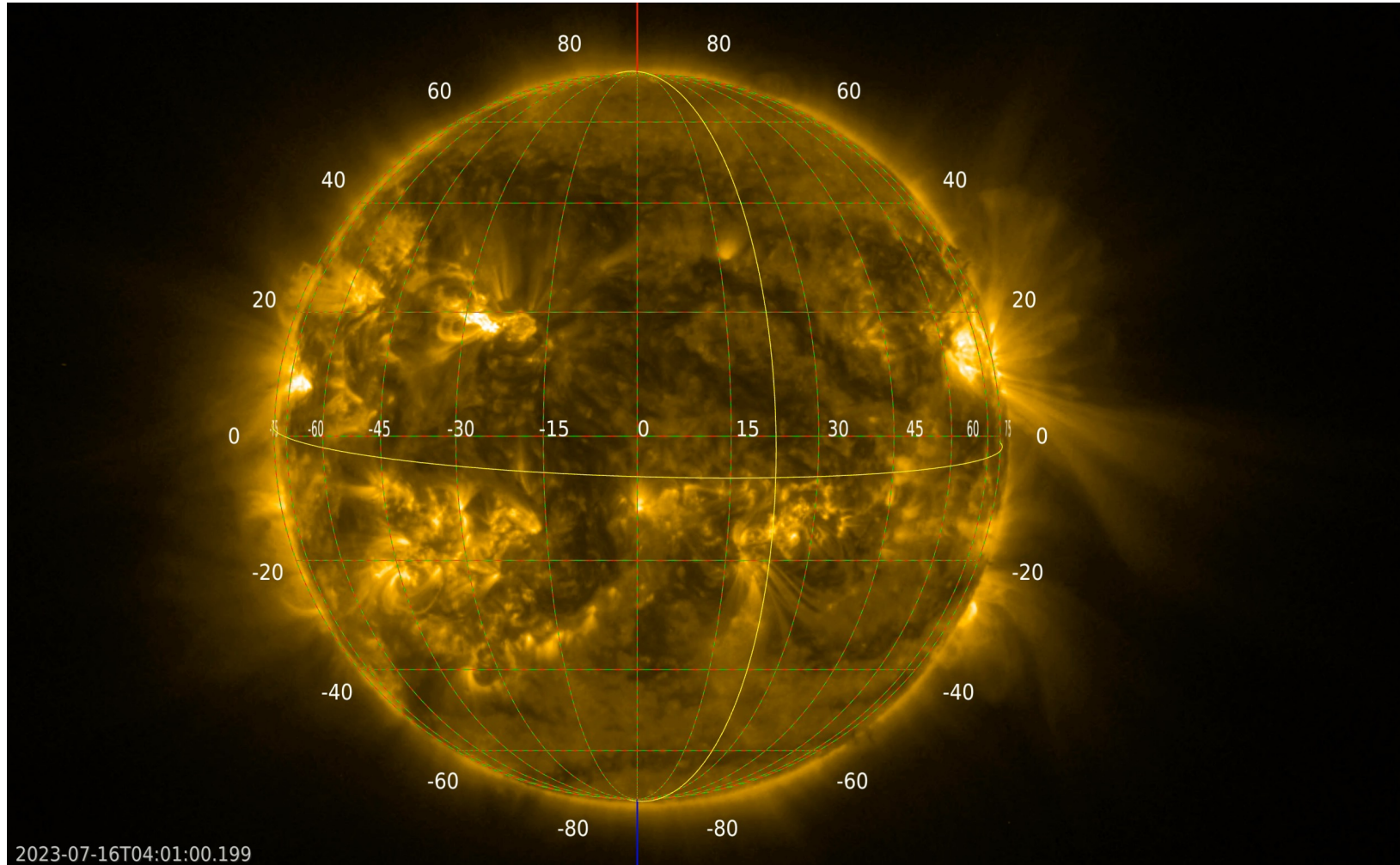


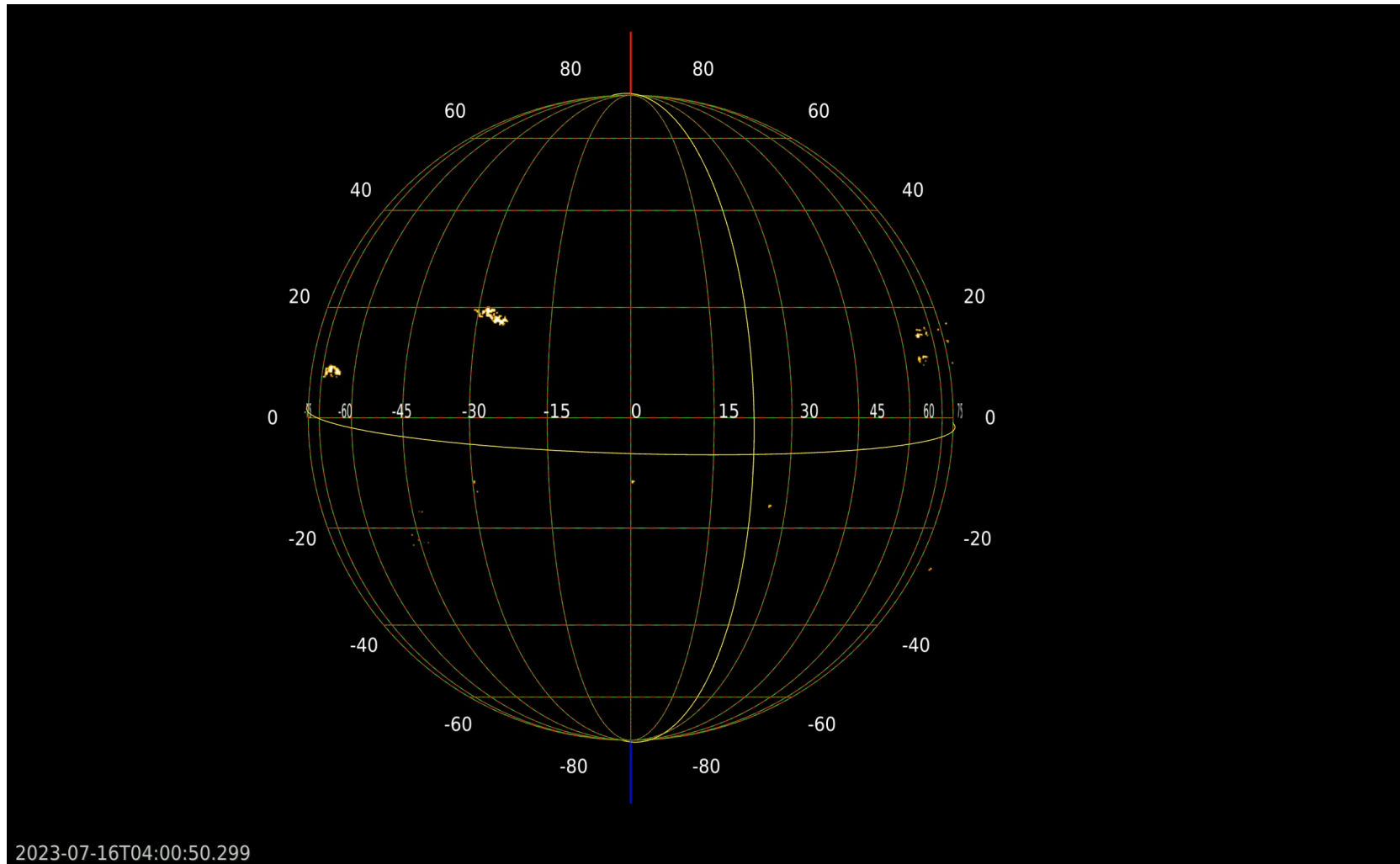
EUI/FSI short exposure observations of STIX flares

