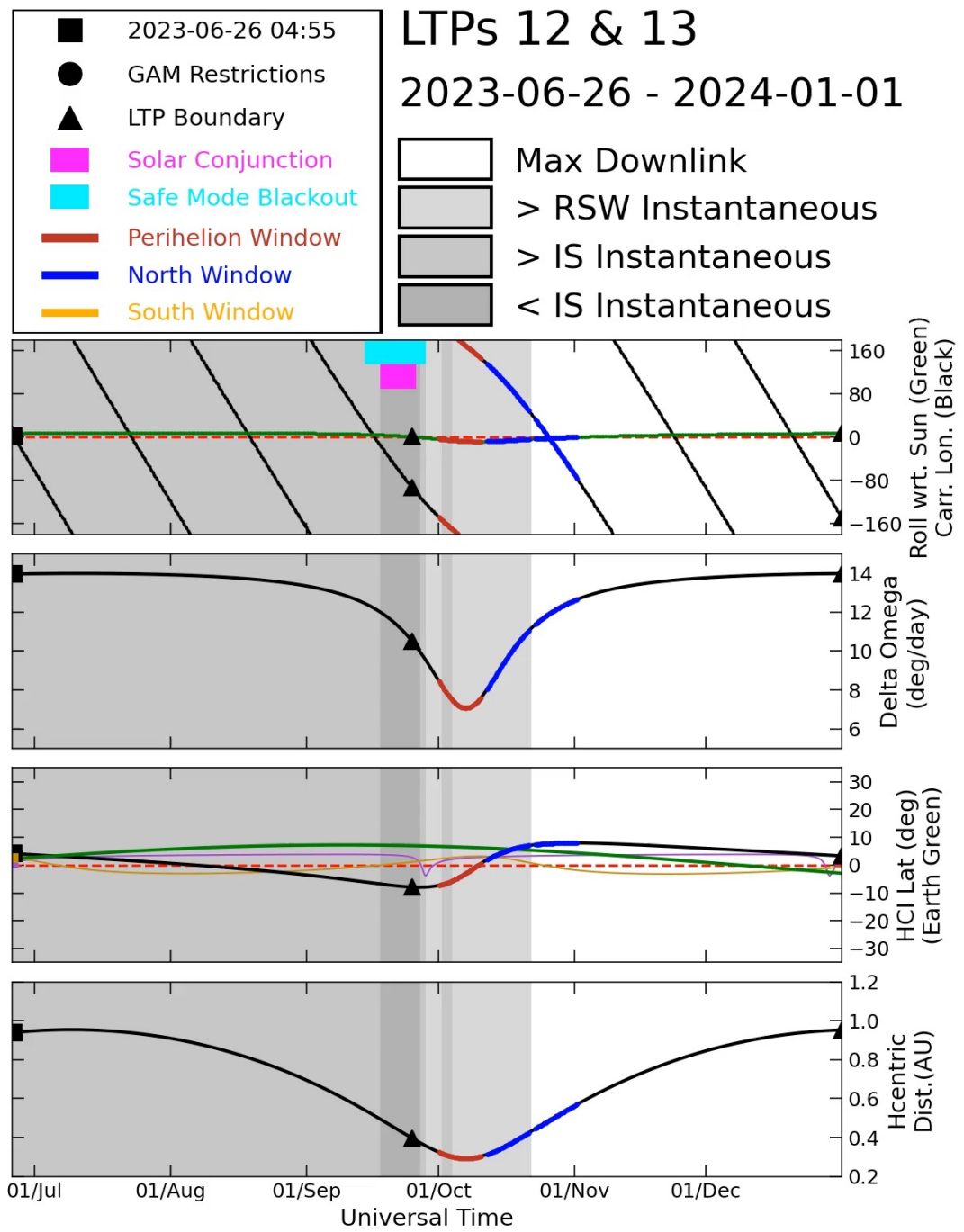
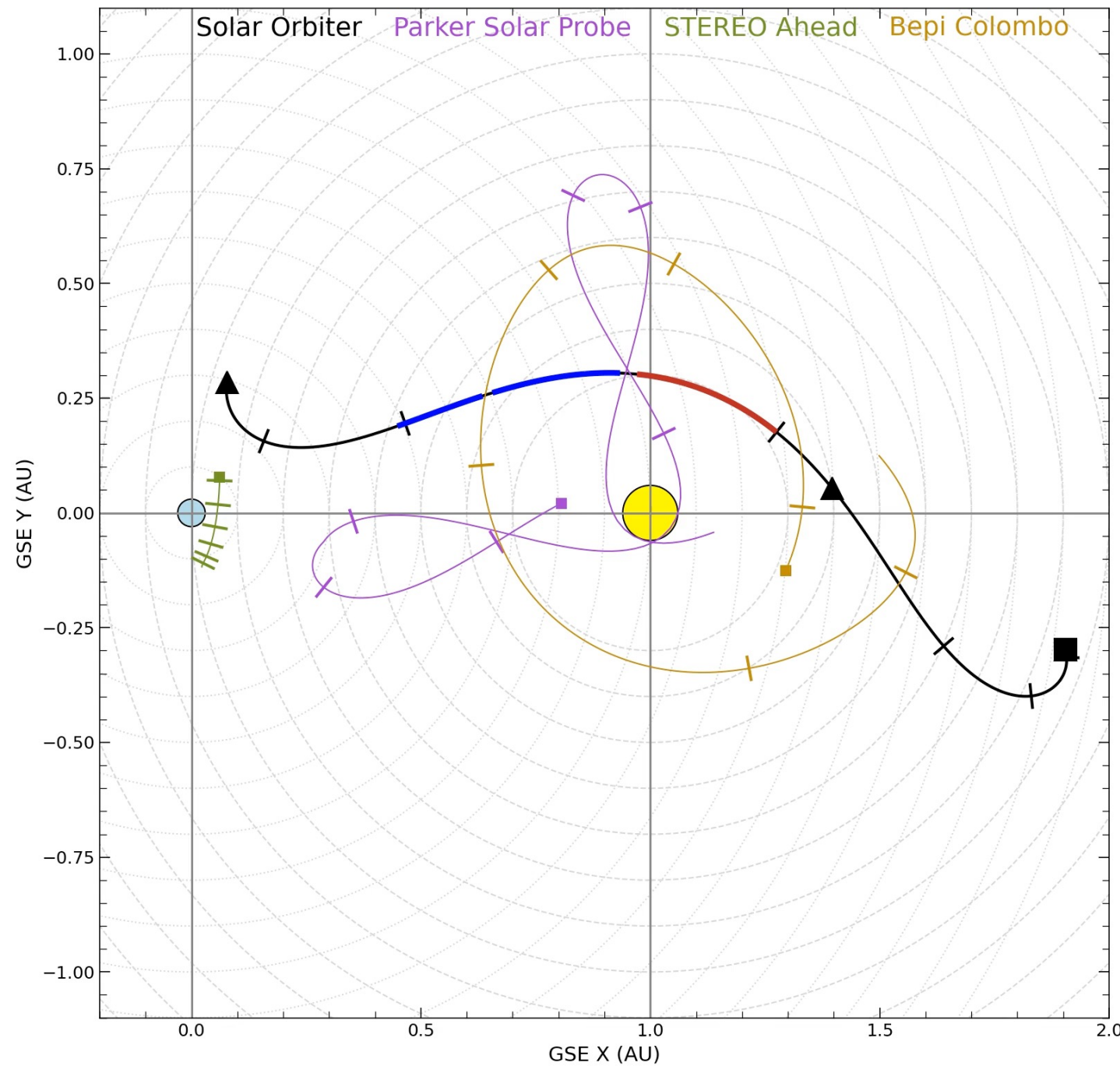
+
loop length + footpoint area

