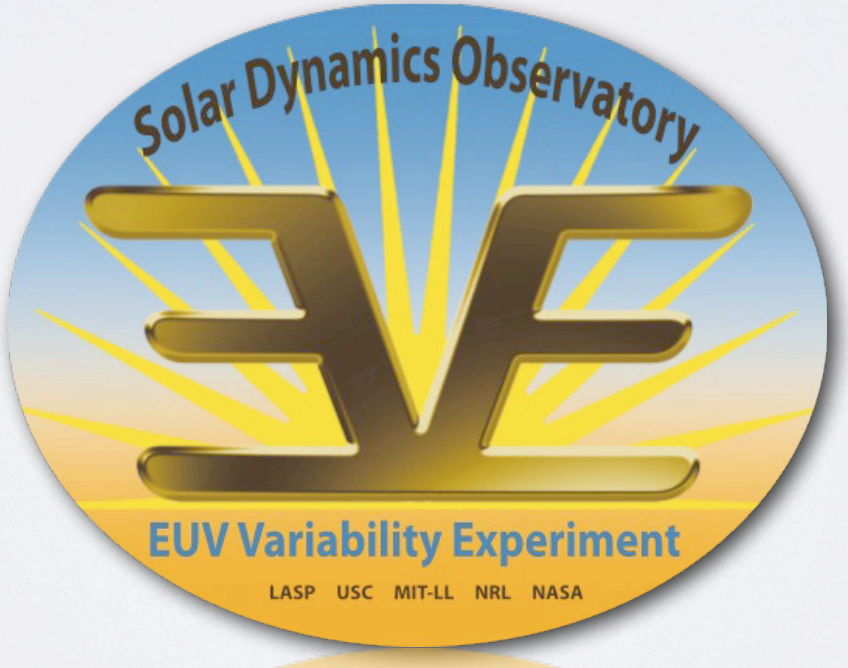
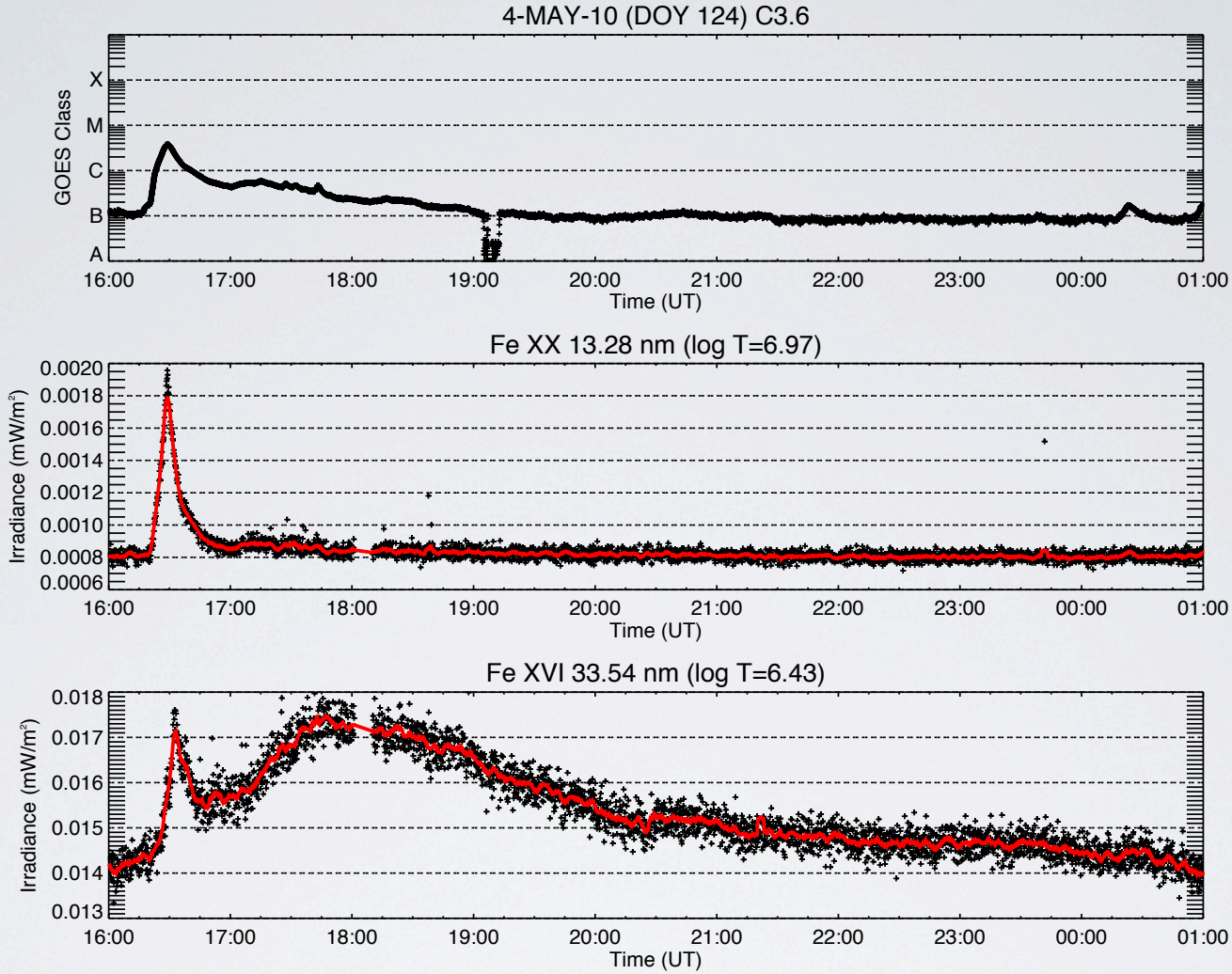
LAST PHASE OF FLARES