Hannah Collier, Säm Krucker, Laura Hayes & Stefan Purkhart

1. EUV FSI 174 Å normal exposure mode (10s)

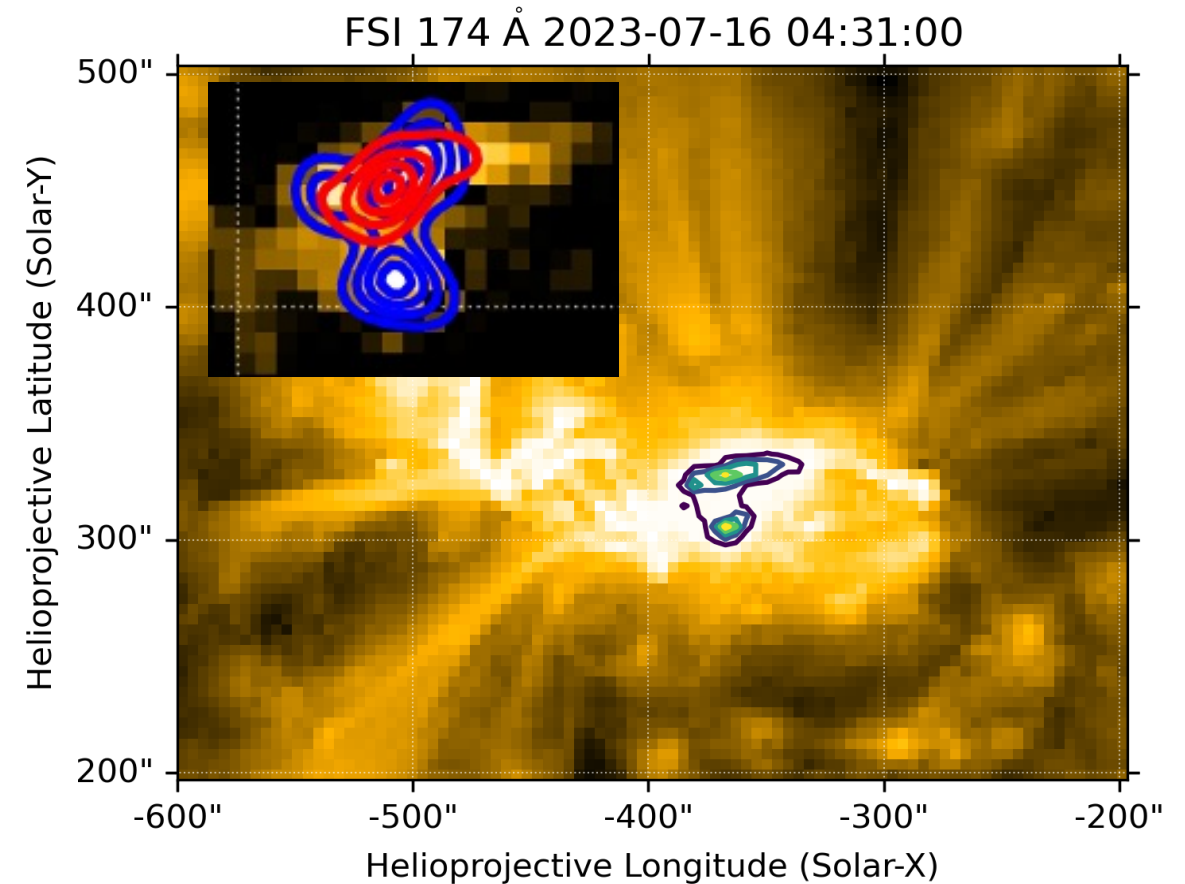
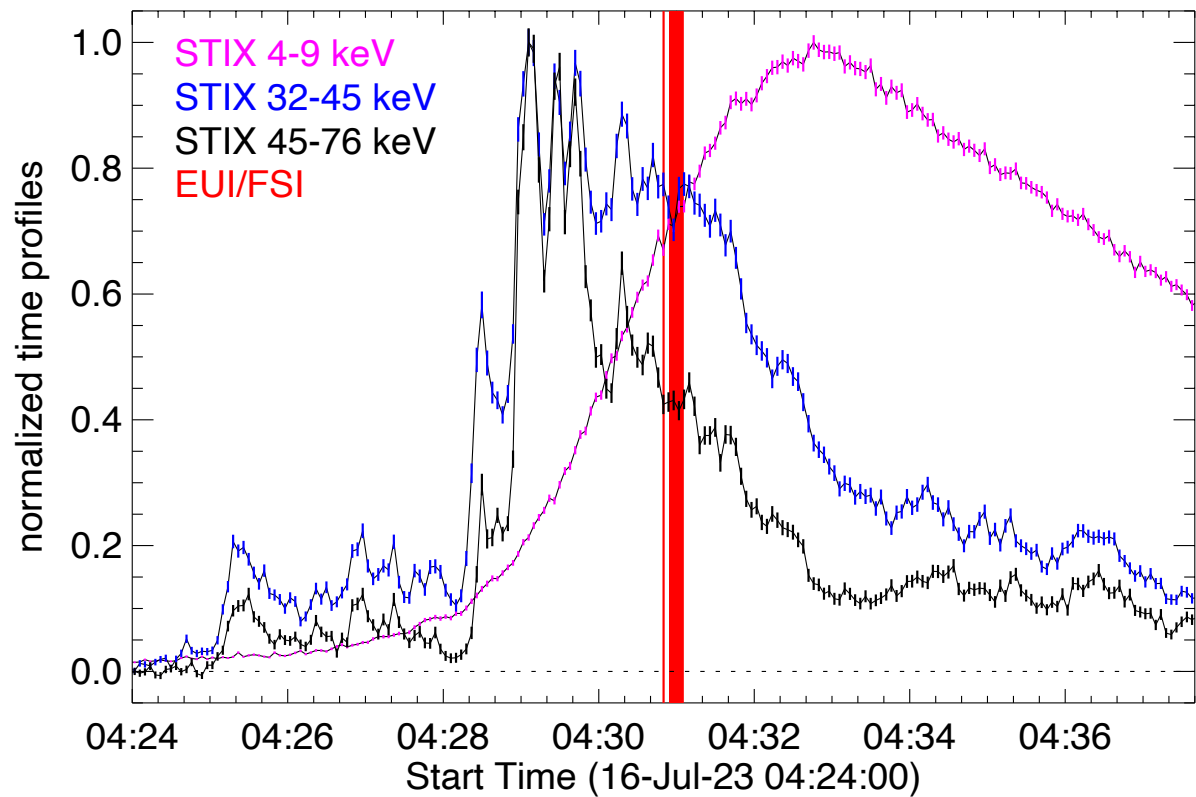


2. EUI FSI 174 Å short exposure mode (0.2s)

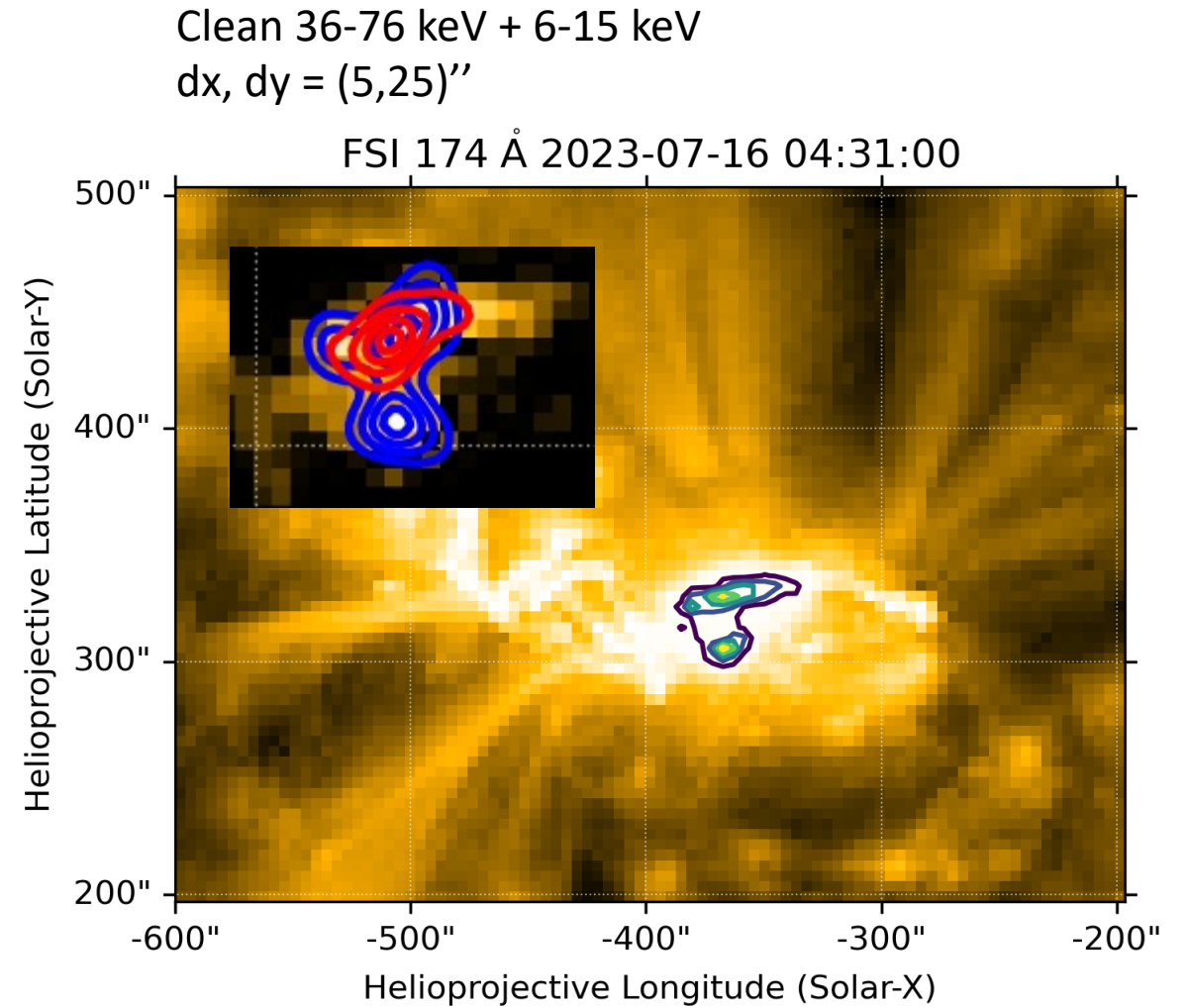
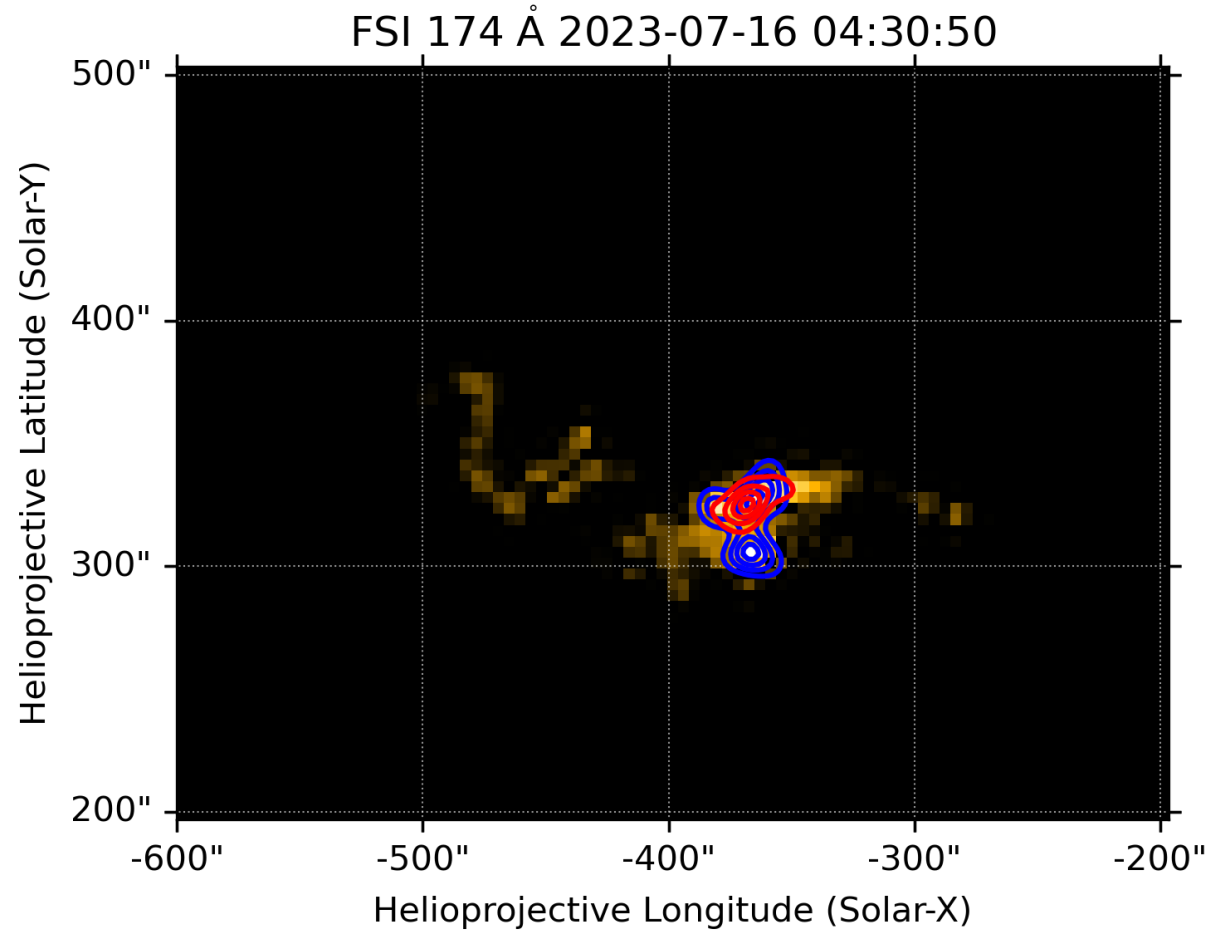