+
pre-flare loop parameters

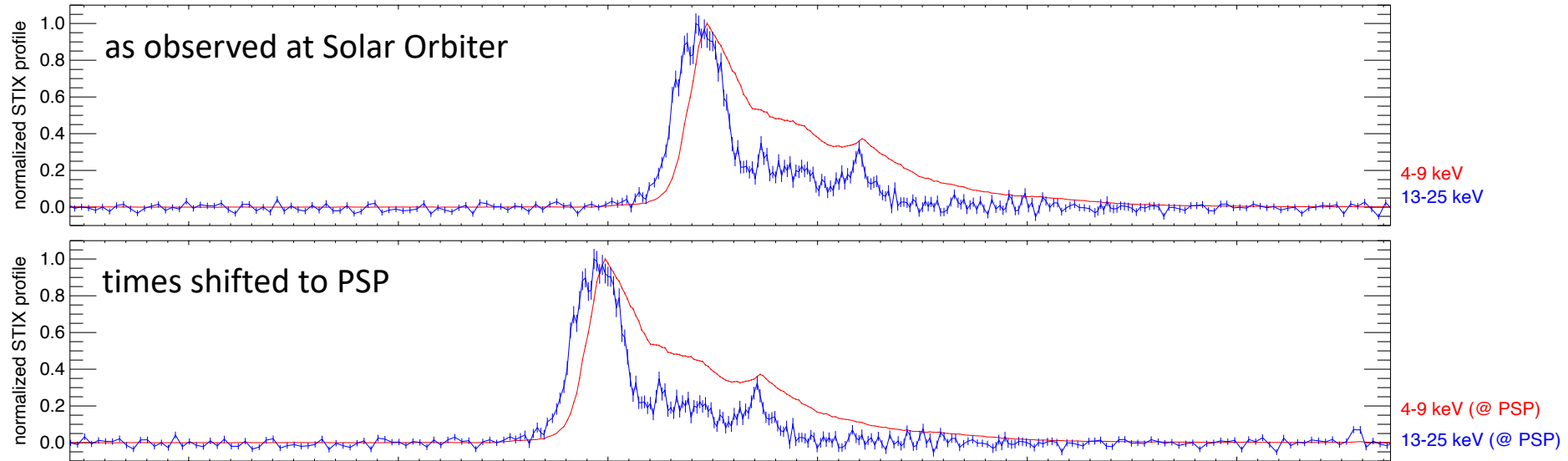




PSP/FIELDS radio events and
their association with STIX flares



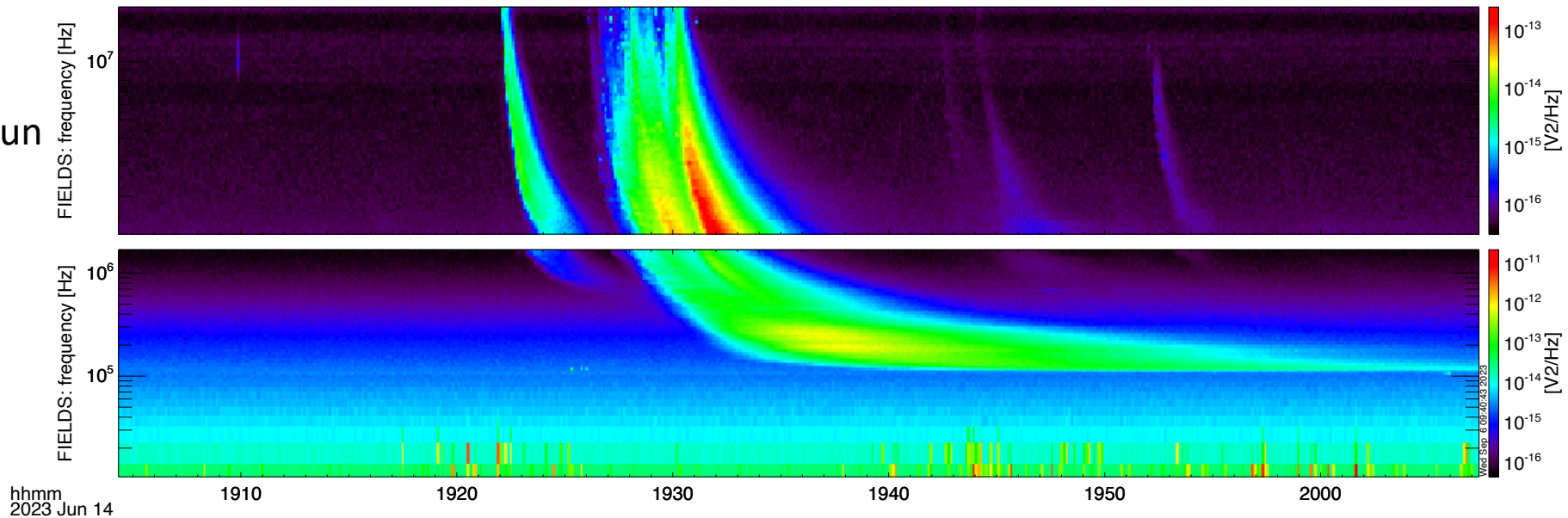
Timing agrees between flare-accelerated electrons and type III burst



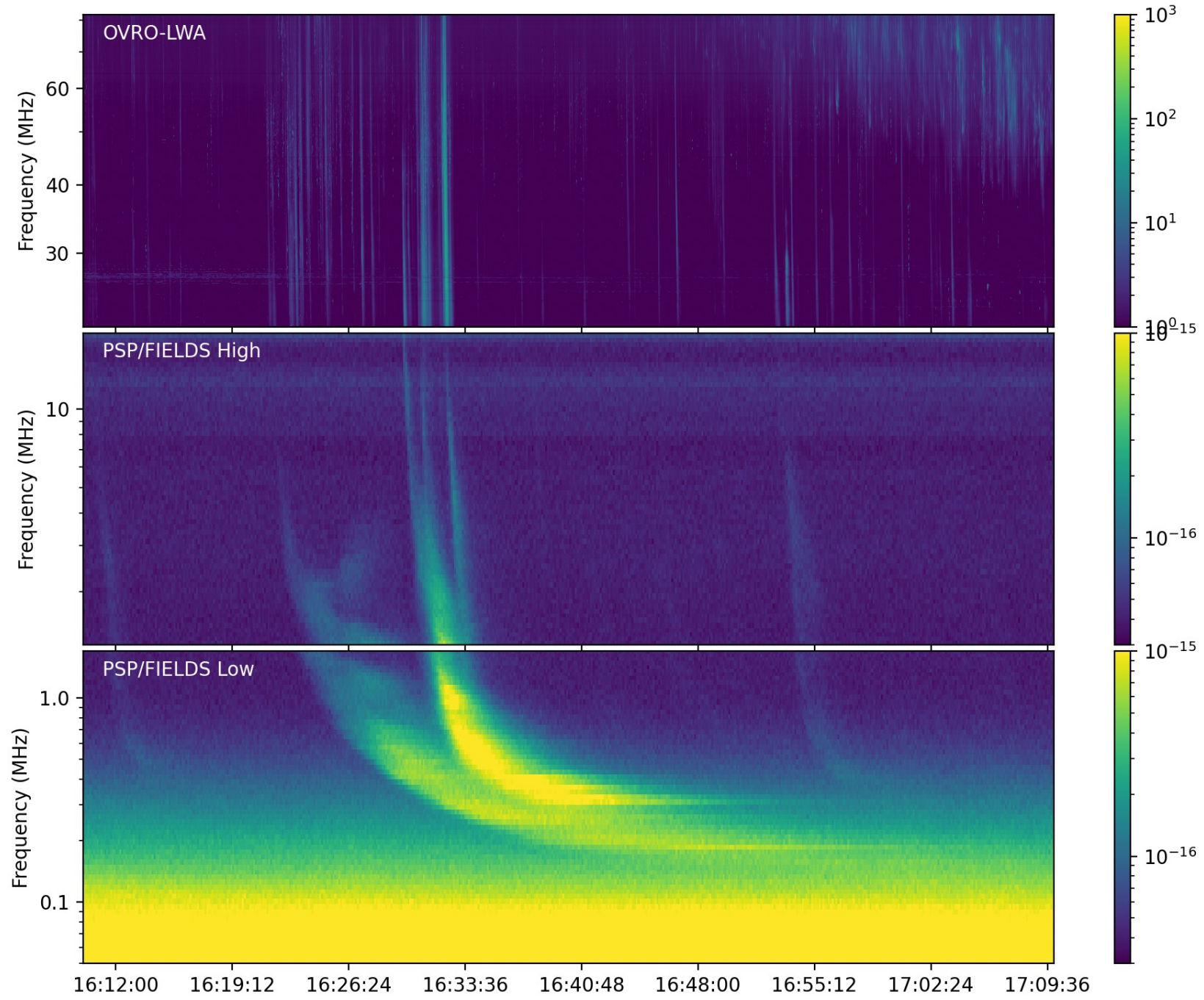
30 MHz

→ $n \sim 10^7 \text{ cm}^{-3}$

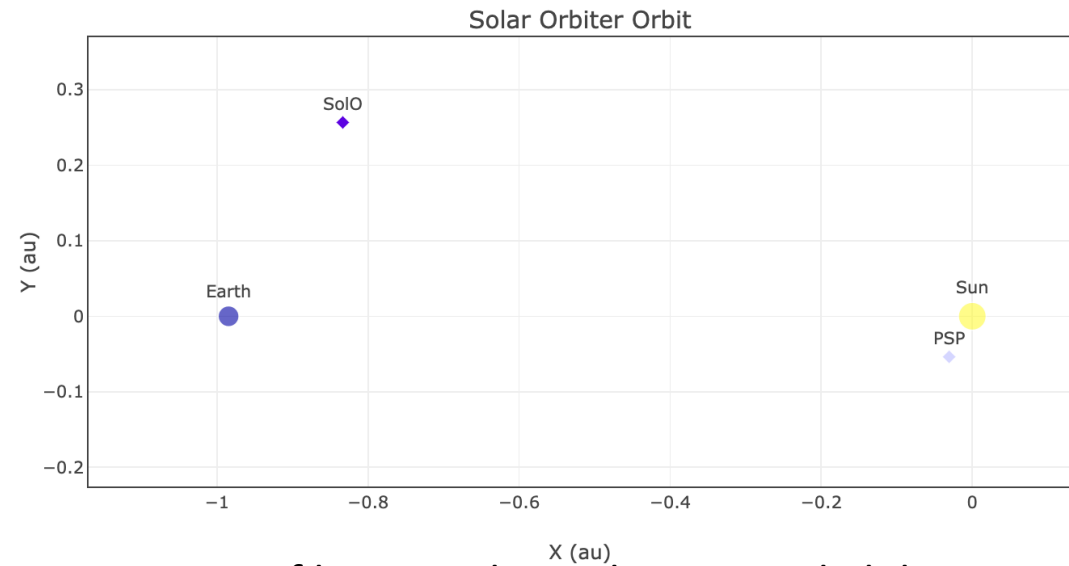
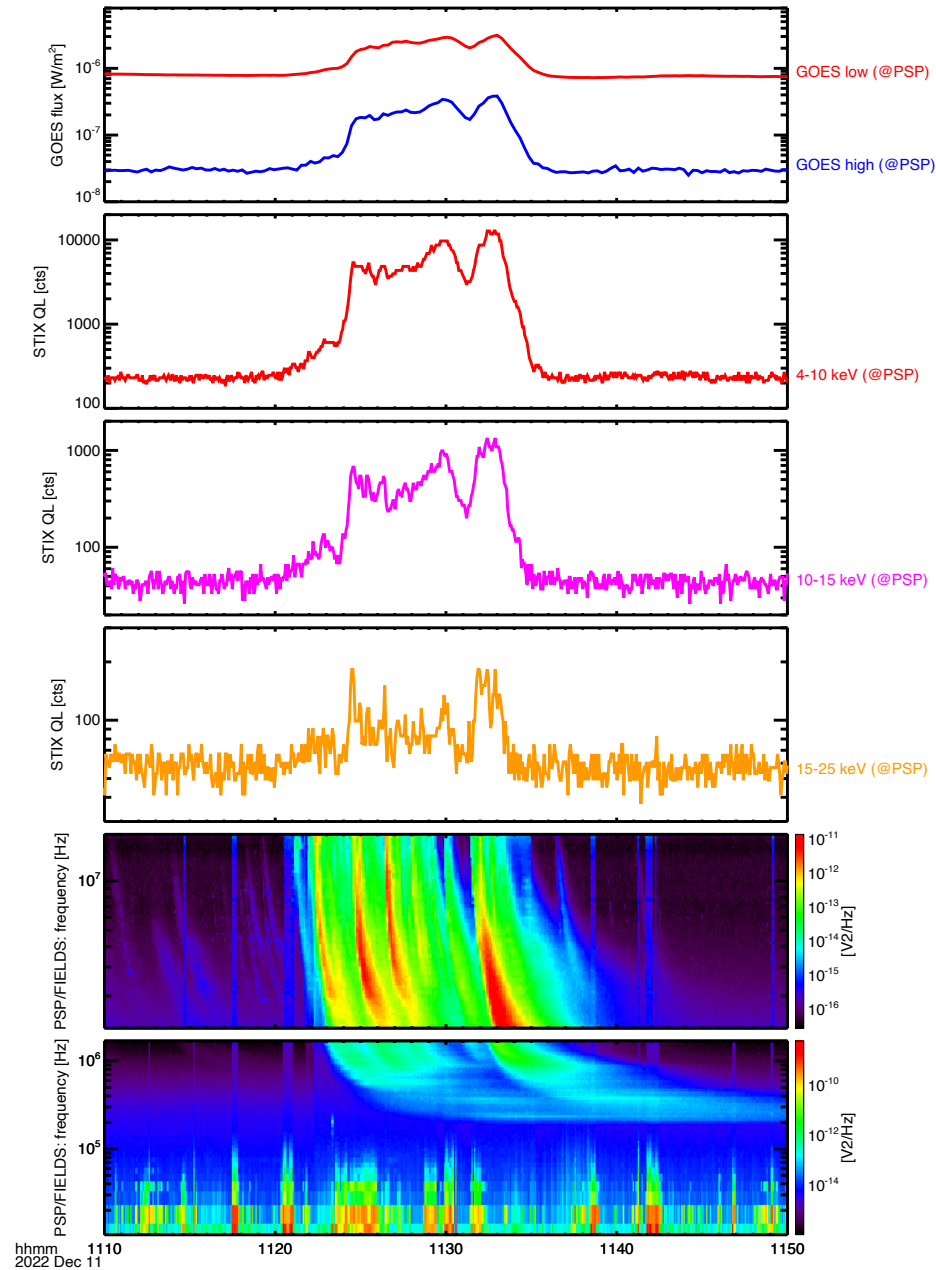
→ above $\sim 2 R_{\text{sun}}$