Rachel Hock





LATE PHASE

2nd peak in Fe XVI 33.5 nm after the gradual phase ...

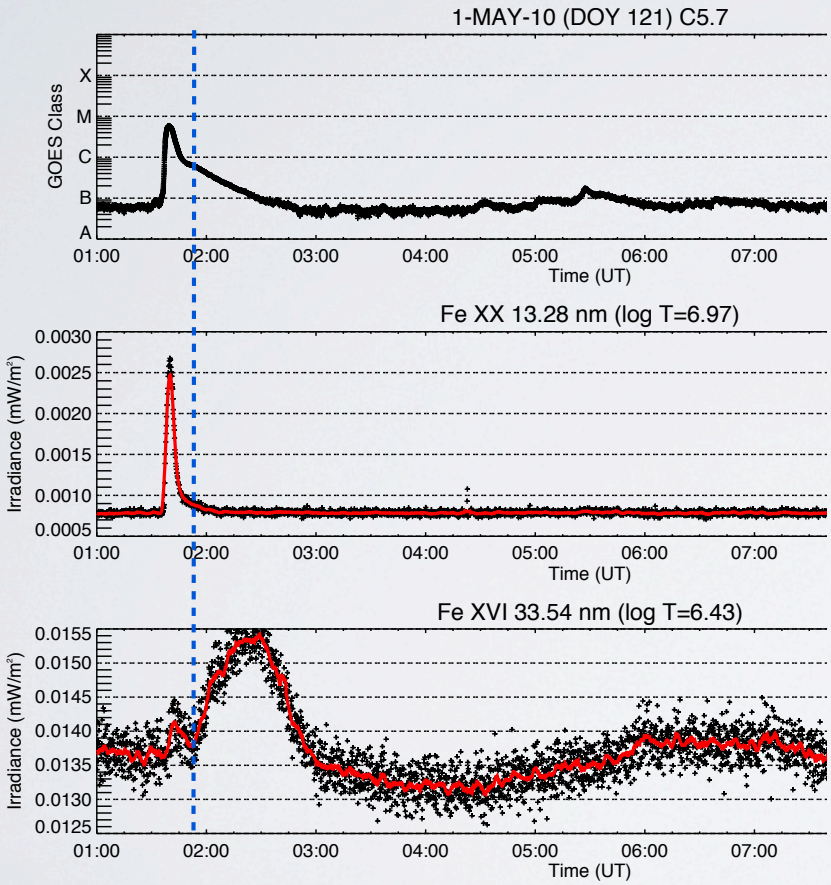
LATE PHASE CATEGORIES

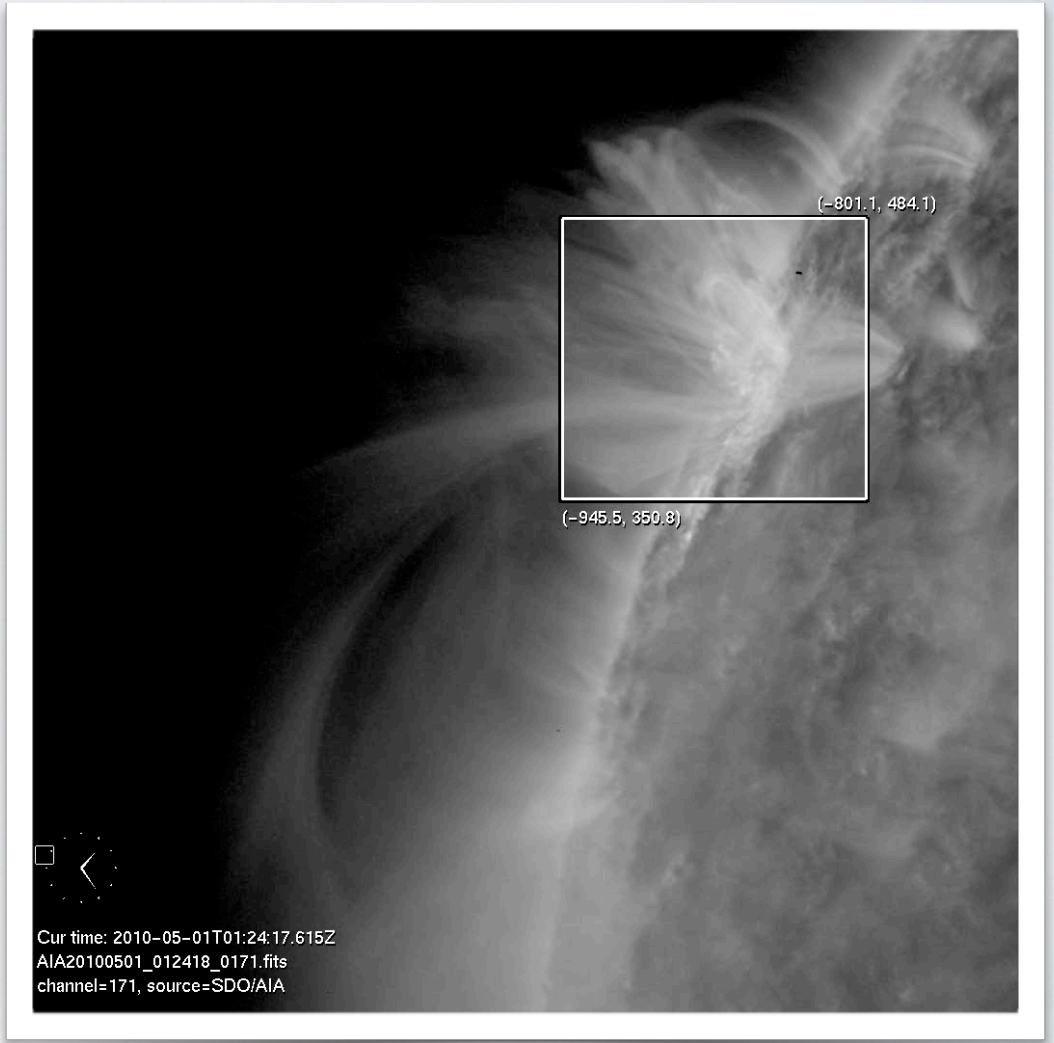
2nd peak in Fe XVI 33.5 nm after main gradual phase plus ...

A clear elbow (change in slope) in GOES roughly corresponding to start of 2nd peak	**Category 1 late phase**
Possible change in slope but there are other small events contaminating flare	**Category 2 late phase**
Clearly 2nd peak comes from another flare (of comparable size), i.e. false late phase	**Category 3 late phase**