SOL2023-07-16 X9 Estimated GOES class flare

STIX Clean **36-76 keV** + **6-15 keV**

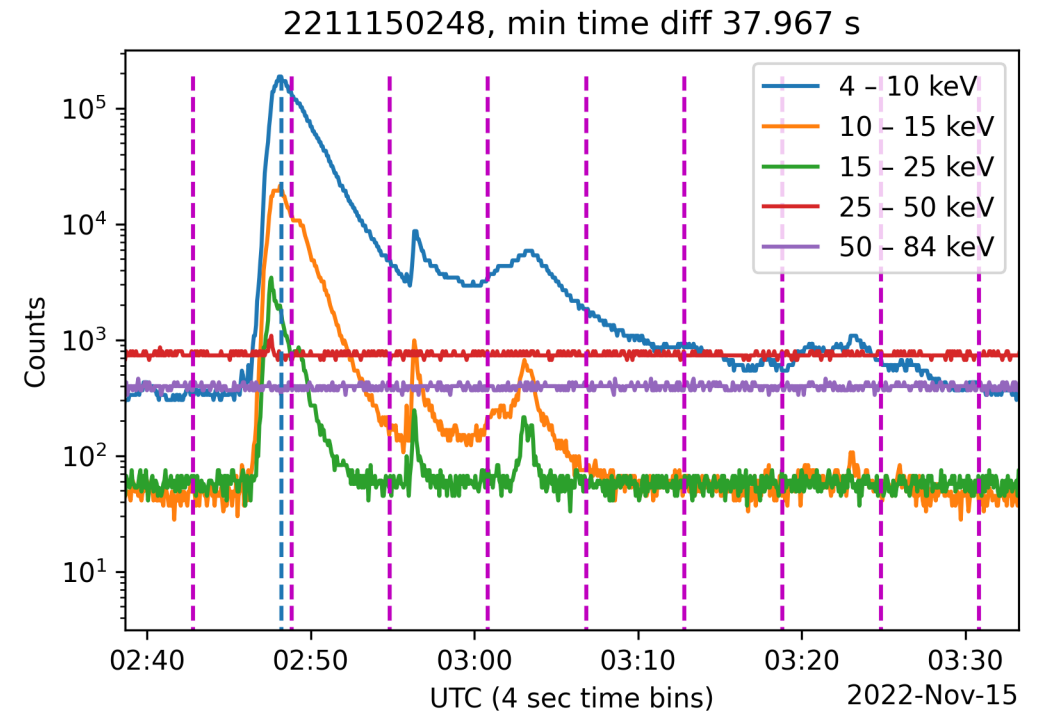


SOL2023-07-16 non-thermal peak @ 04:30:00



Method

1. Start from **stixdcpy flare list** and find all flares with short exposure observations (began in Nov 22, data only released up to June 23) – 4601 events
2. Filter for large non-thermal events (25-50 keV quicklook peak counts > 1000) – 77 events
3. Manually inspect the time of the eui short exposure frame compared to the non-thermal peak time and filter for events with a ‘reasonably short’ time delay between non-thermal peak and EUI observation

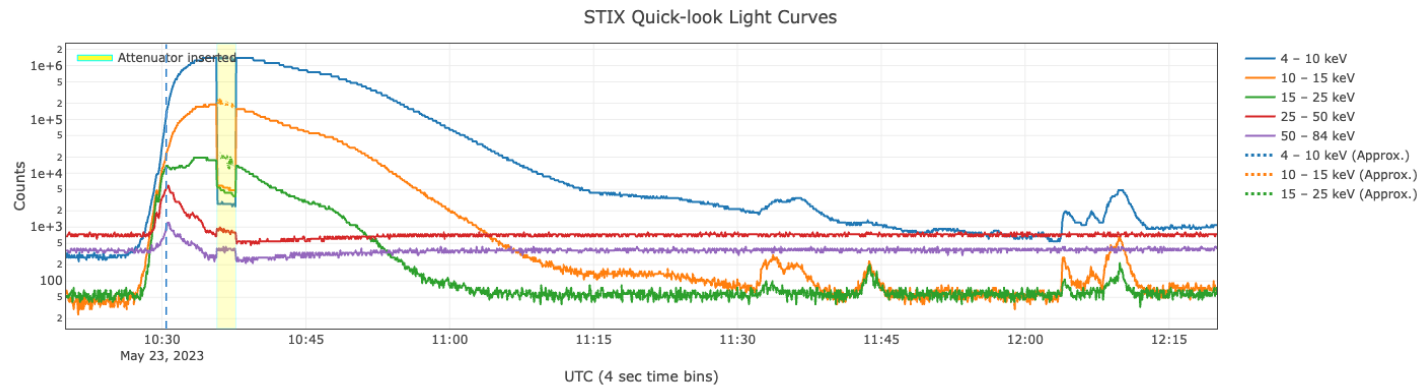


Event list

→ 22 interesting flares to investigate

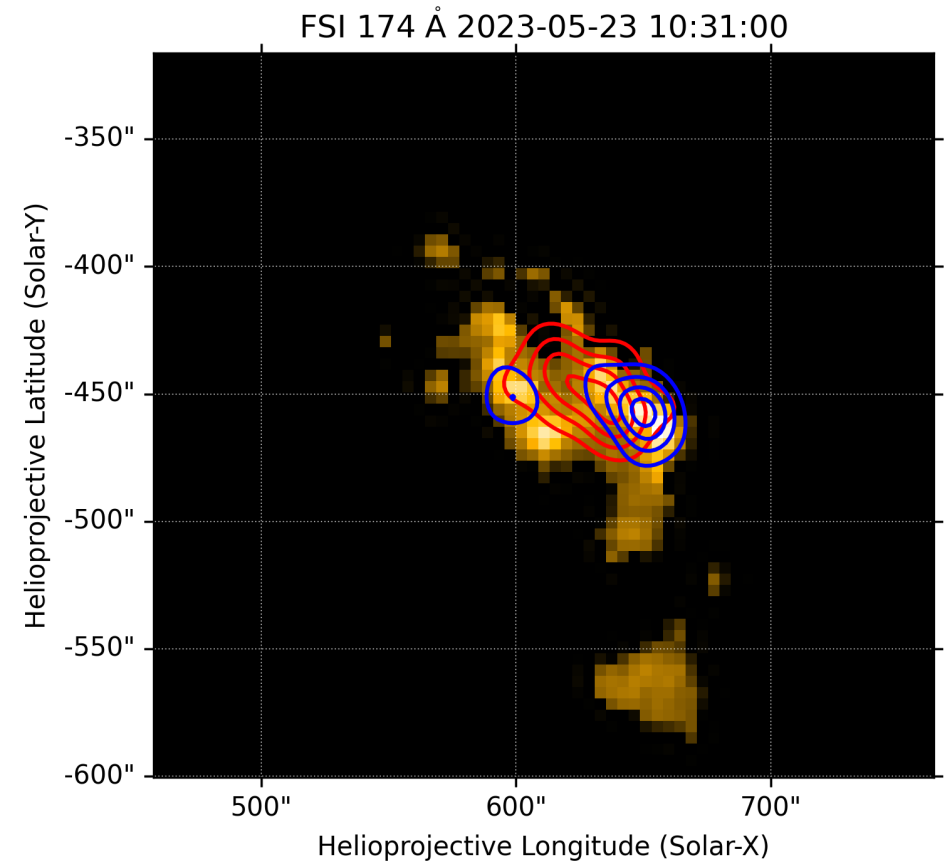
	flare_id	duration	att_in	peak.UTC	LC0_BKG	_id	GOES_class	GOES_flux	CFL_X_ar
506	2305231038	4684	TRUE	2023-05-23T10:38:35.738	217.01865748883200	29190	C4.2	4.15575095757959E-06	
1165	2301091852	3800	TRUE	2023-01-09T18:52:44.298	250.04935016086300	21362	X2.0	0.0001976581697817	
1166	2301091850	4152	TRUE	2023-01-09T18:50:12.298	250.04872805449400	35027	X2.0	0.0001976581697817	
160	2303290227	3964	TRUE	2023-03-29T02:27:44.147	296.9664237206930	35031	X1.3	0.0001271399669349	
159	2303290232	3940	TRUE	2023-03-29T02:32:00.147	224.38549398218900	25932	X1.3	0.0001271399669349	
908	2211111136	3436	FALSE	2022-11-11T11:36:56.074	226.3668399931750	18401	M1.2	1.22502306112438E-05	
1631	2306010000	4656	FALSE	2023-06-01T00:00:48.038	212.63245226924100	29697	C9.2	9.16857788979542E-06	
1699	2302050324	3544	FALSE	2023-02-05T03:24:48.154	223.00000000000000	22707	C6.7	6.69279643261689E-06	
340	2305252212	5040	FALSE	2023-05-25T22:12:59.816	219.9219132441260	29356	C1.1	1.06696279544849E-06	
798	2211130618	596	FALSE	2022-11-13T06:18:15.952	230.26985241668700	18511	C4.1	4.07313109462848E-06	
1146	2301100220	4132	TRUE	2023-01-10T02:20:48.345	250.04935016086300	21381	M2.7	2.69335178018082E-05	
799	2301142052	5812	FALSE	2023-01-14T20:52:04.260	278.455469046836	21716	M4.6	4.60175615444314E-05	
798	2301142054	5820	FALSE	2023-01-14T20:54:48.260	228.54509424751500	21817	M4.6	4.60175615444314E-05	
706	2211141337	1748	FALSE	2022-11-14T13:37:48.150	266.4440321096410	18603	C7.5	7.49960463508614E-06	
745	2301151428	5032	FALSE	2023-01-15T14:28:24.370	274.00057281237200	21767	M4.9	4.88779805891682E-05	
922	2211110709	2380	FALSE	2022-11-11T07:09:24.047	228.9365881996930	18385	M1.2	1.24653297461919E-05	
101	2303292340	4212	FALSE	2023-03-29T23:40:40.190	218.26198437055200	25992	M1.2	1.17001045509824E-05	
1286	2303061437	4900	FALSE	2023-03-06T14:37:12.716	235.34007810011900	24807	C7.2	7.21948208592949E-06	
521	2304222221	2296	FALSE	2023-04-22T22:21:40.925	218.5080318407150	27498	B6.9	6.91727450430335E-07	
1033	2305150054	3724	FALSE	2023-05-15T00:54:59.364	235.53833913604500	28666	C3.4	3.40057727044041E-06	
1021	2306111426	4836	FALSE	2023-06-11T14:26:24.539	213.93333333333300	30307	C2.2	2.17660112866724E-06	
667	2211150248	3276	FALSE	2022-11-15T02:48:12.033	271.44915135159000	18642	M1.1	1.06693178167916E-05	