Combined OVRO-LWA & PSP/FIELDS Dynamic Spectrum on 2023 May 2

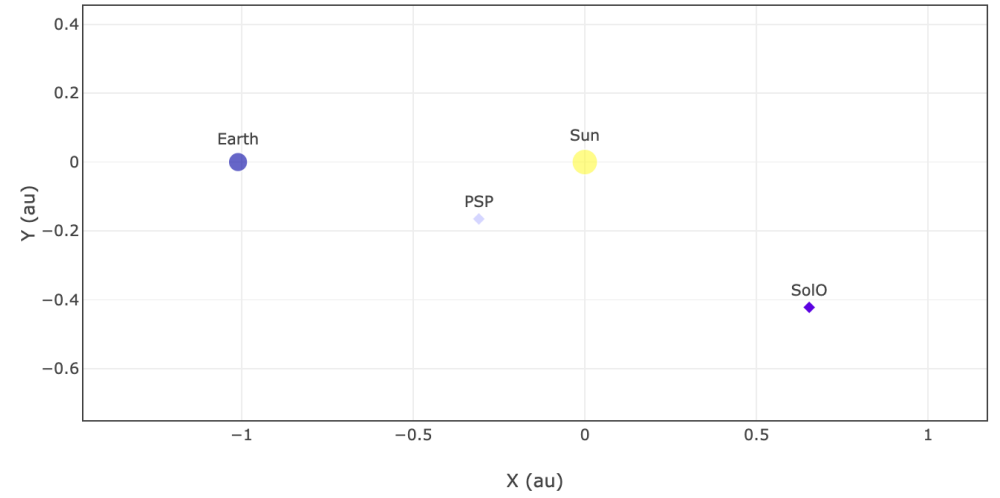
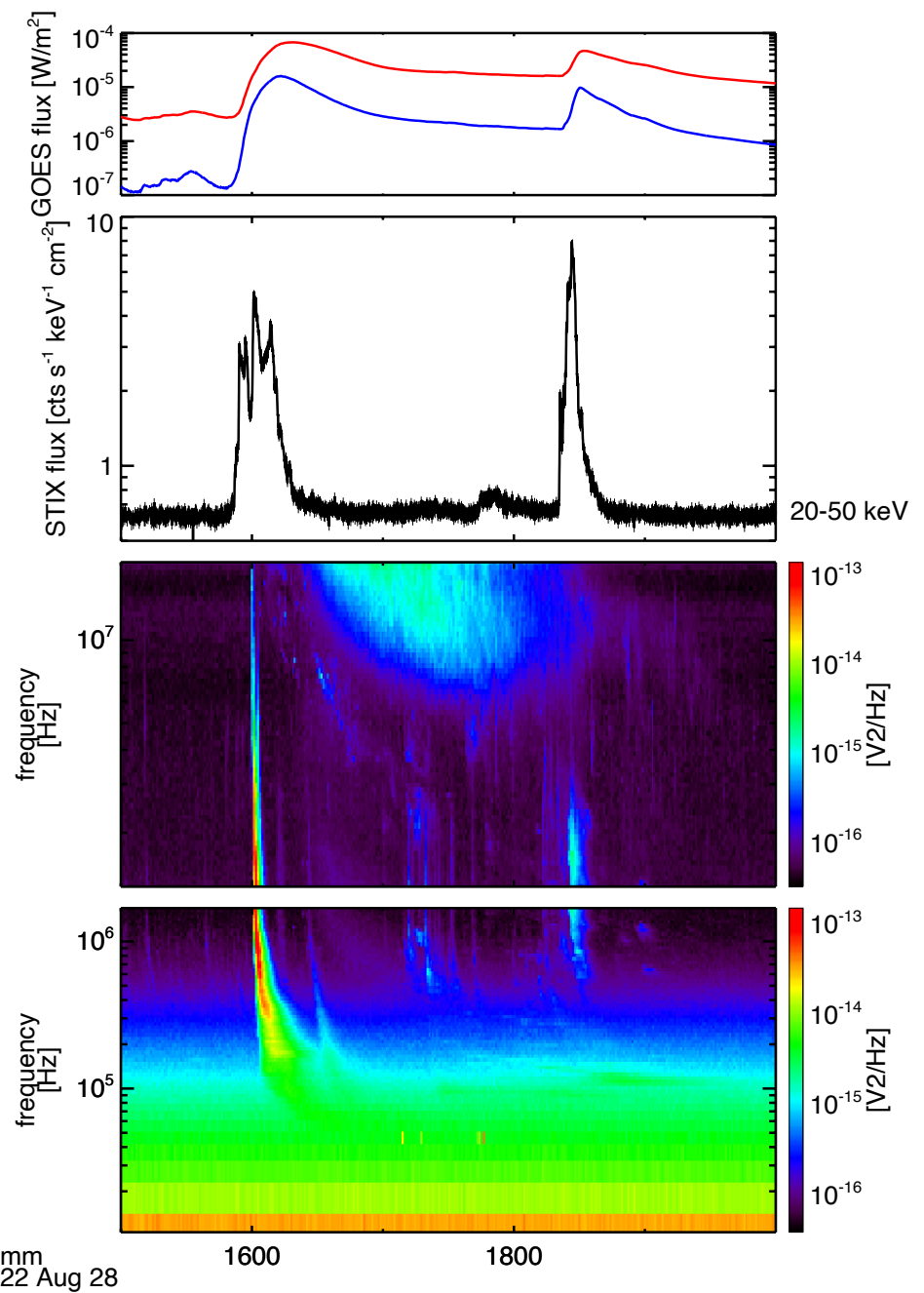