No 2nd peak in Fe XVI 33.5 nm	**No late phase**

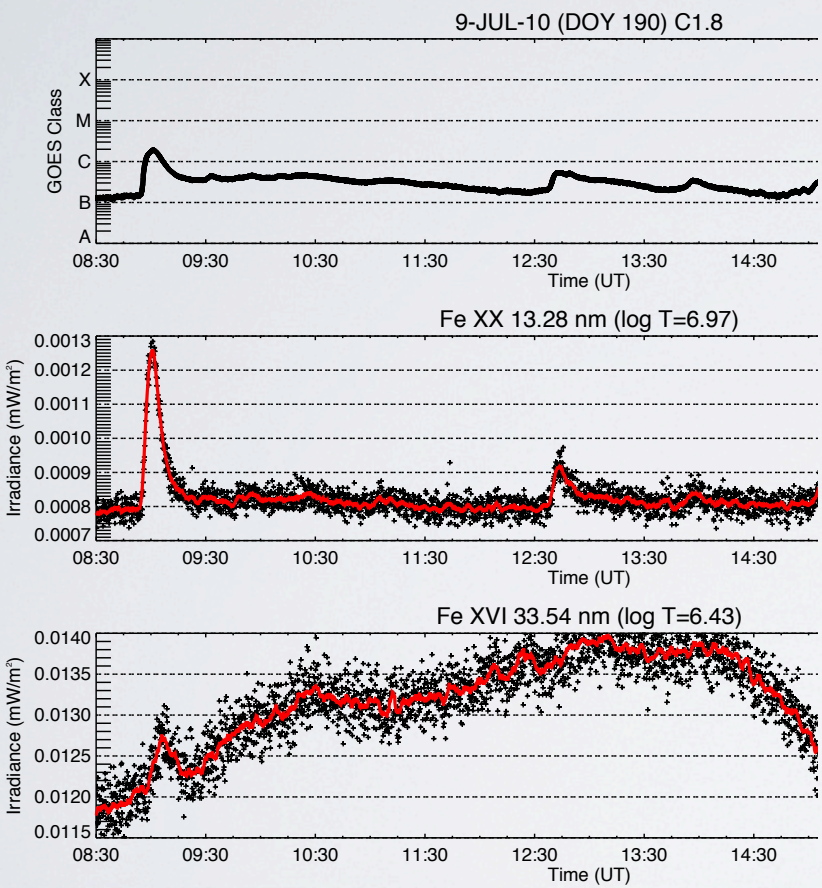
CATEGORY I LATE PHASE

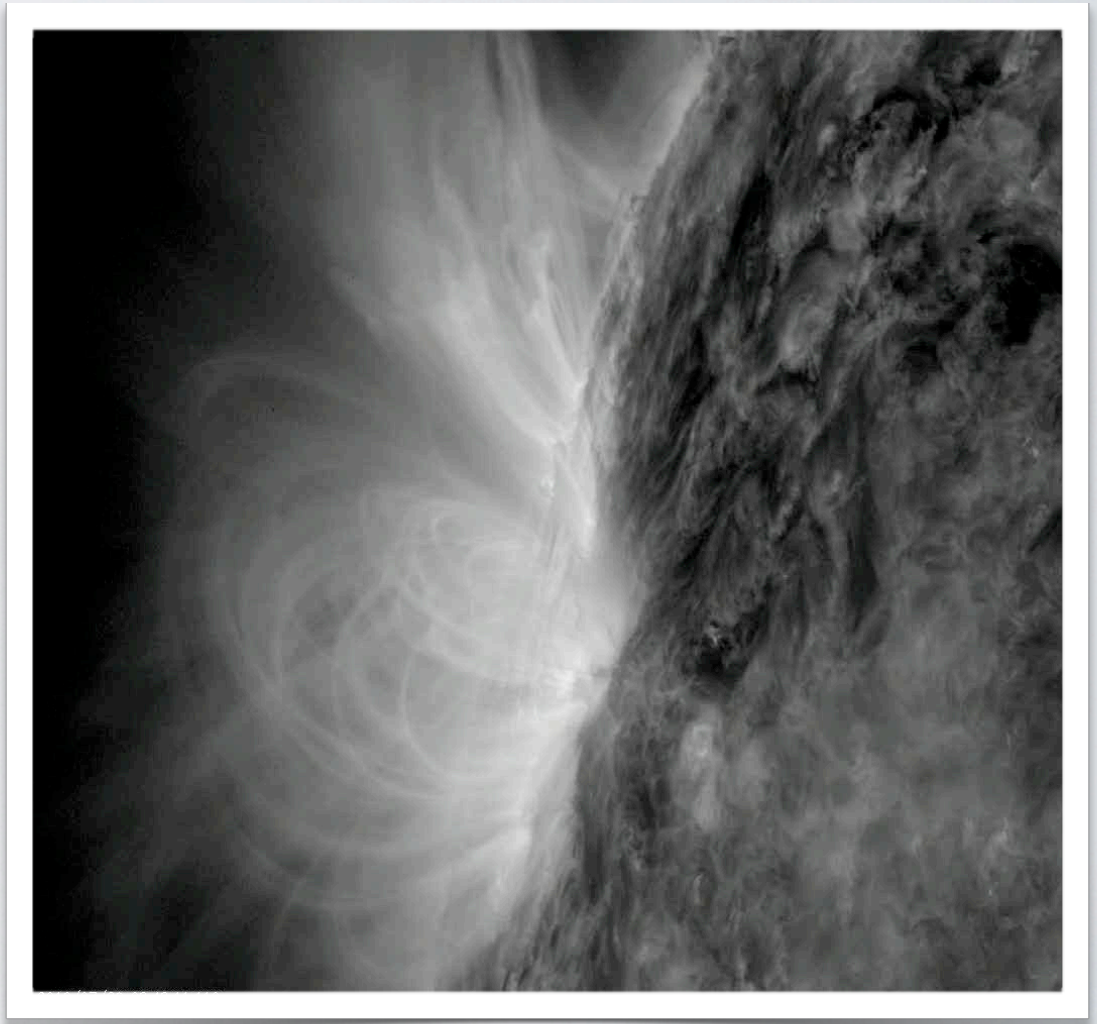