Good correspondence



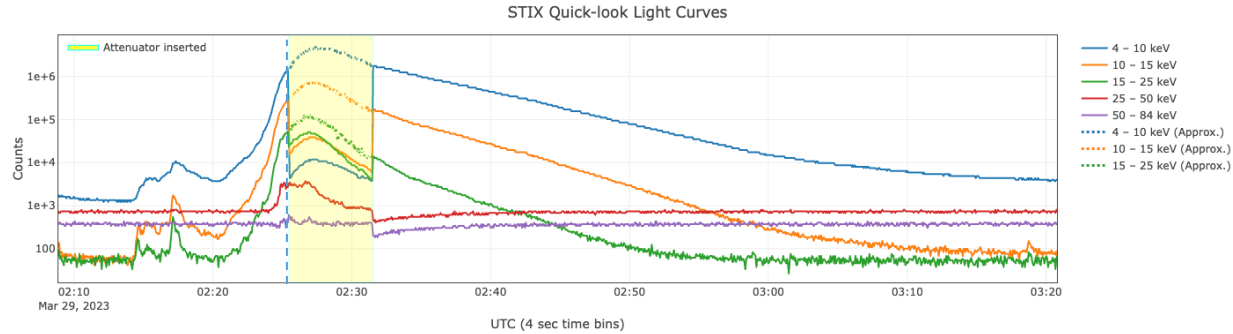
No shift applied to STIX maps

6-10 keV
20-76 keV

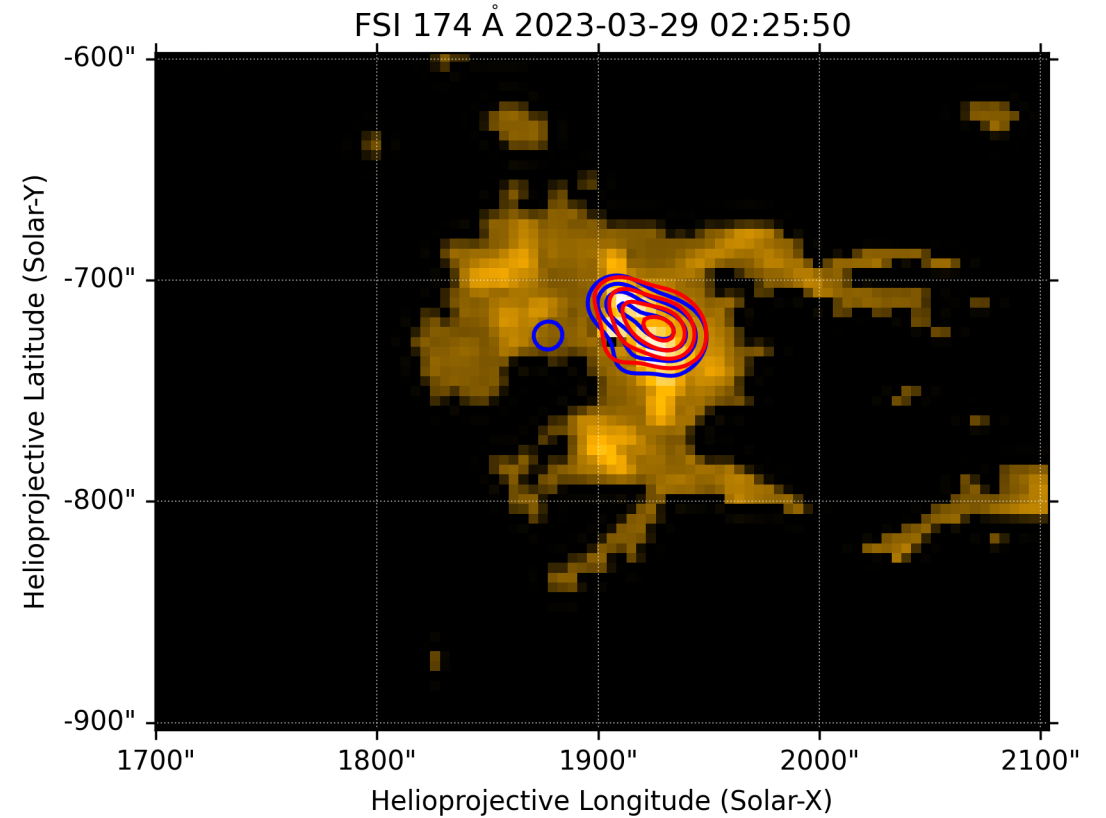
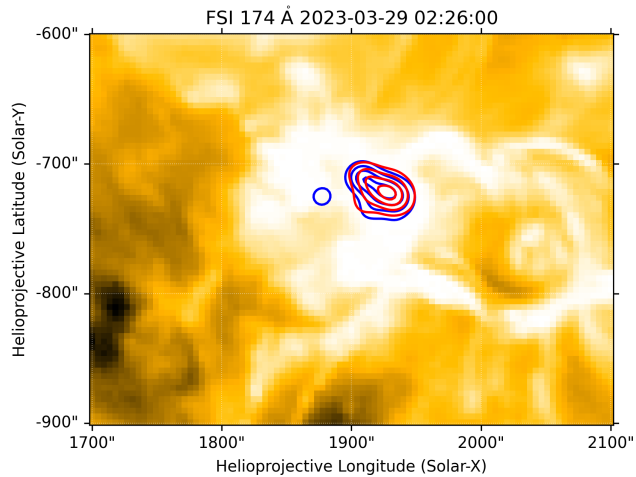


Good correspondence

6-10 keV
20-76 keV

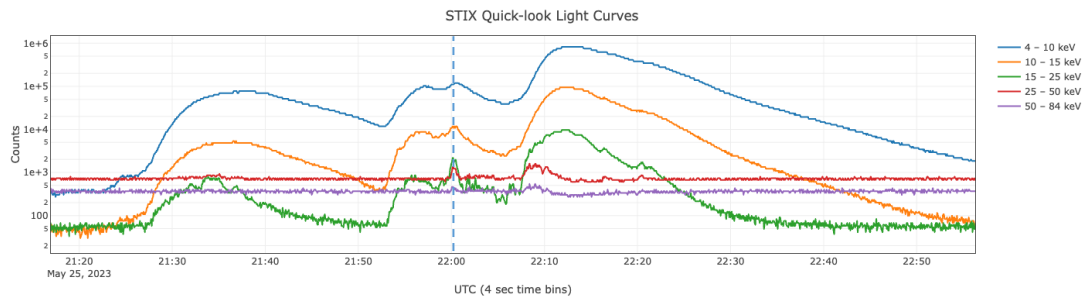


Shift applied: (-15, 30)''