Classic type III burst



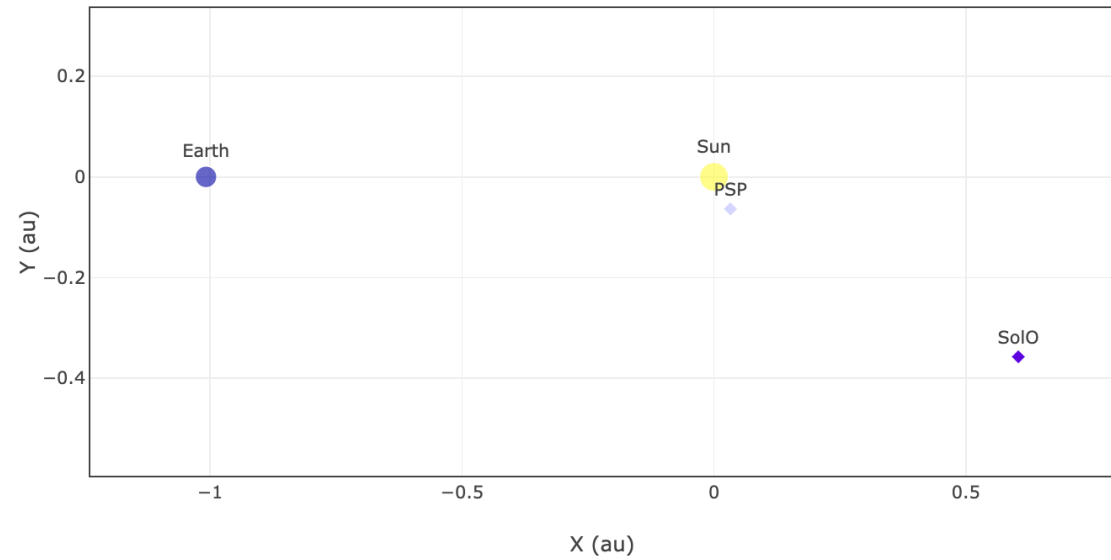
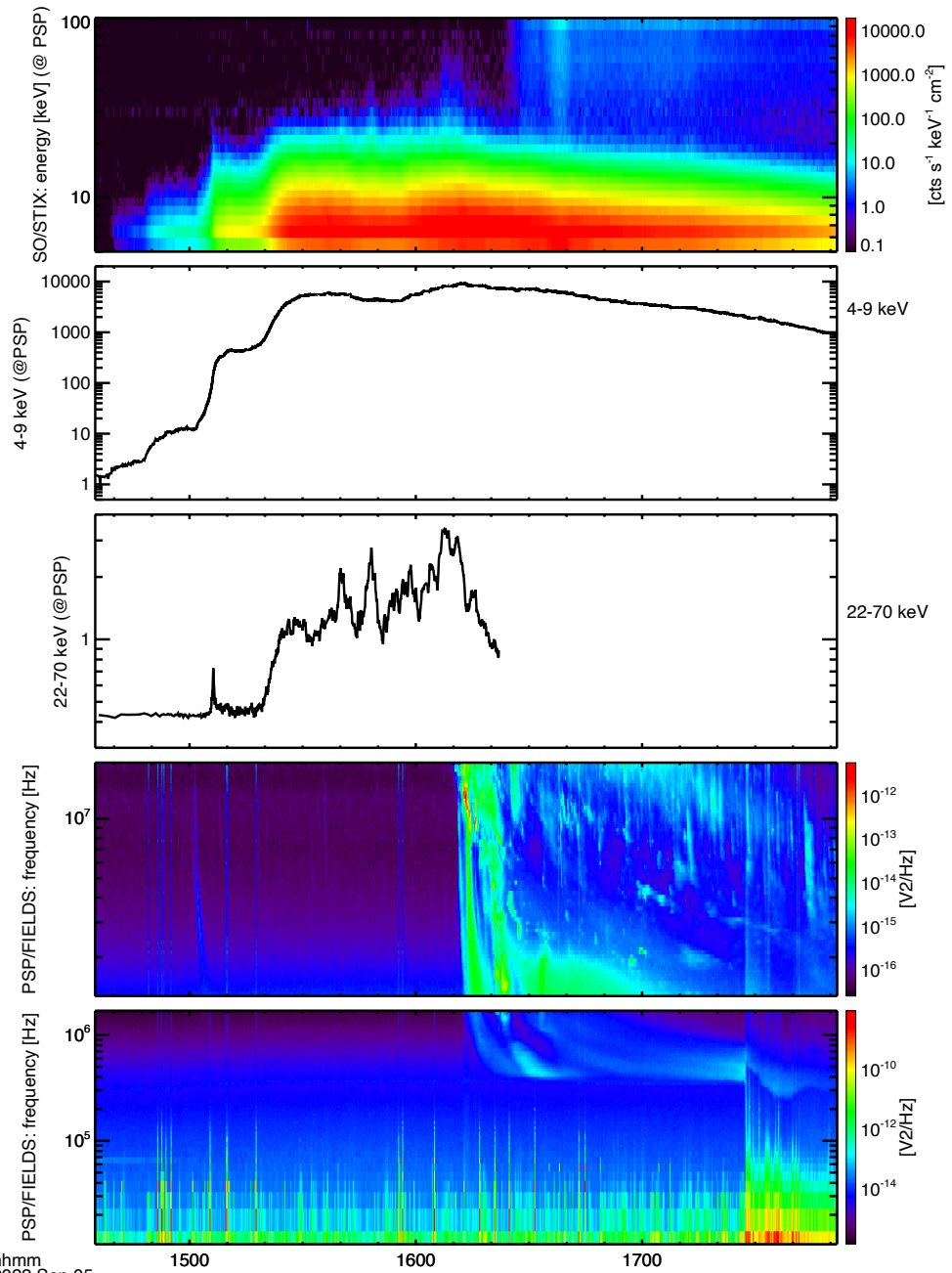
STIX profiles are adjusted to PSP radial distance

Type IV burst



Same flare that Hanya showed yesterday

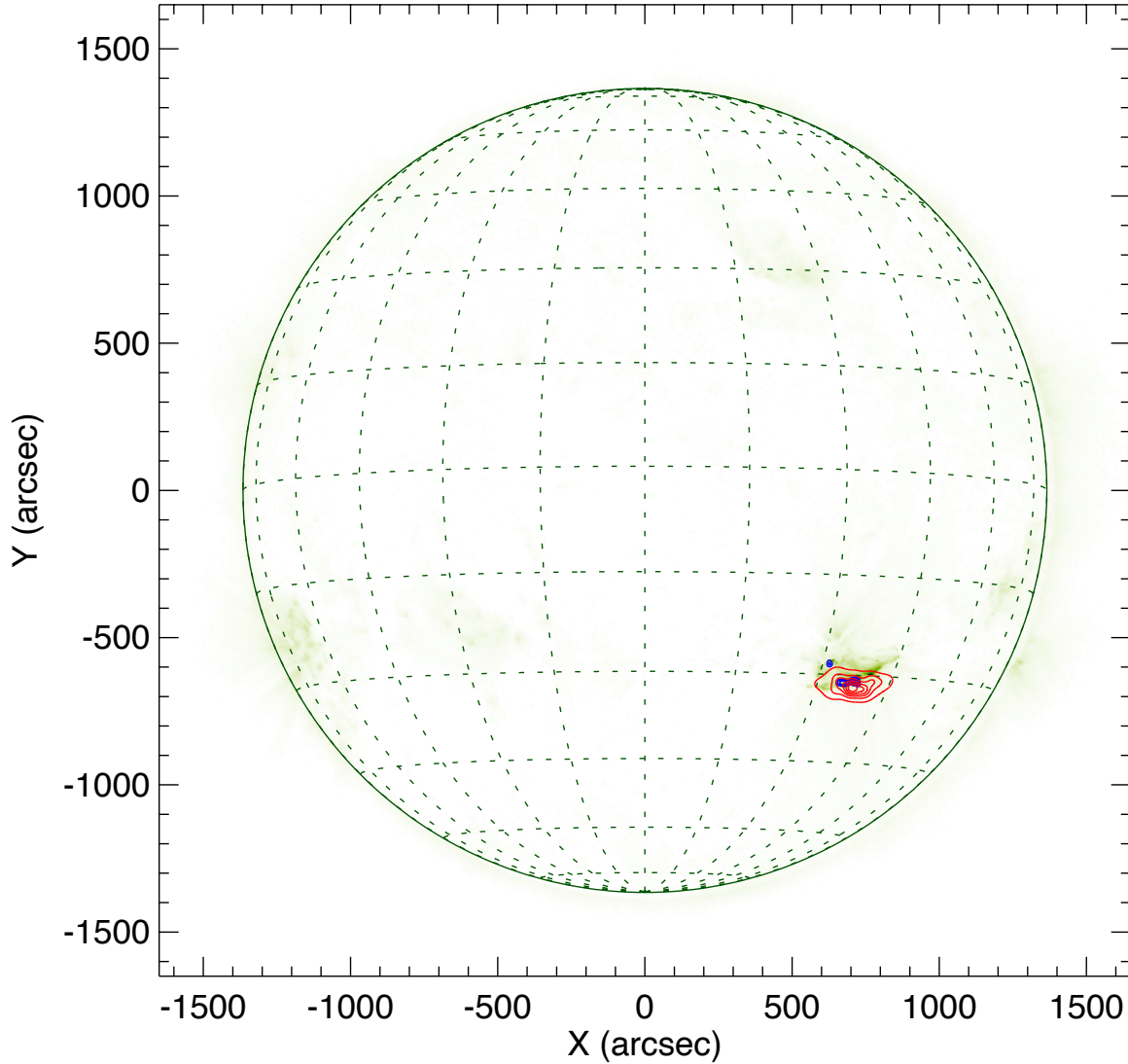
Gradual flare with type II



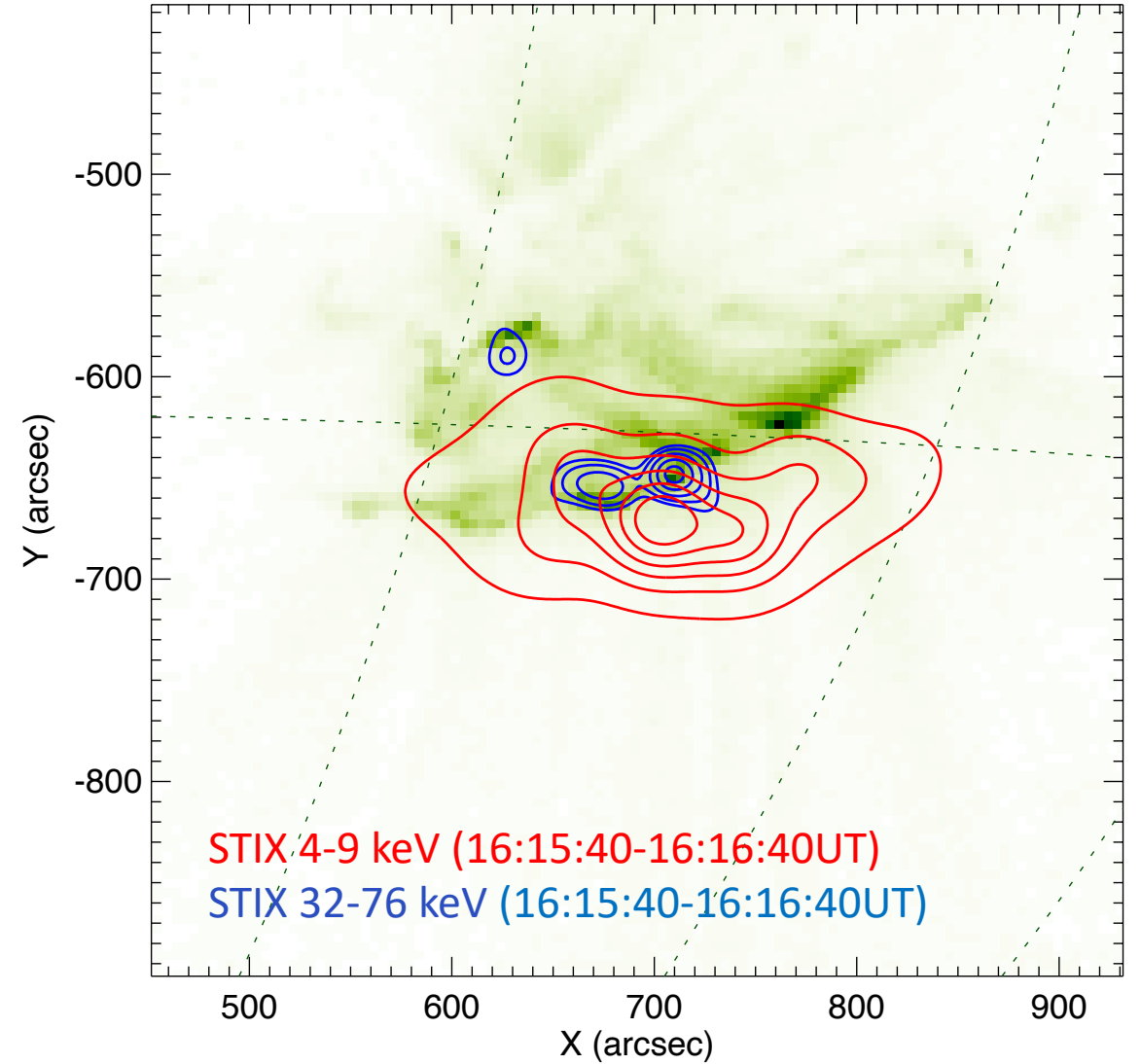
FSI short exposure images shown in the following slides