Start of 2nd peak roughly corresponds to break in GOES slope

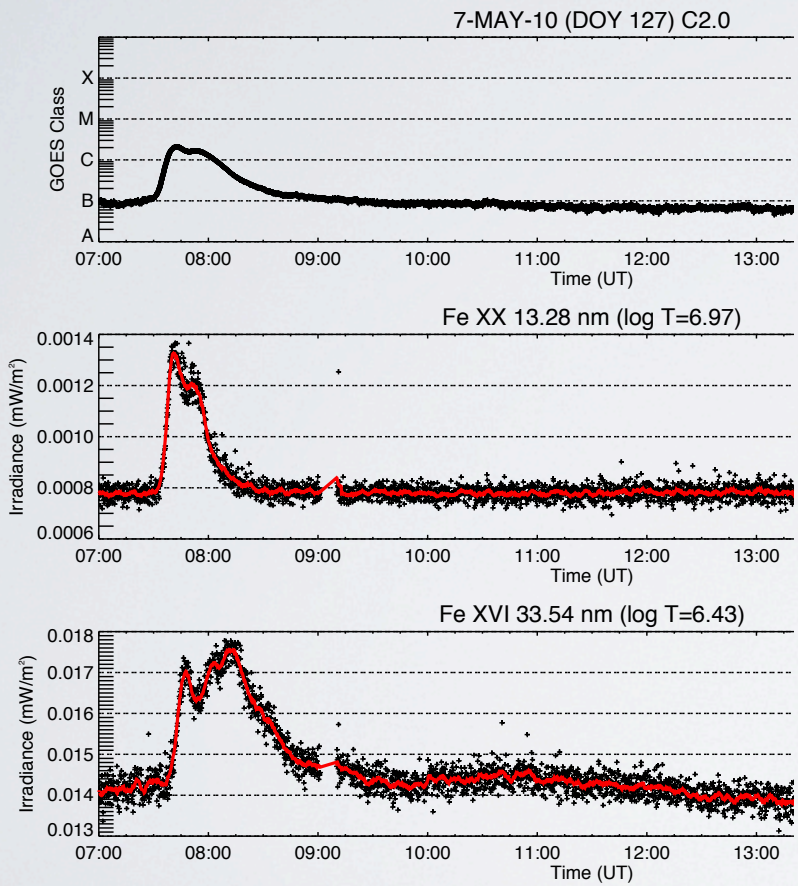
CATEGORY 2 LATE PHASE