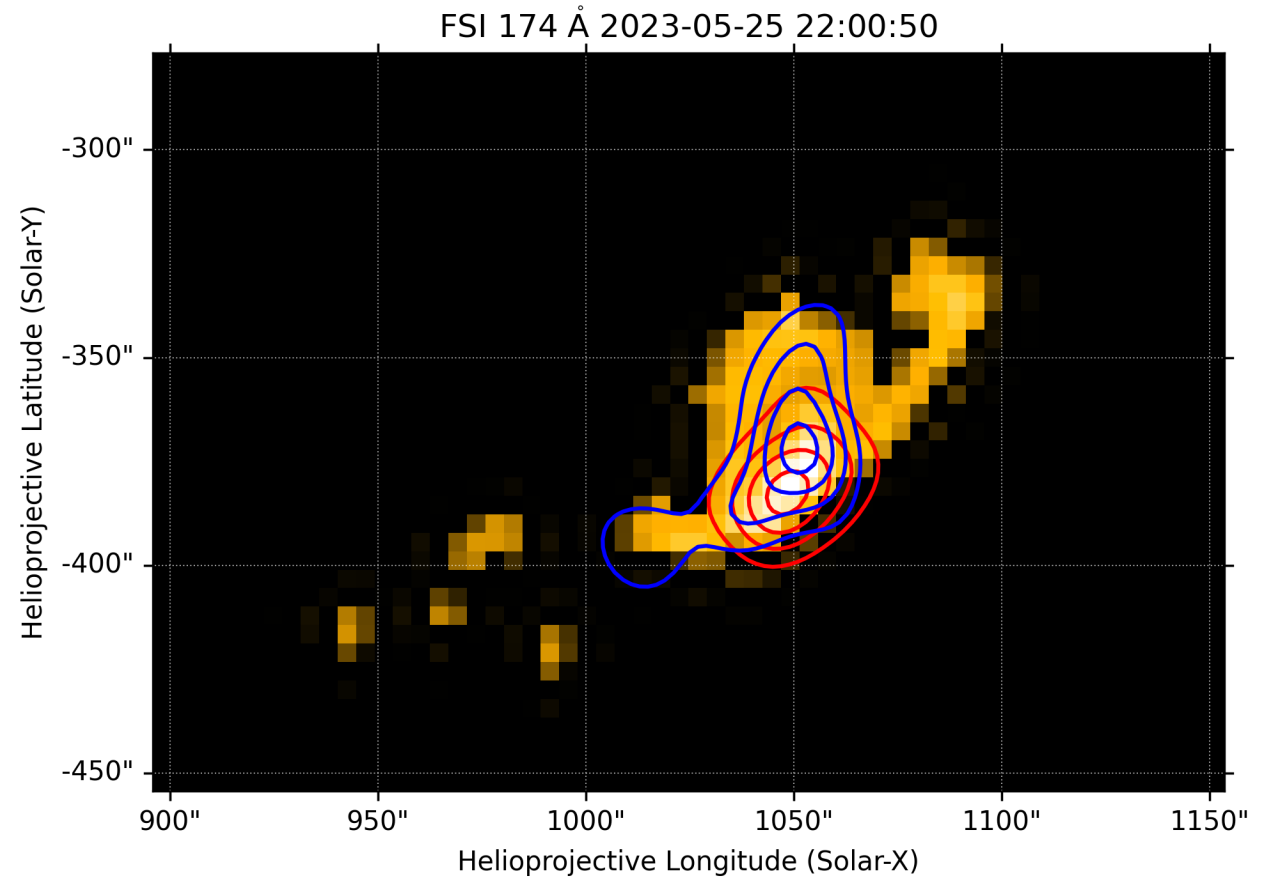


Good correspondence

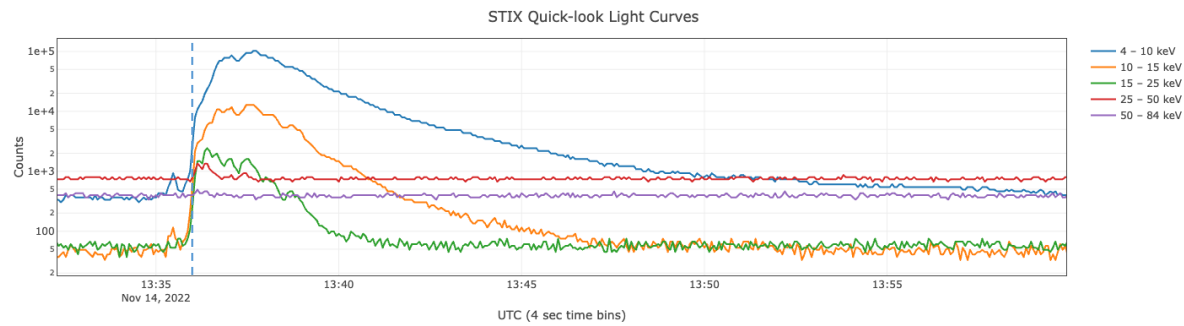
6-10 keV
20-76 keV



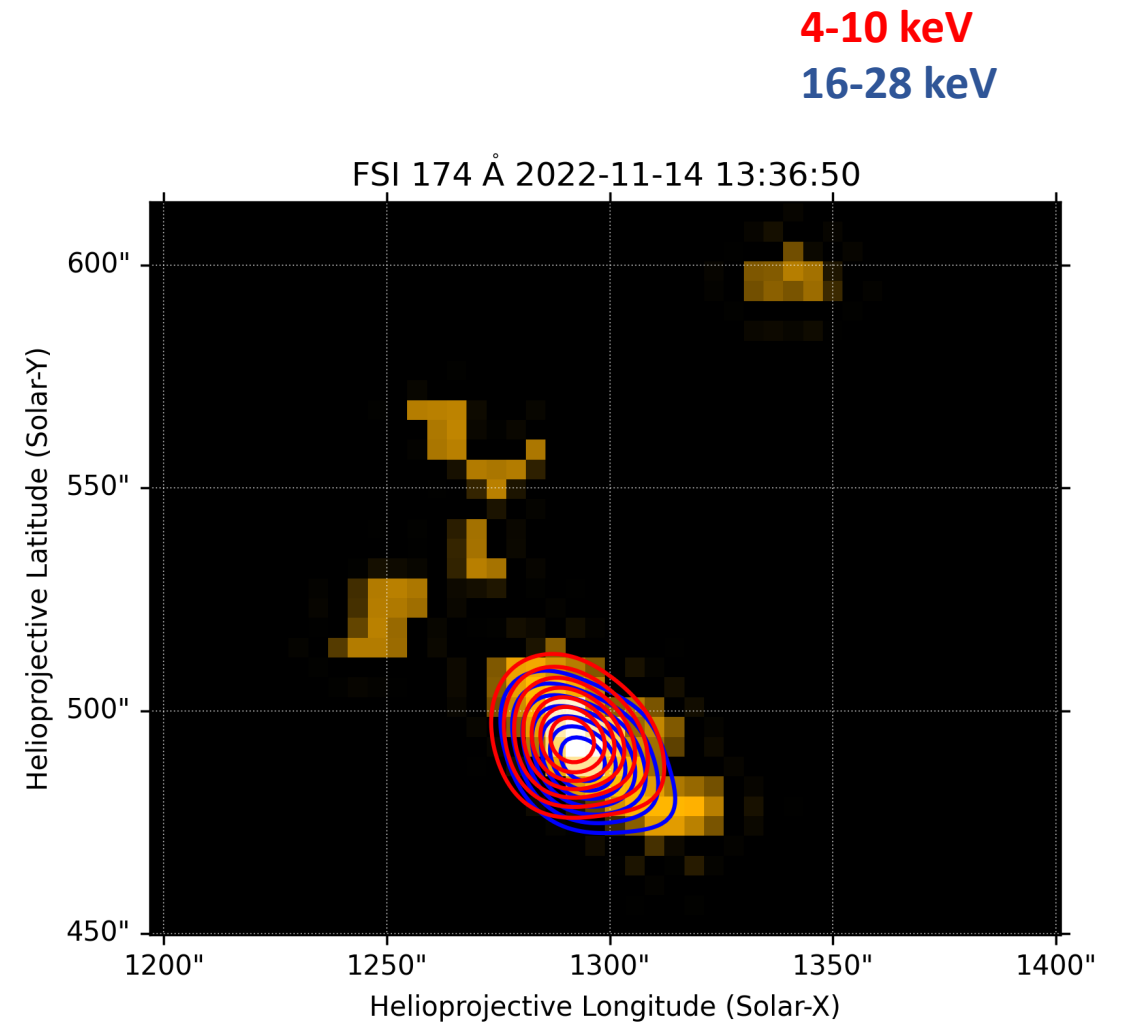
Shift applied: (-20, -5)''



Good correspondence

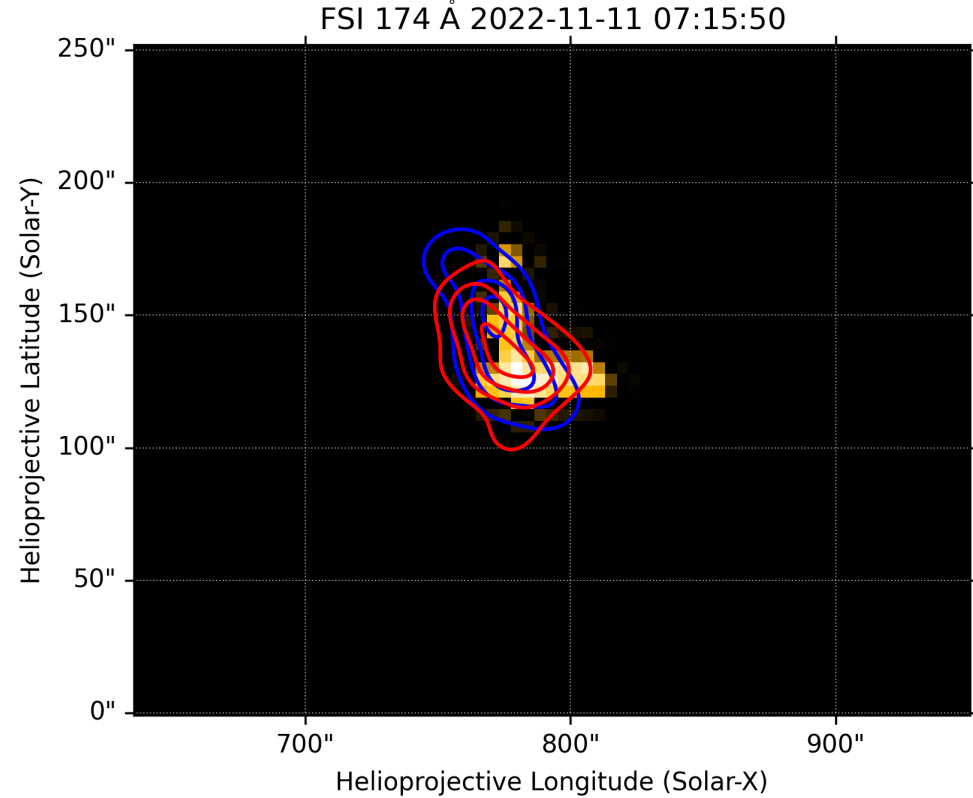
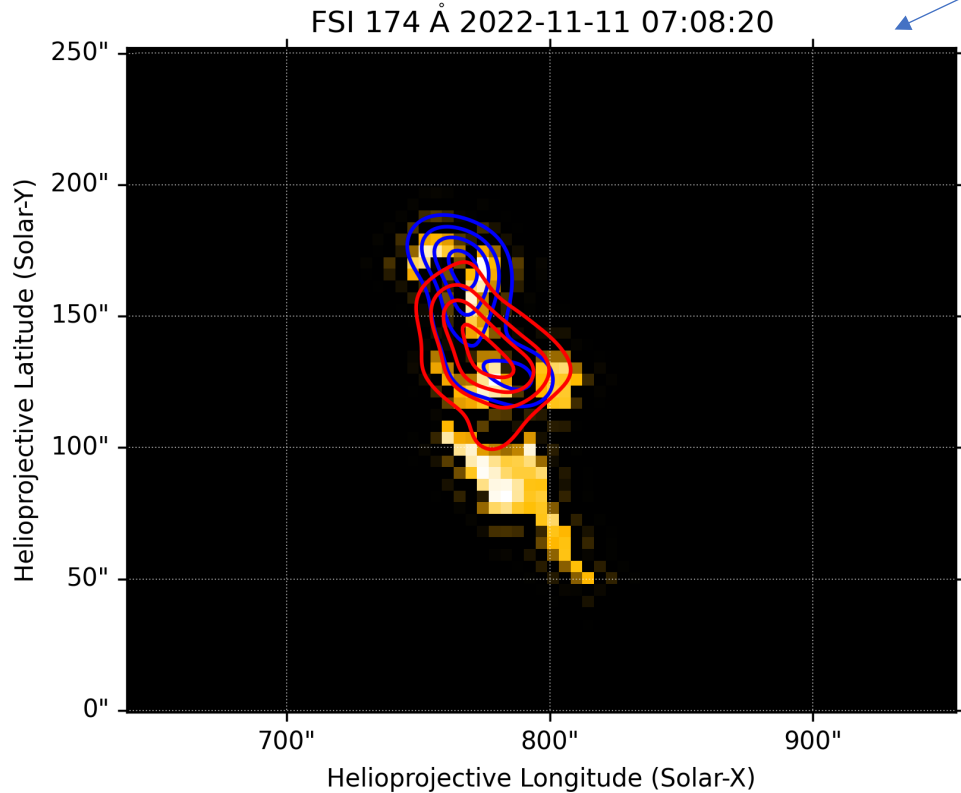
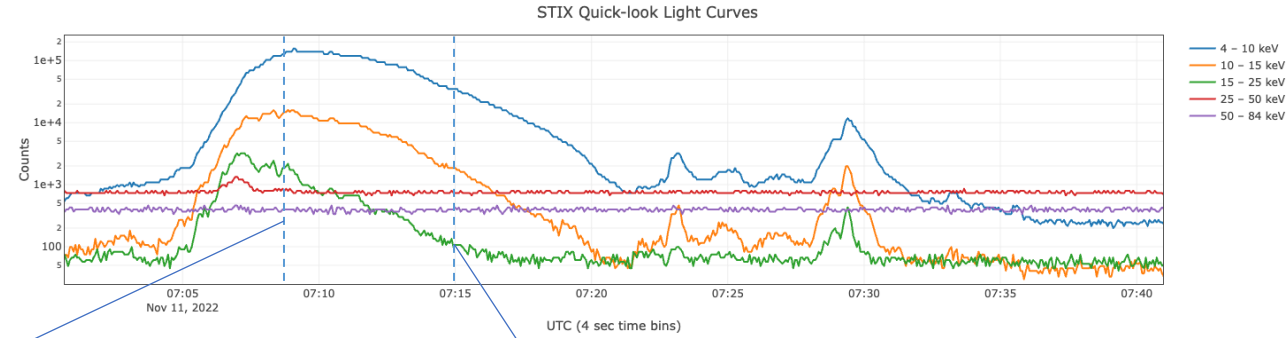