Impulsive phase

EUI/FSI 174A: 5-Sep-2022 16:20:50.283 UT

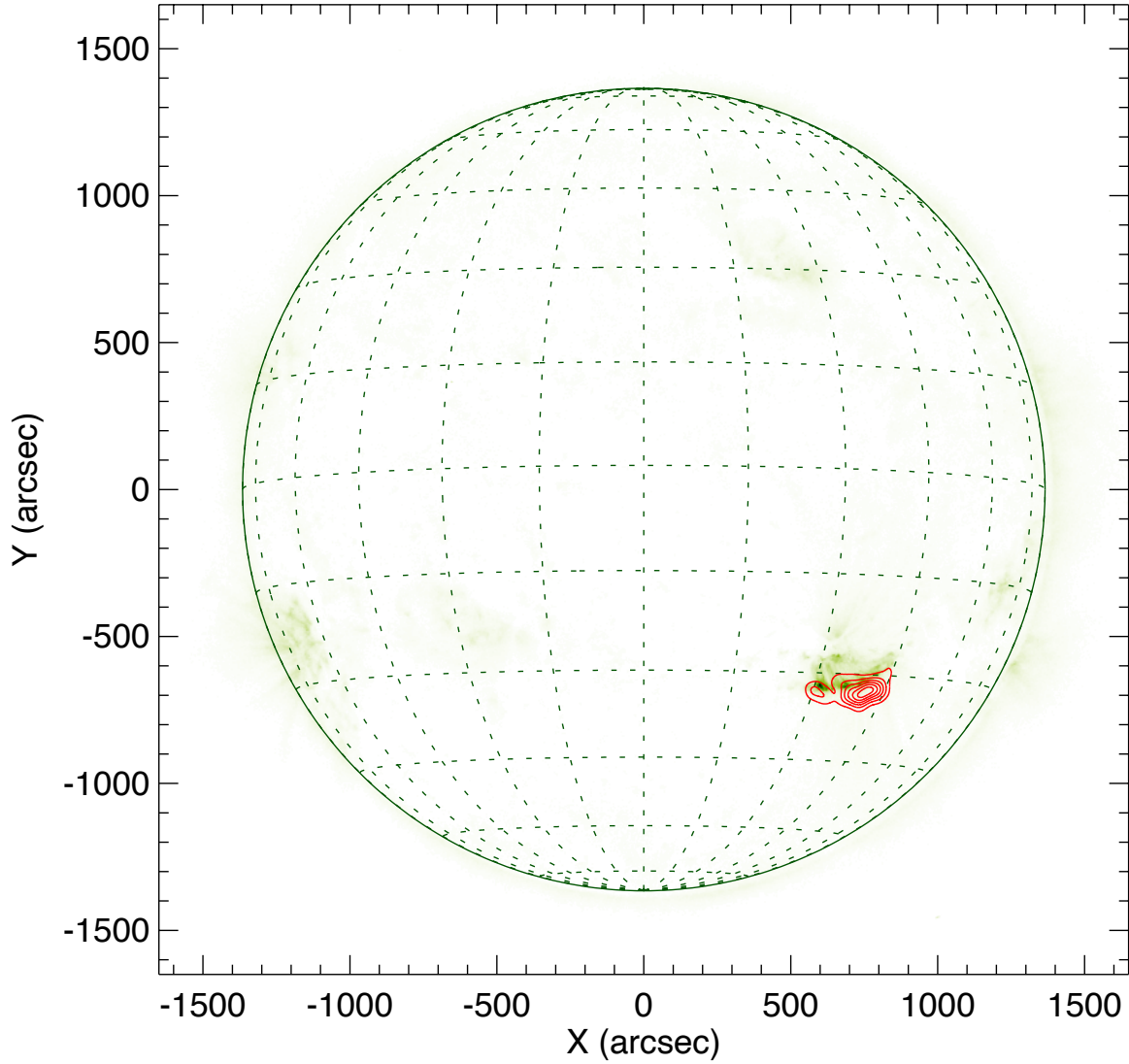


EUI/FSI 174A: 5-Sep-2022 16:20:50.283 UT

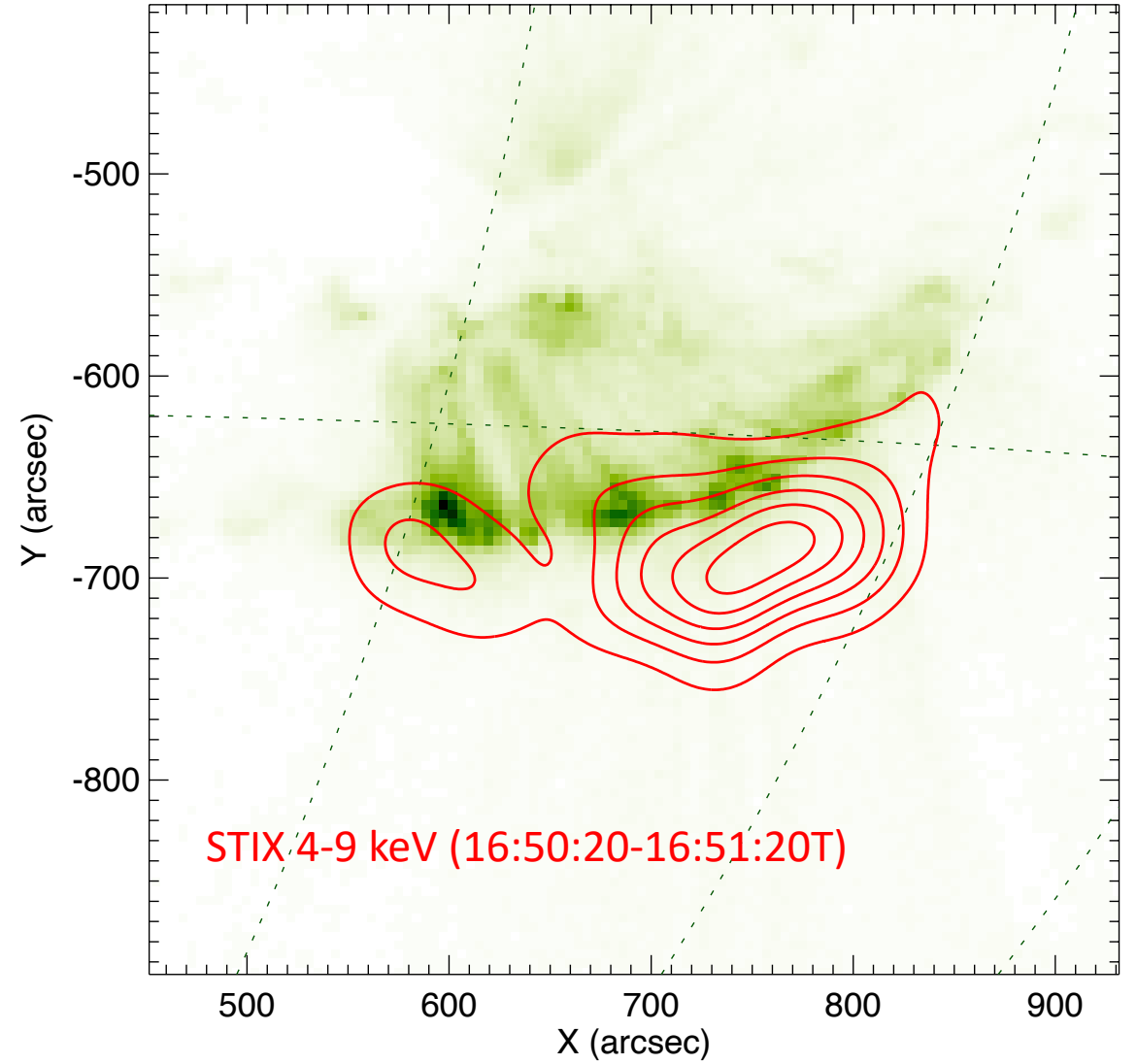


decay phase

EUI/FSI 174A: 5-Sep-2022 16:50:50.286 UT

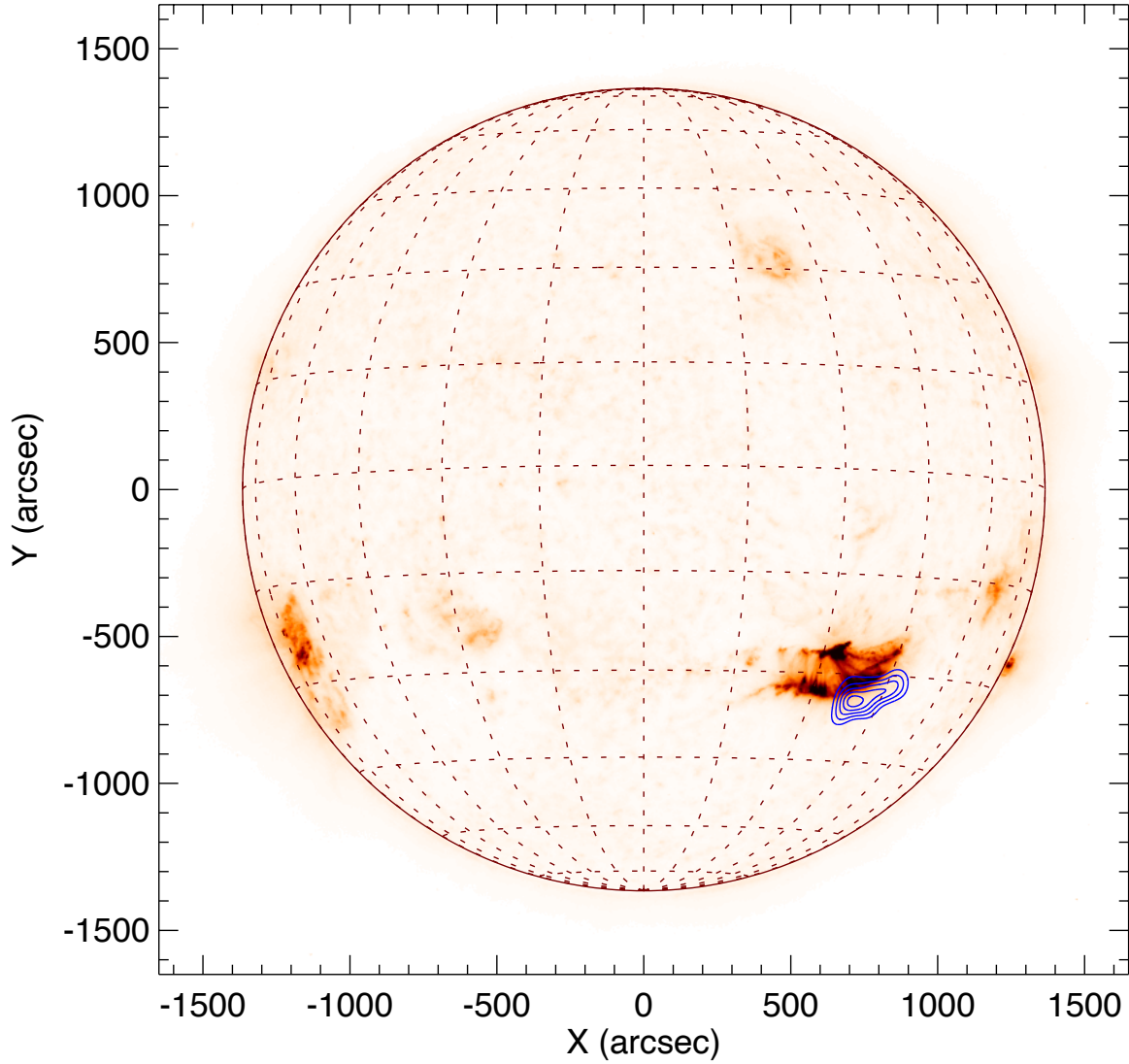