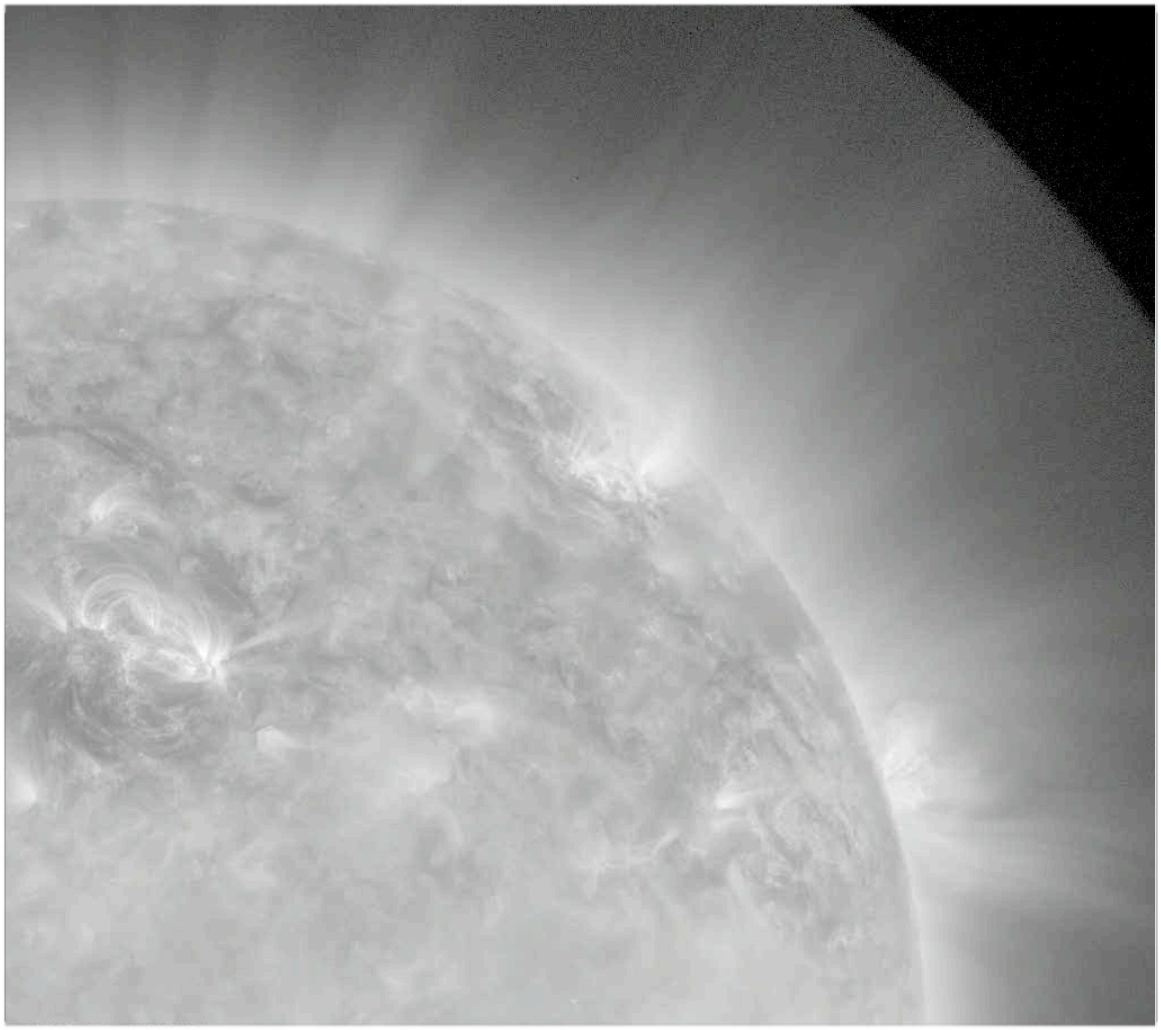


There is other activity that could be contributing to the 2nd peak. The 2nd peak is broader.