Shift applied: (10, 0)''



Good correspondence

No shift applied to STIX maps

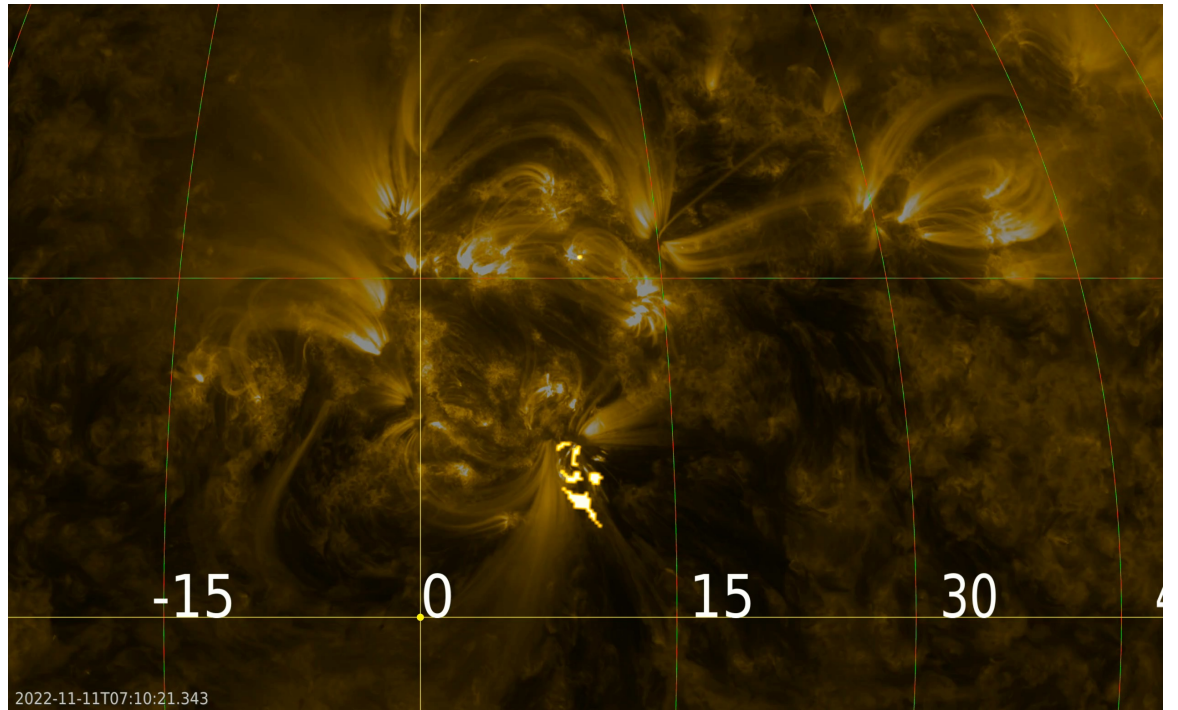
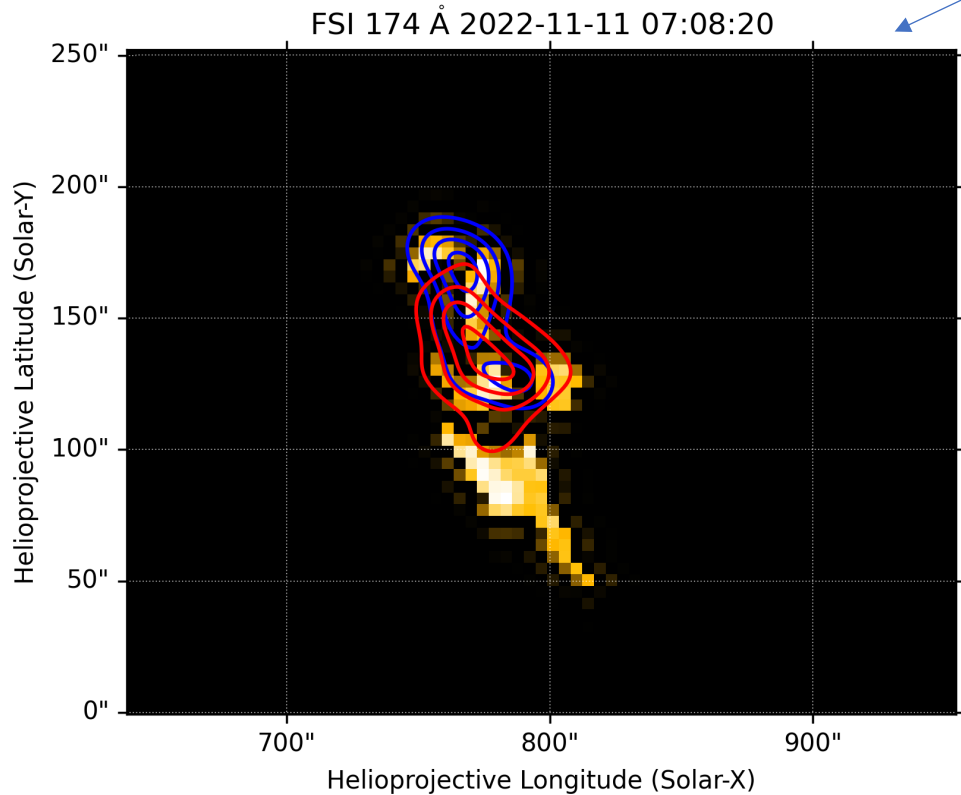
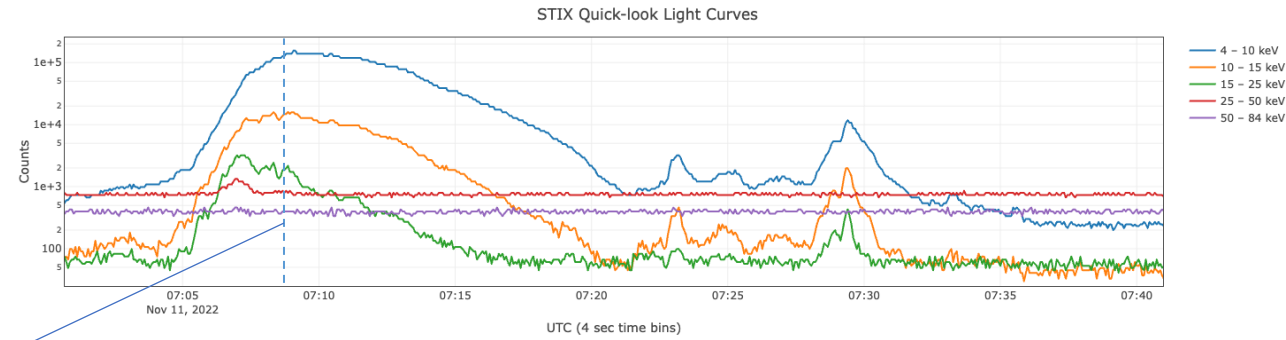