EUI/FSI 174A: 5-Sep-2022 16:50:50.286 UT

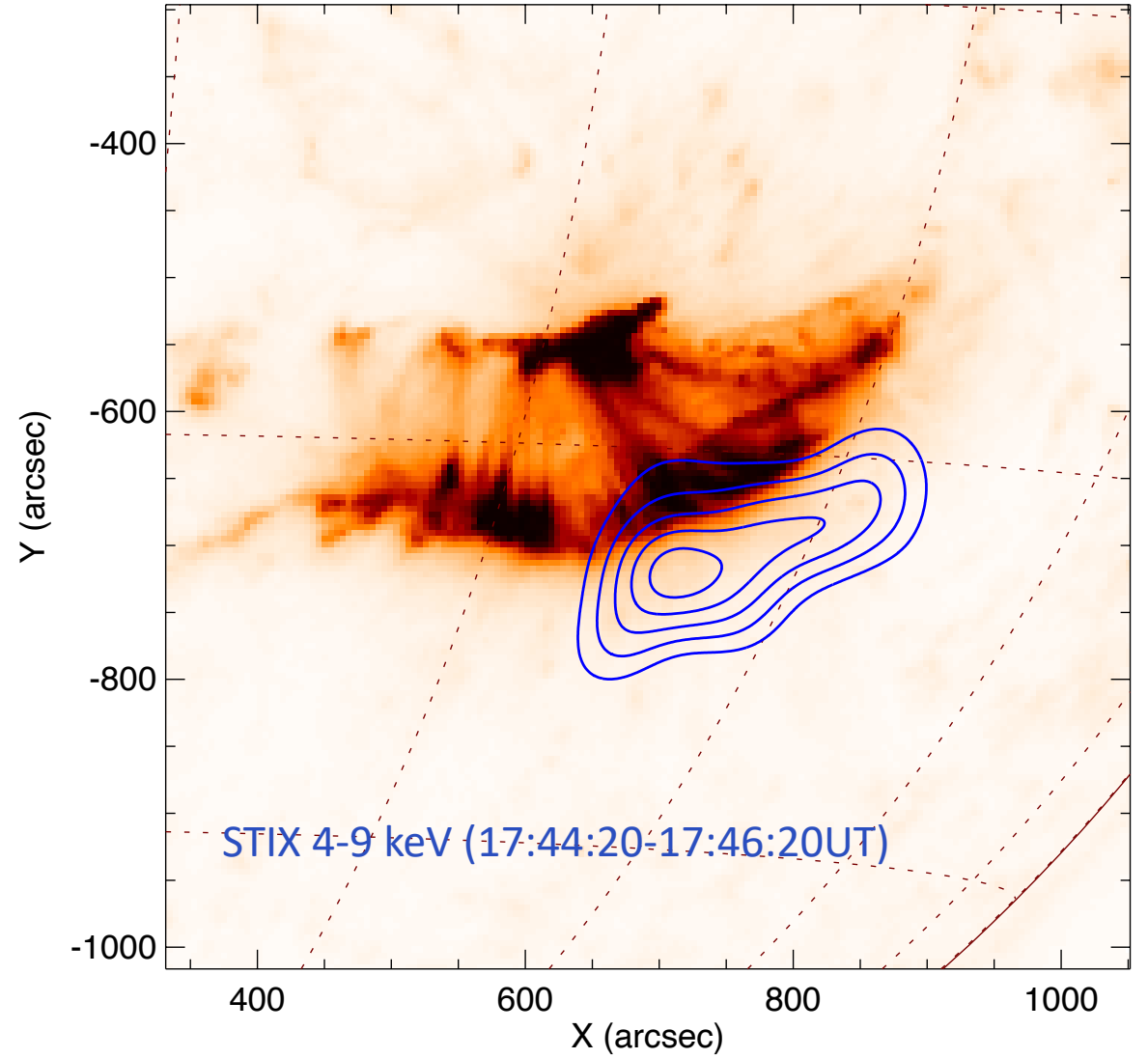


~3 hours after onset (304A image)

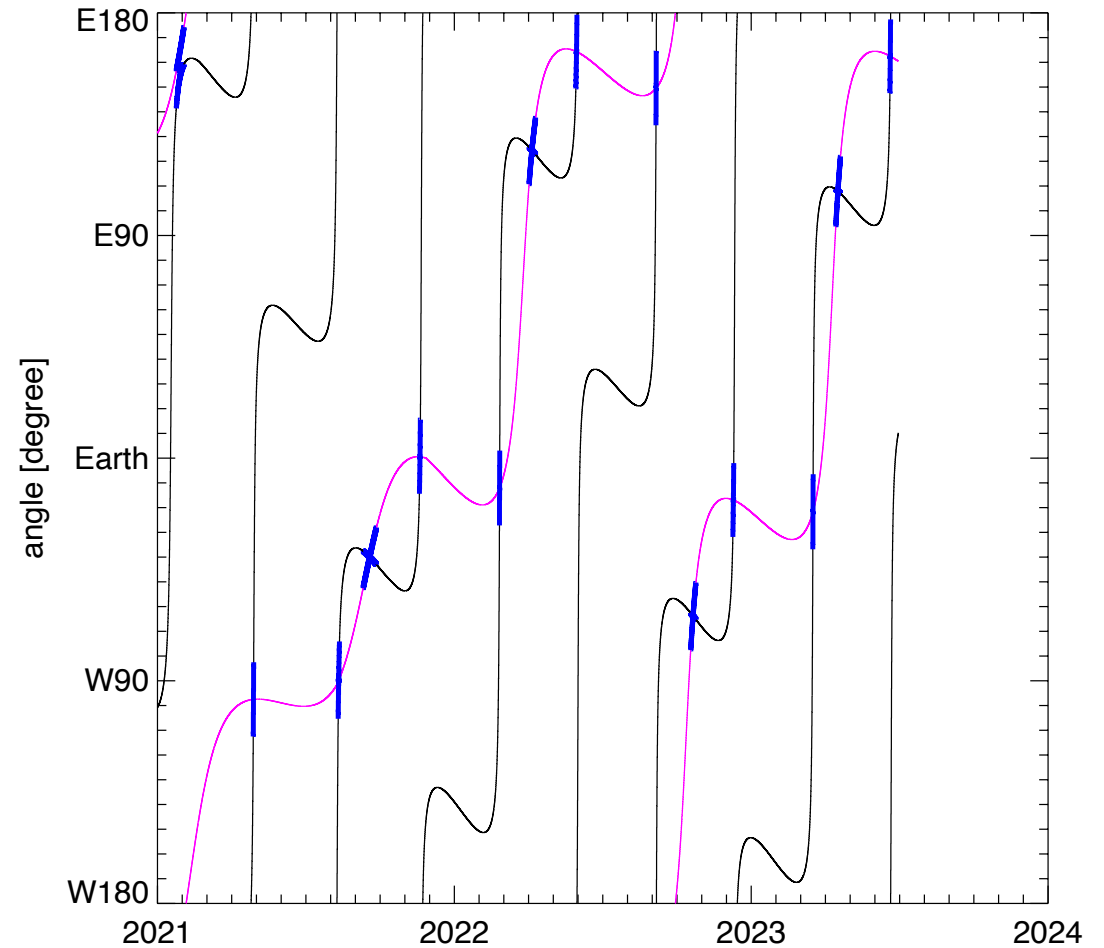
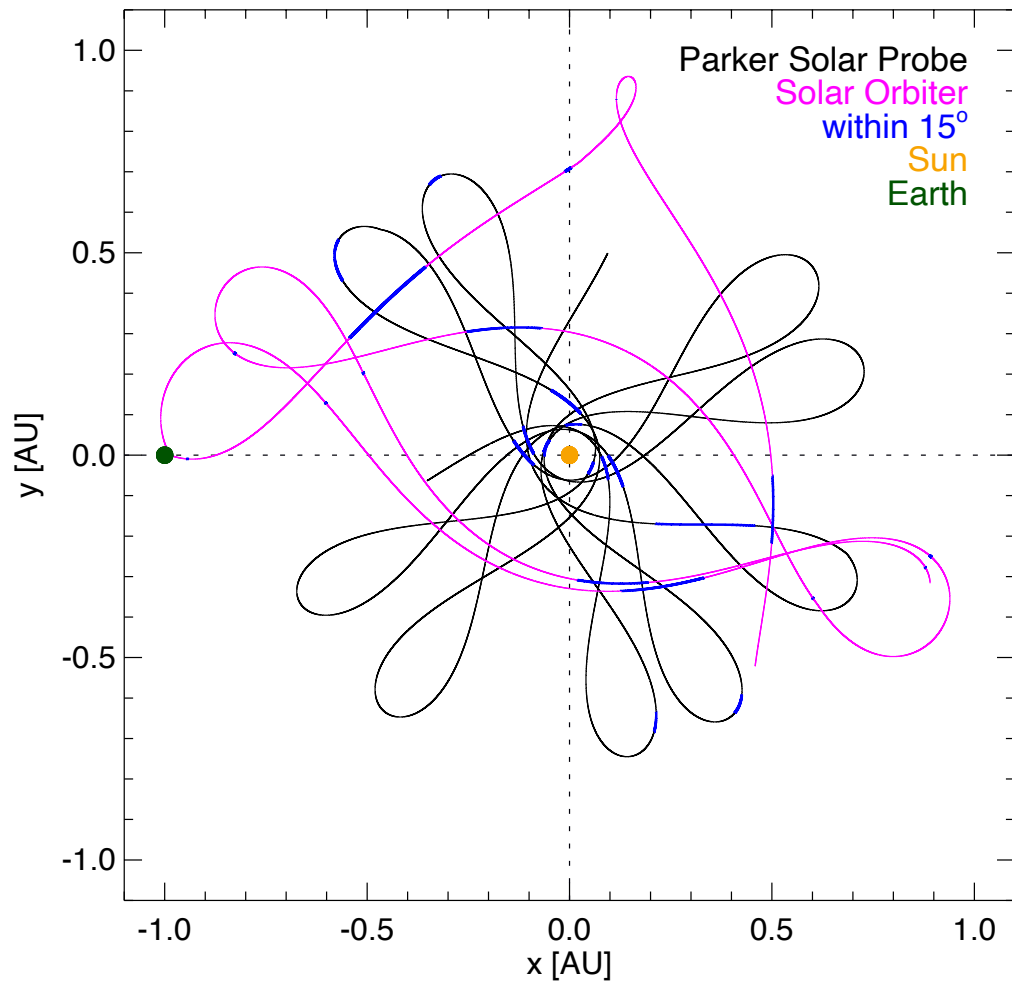
EUI/FSI 304A: 5-Sep-2022 17:45:20.291 UT