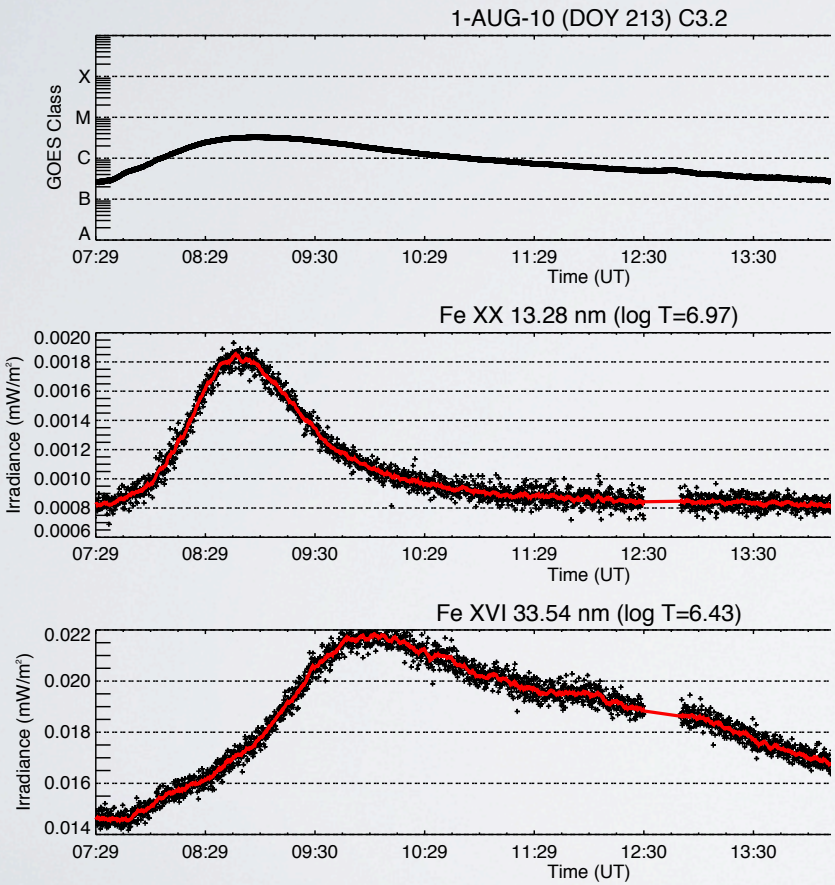
CATEGORY 3 LATE PHASE

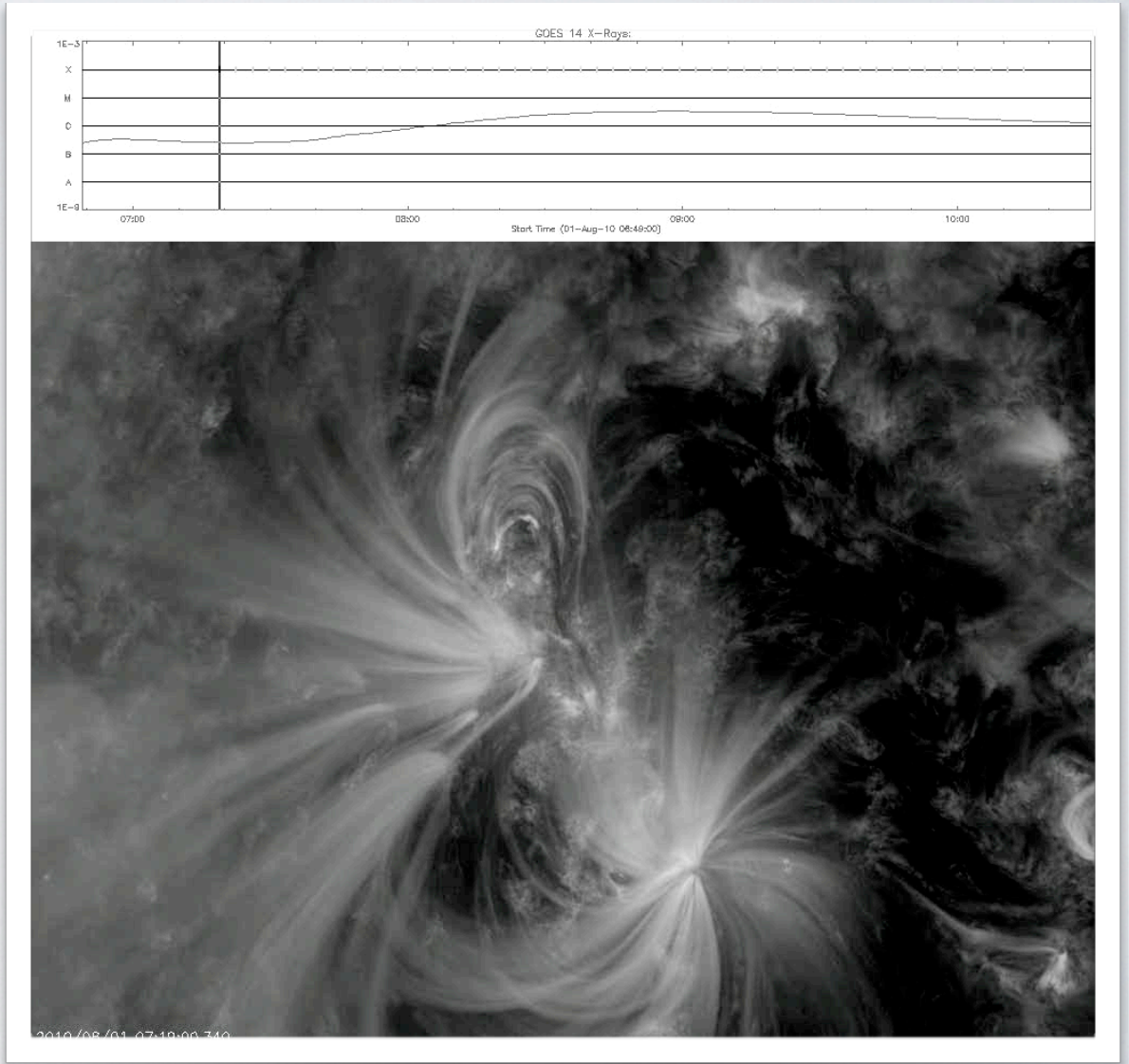


Looking closely at the movie there are really 2 separate brightenings.



NO LATE PHASE





EVE FLARE CATALOG

- Examined 21 flares
  - 1-May-2010 to 1-Sep-2010
  - C2.0 and larger
  - 1 flare with incomplete EVE data (happened during a FOV map)
- 2 in Tom's table not in mine
  - 30-Apr-2010 C2.2
  - 8-May-2010 C1.8