Good correspondence

4-10 keV

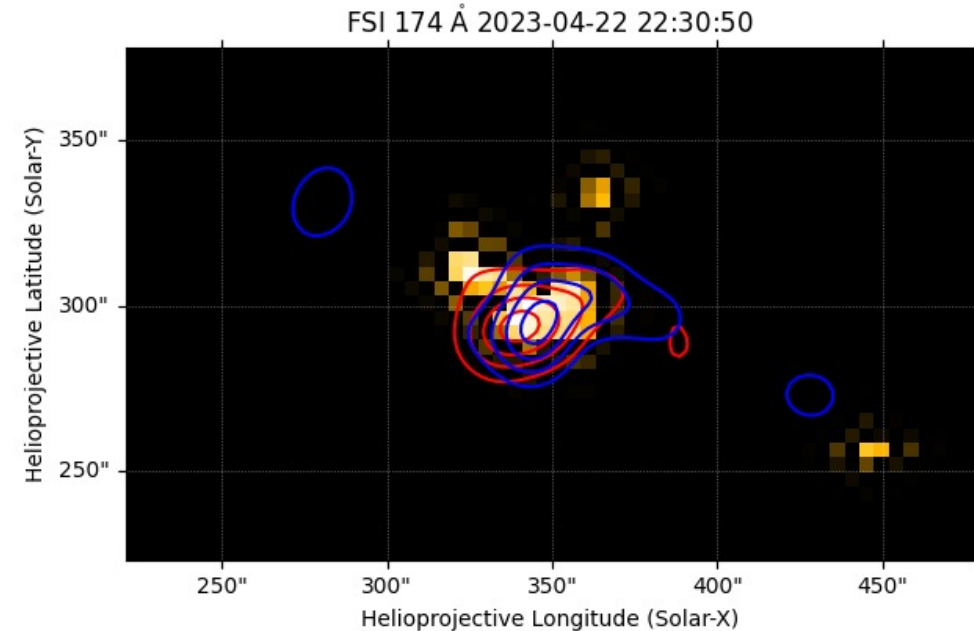
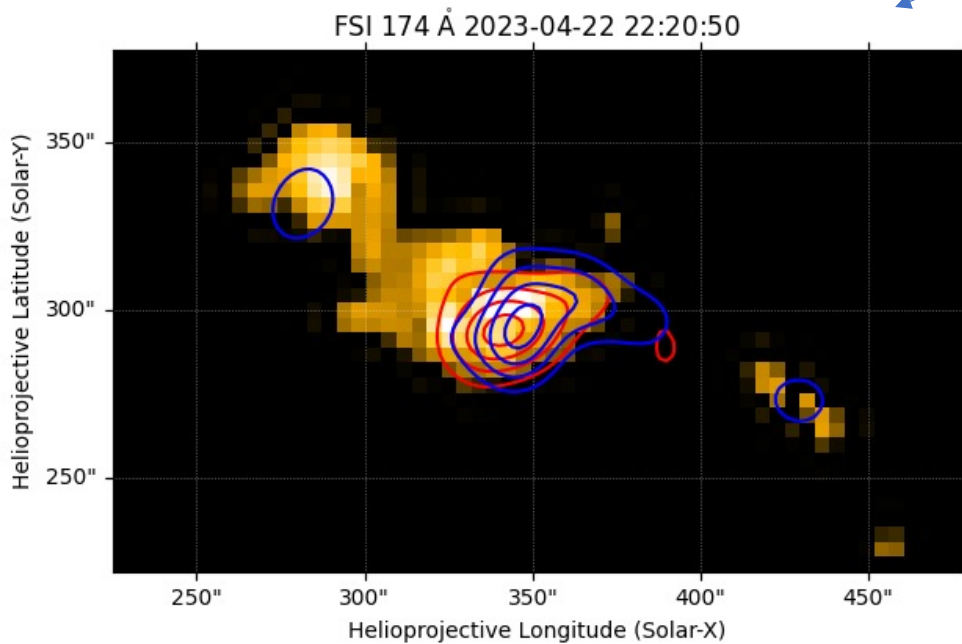
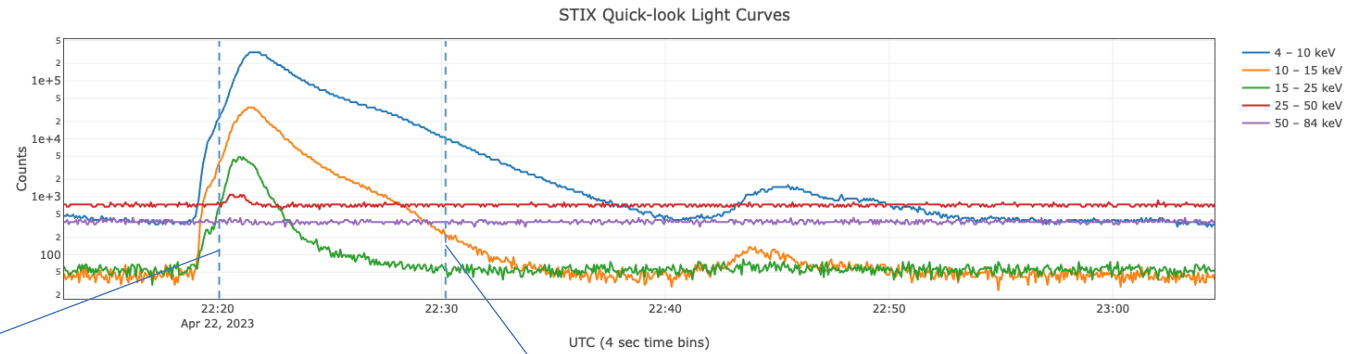
16-28 keV

No shift applied to STIX maps



Interesting science cases: case 1. *flux rope anchor points?*

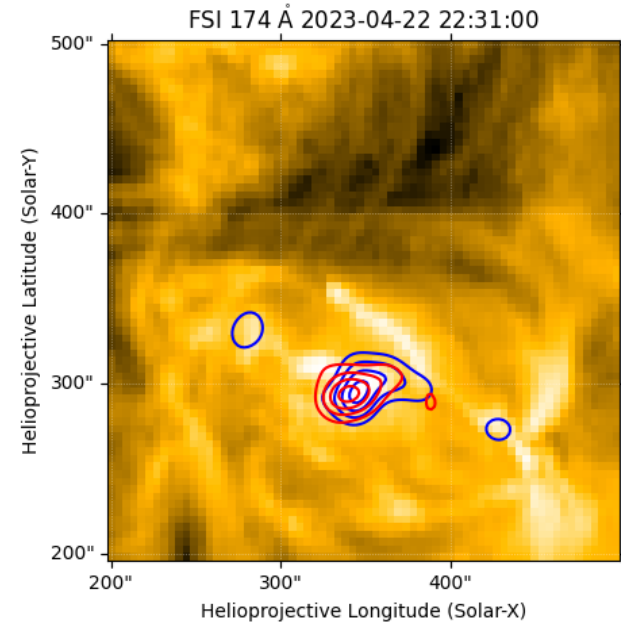
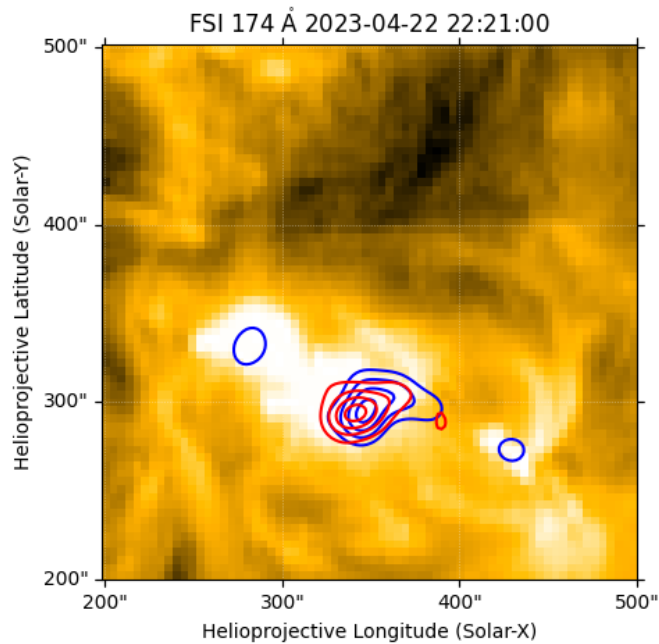
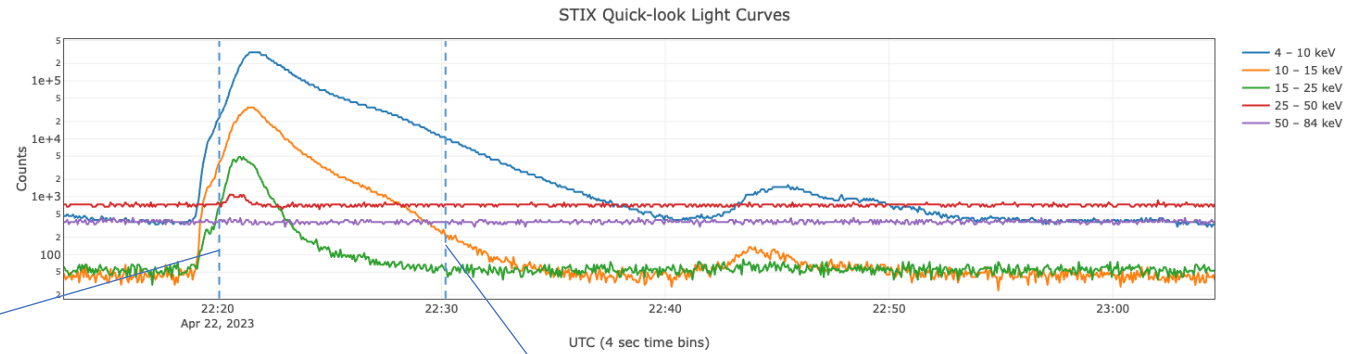
Shift applied: $(-30, 30)''$



6-10 keV
20-50 keV

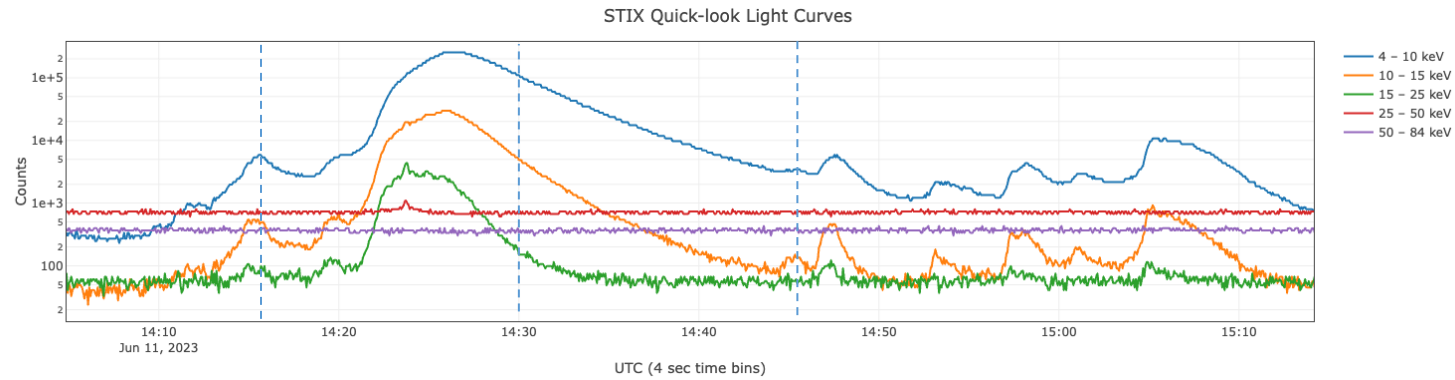
Interesting science cases: case 1. *flux rope anchor points?*