EUI/FSI 304A: 5-Sep-2022 17:45:20.291 UT



Times with similar viewing angle between PSP and SO



Times with a similar (within $\pm 15^\circ$) viewing angles

Short windows during encounters:

- Half a day to 2 days; 7.7 days total
- Solar Orbiter never close to the Sun, but there are two cases around ~ 0.6 AU

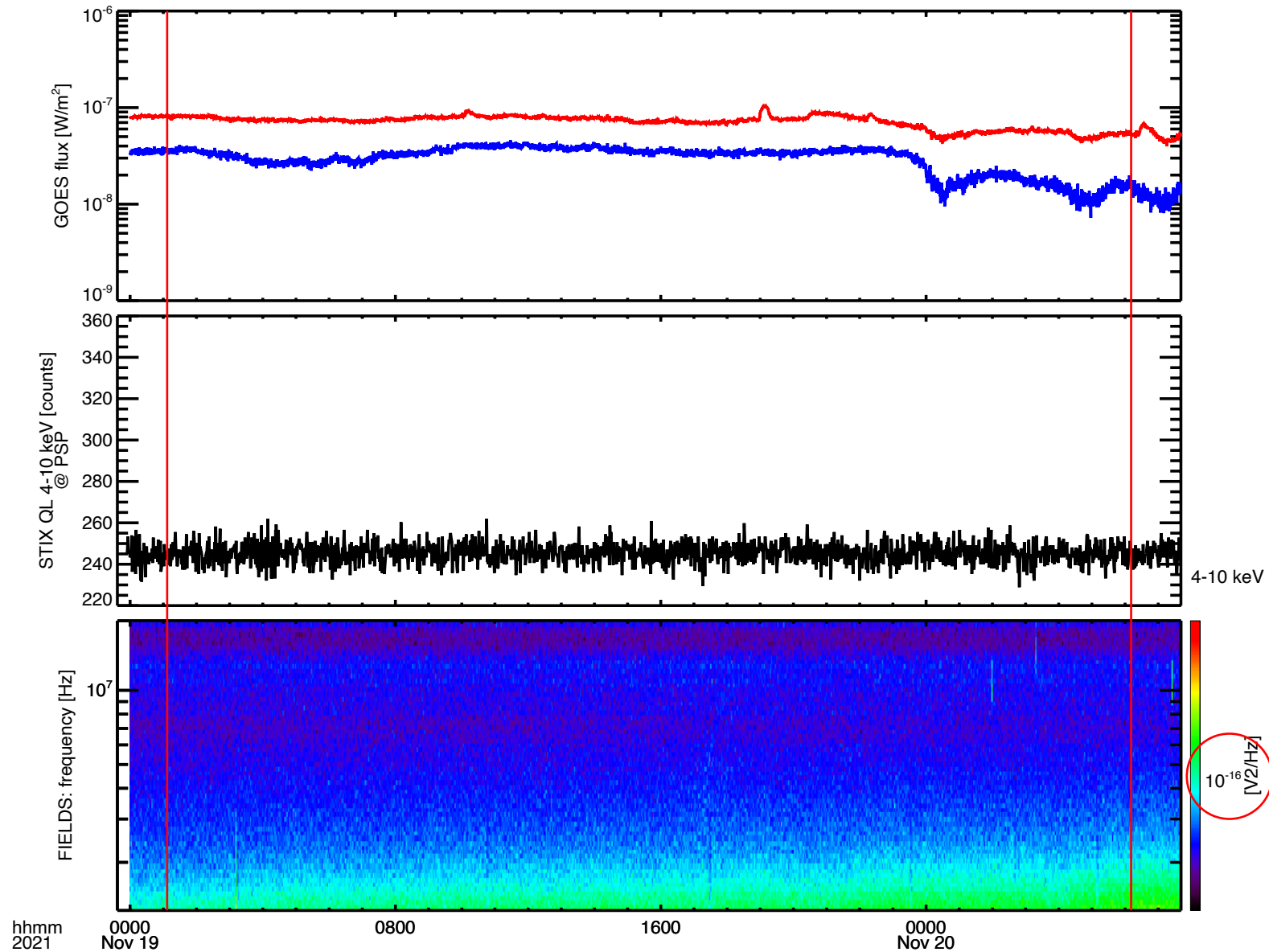
Long windows outside encounters:

- 6 to 16 days; 46.2 days total
- two cases with SO within 0.4 AU

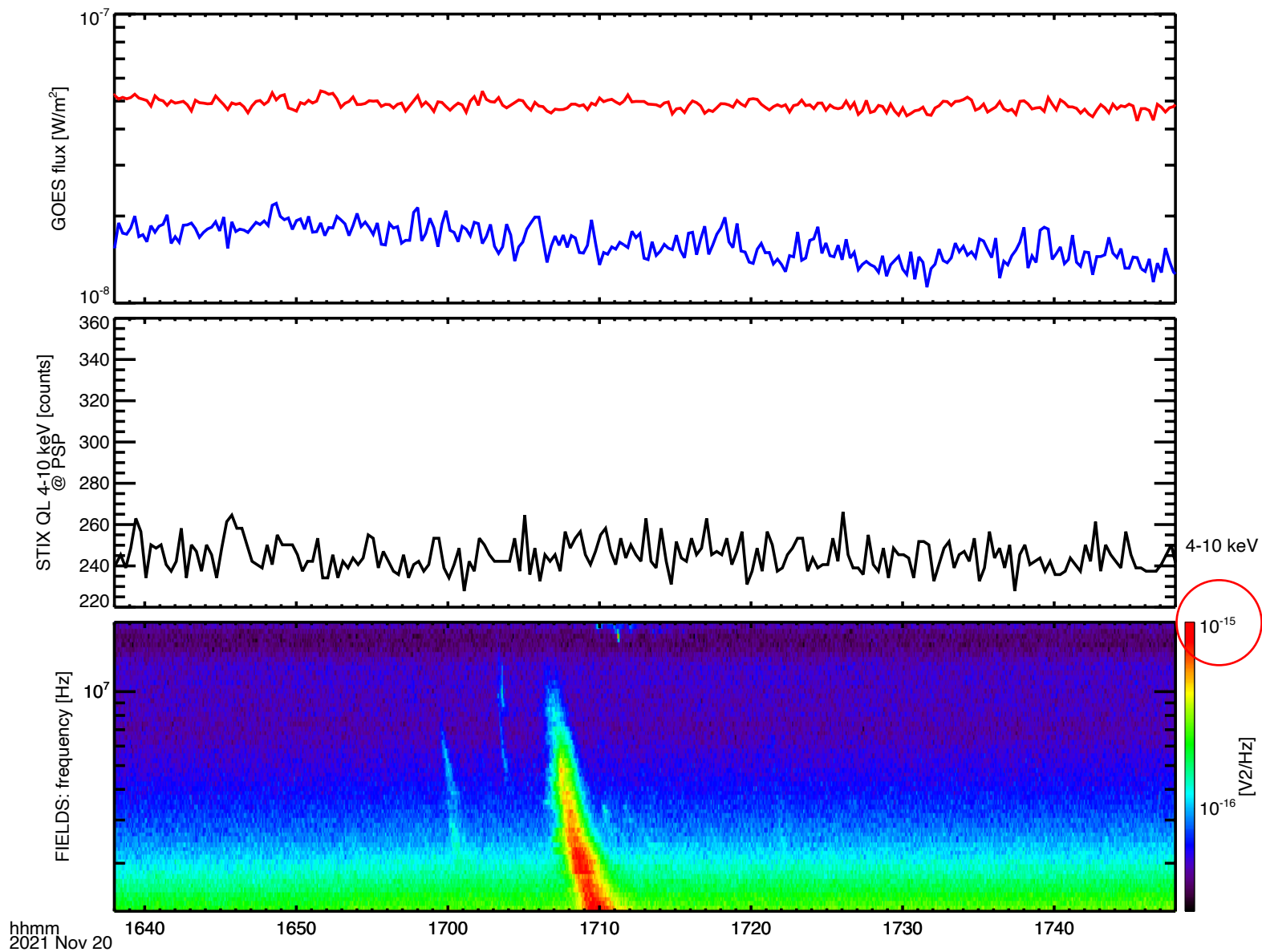
	Start time	End time	Within encounter	Duration [h]	Angle	R_{psp} [AU]	R_{so} [AU]	comments
1	2021-01-24/01:58	2021-02-02/12:22		226	W156	0.39	0.52	
2	2021-04-28/18:30	2021-04-29/06:30	8	12	E97	0.08	0.89	Very quiet., a few flares at detection limit, type III
3	2021-08-11/04:21	2021-08-12/18:47	9	38	E89	0.14	0.71	Very quiet
4	2021-09-10/20:44	2021-09-27/06:09		393	E52	0.75	0.60	
5	2021-11-19/01:07	2021-11-20/06:11	10	29	W01	0.12	0.94	No STIX signal above background, a few type III
6	2022-02-25/11:04	2022-02-25/19:33	11	8	E11	0.06	0.62	Some activity, but no obvious correlation
7	2022-04-02/21:29	2022-04-10/23:17		194	W111	0.75	0.40	
8	2022-05-30/09:02	2022-05-31/17:59	12	33	W164	0.12	0.93	
9	2022-09-05/22:04	2022-09-06/06:42	13	9	W149	0.06	0.70	SEP contamination in STIX
10	2022-10-18/14:41	2022-10-25/01:13		155	E77	0.76	0.36	
11	2022-12-09/10:02	2022-12-10/12:35	14	27	E16	0.11	0.87	Active (several C class flares). but no correlation with type IIIs
12	2023-03-17/18:54	2023-03-18/03:31	15	9	E21	0.06	0.55	
13	2023-04-14/23:31	2023-04-20/19:42		140	W94	0.69	0.34	
14	2023-06-20/12:44	2023-06-21/08:27	16	20	W163	0.1	0.92	

Encounter 10

	Start time	End time	Within encounter	Duration [h]	Angle	R_{psp} [AU]	R_{so} [AU]	comments
5	2021-11-19/01:07	2021-11-20/06:11	10	29	W01	0.12	0.94	

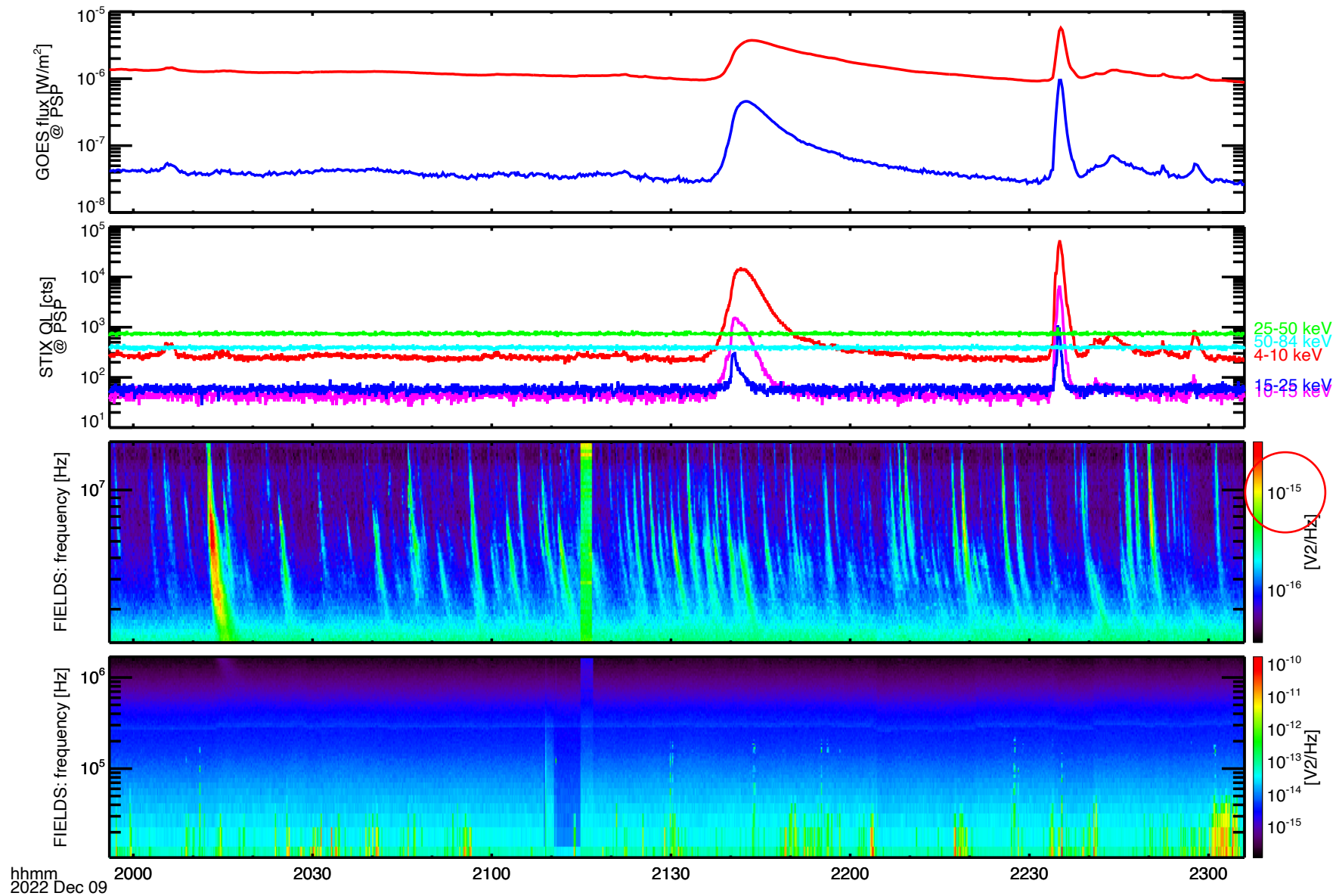


type III, no X-ray signal

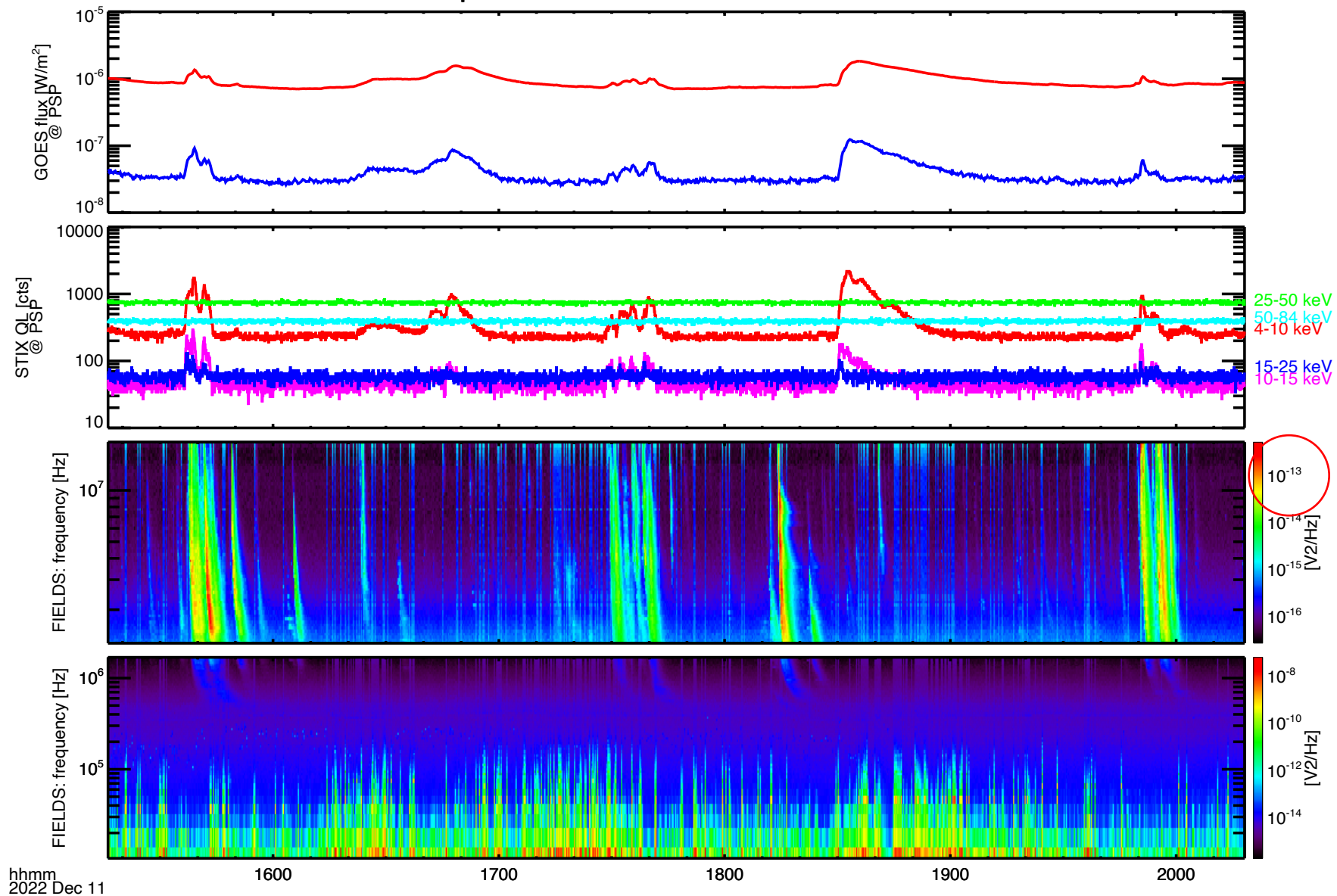


Encounter 14

Uncorrelated events



Next day: clearly correlated events mixed in with uncorrelated type IIIs
note peak value is above 10^{-13}



Encounter 15