Shift applied: $(-30, 30)''$

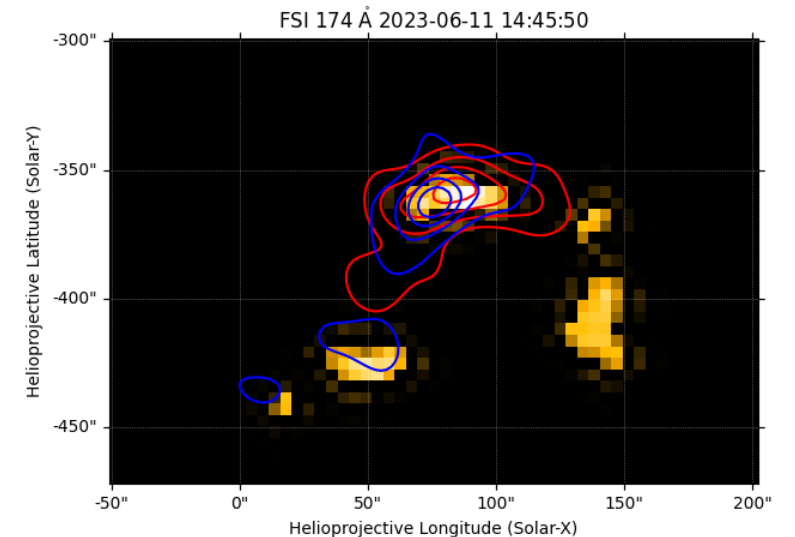
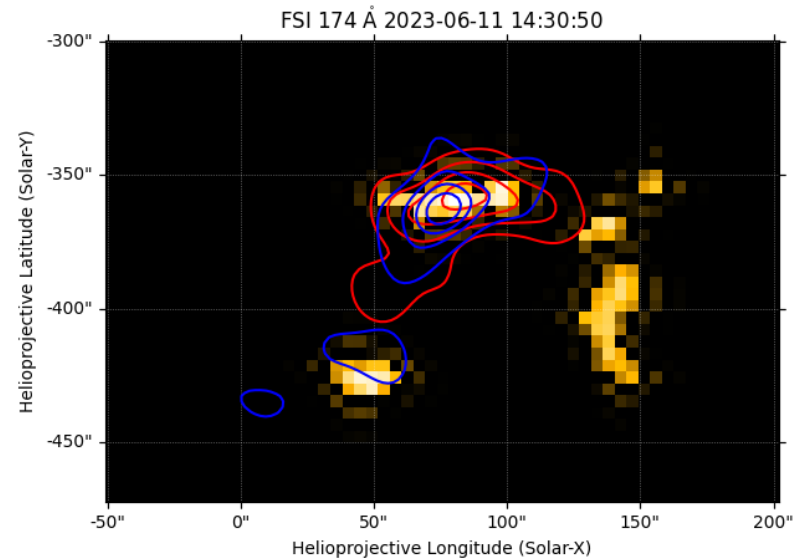
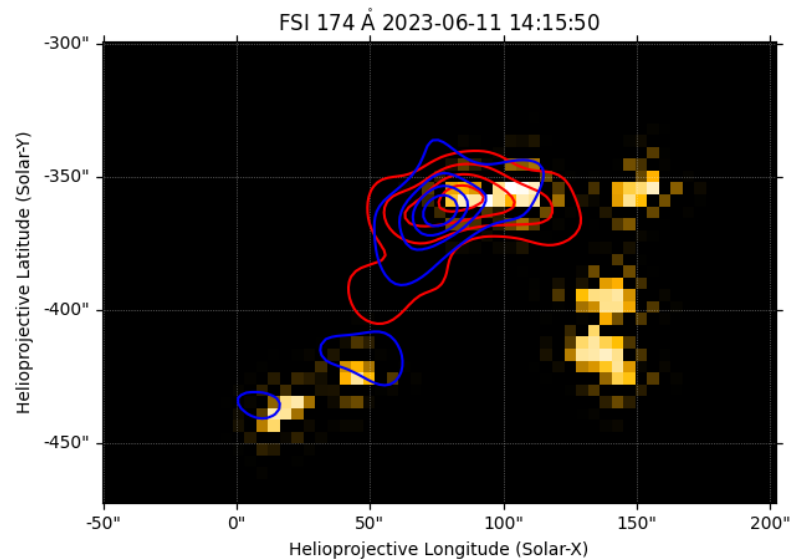


6-10 keV
20-50 keV

Interesting science cases: case 2. *flux rope anchor points or something else?*

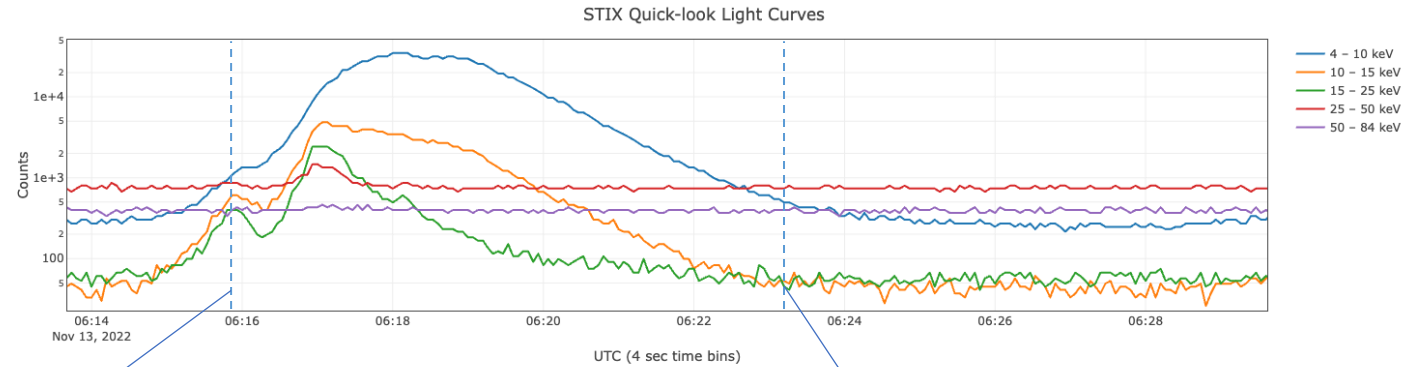


6-10 keV
20-50 keV

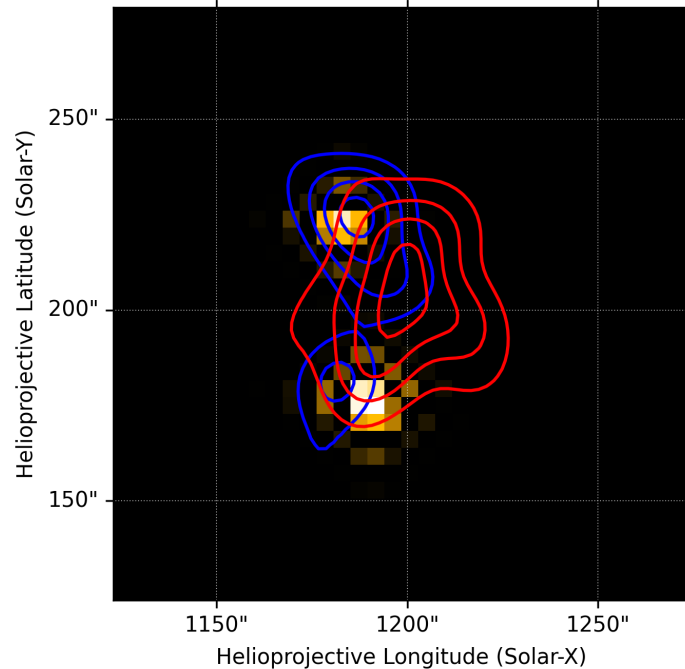


Need for high cadence short exposure observations

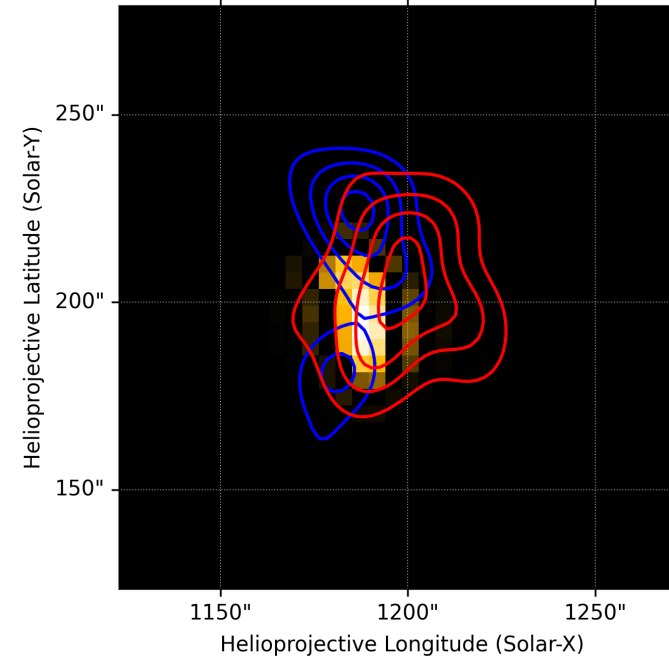
7.5 mins later only see heated plasma in thermal loop



FSI 174 Å 2022-11-13 06:15:50



FSI 174 Å 2022-11-13 06:23:20



6-10 keV
20-76 keV

No shift applied to STIX maps

Next steps

- Advocate for high cadence short exposure EUV FSI + HRI observations
 - can utilise the STIX flare trigger, tests ongoing
- Look for EUV signatures unrelated to e^-
- Compare energy content from EUV and X-ray measurements
- Compare results with de-saturated AIA images
- Test imaging algorithms
- Test STIX aspect system