C2.0-C2.9	7
C3.0-C3.9	4
C4.0-C4.9	2
C5.0-C5.9	2
C6.0-C6.9	1
C7.0-C7.9	0
C8.0-C8.9	1
C9.0-C9.9	1
M1.0-M1.9	3
M2.0+	1

May	8
June	3
July	6
August	5

North	19
South	3

STATISTICS

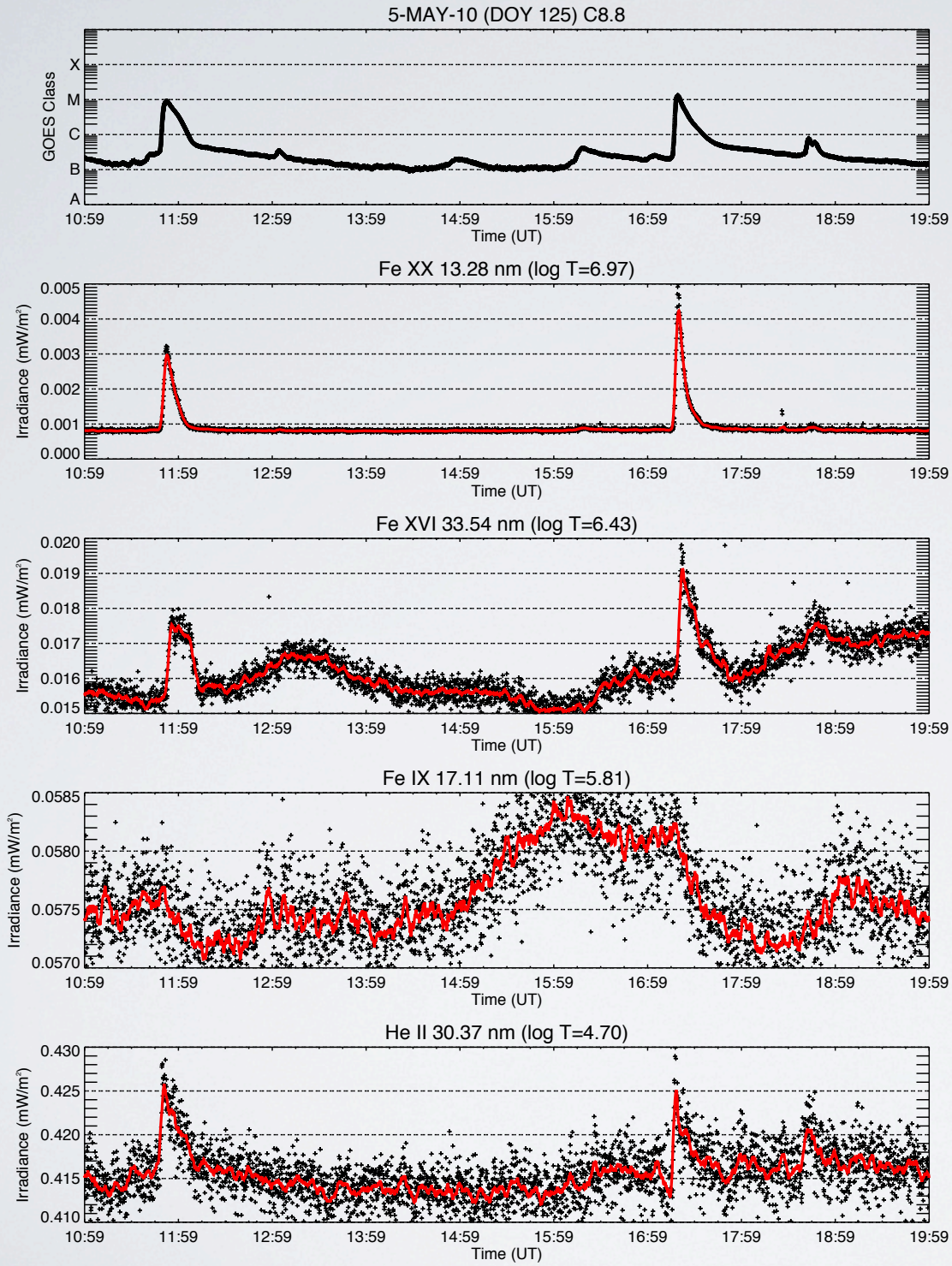
	2-Ribbon			Compact			Other			Total		
	Eruptive	*Confined*	*Total*	*Eruptive*	*Confined*	*Total*	*Eruptive*	*Confined*	*Total*	*Eruptive*	*Confined*	*Total*
Category 1				**4**		**4**				**4**		**5***
Category 2				**4**		**4**				**4**		**4**
Category 3				**1**	**1**	**2**	**1**		**1**	**2**	**1**	**3**
No late phase	**4**	**1**	**5**	**1**	**1**	**2**	**1**	**1**	**2**	**6**	**3**	**9**
Total	**4**	**1**	**5**	**10**	**2**	**12**	**2**	**1**	**3**	**17**	**4**	**21**

*No AIA data available for one flare

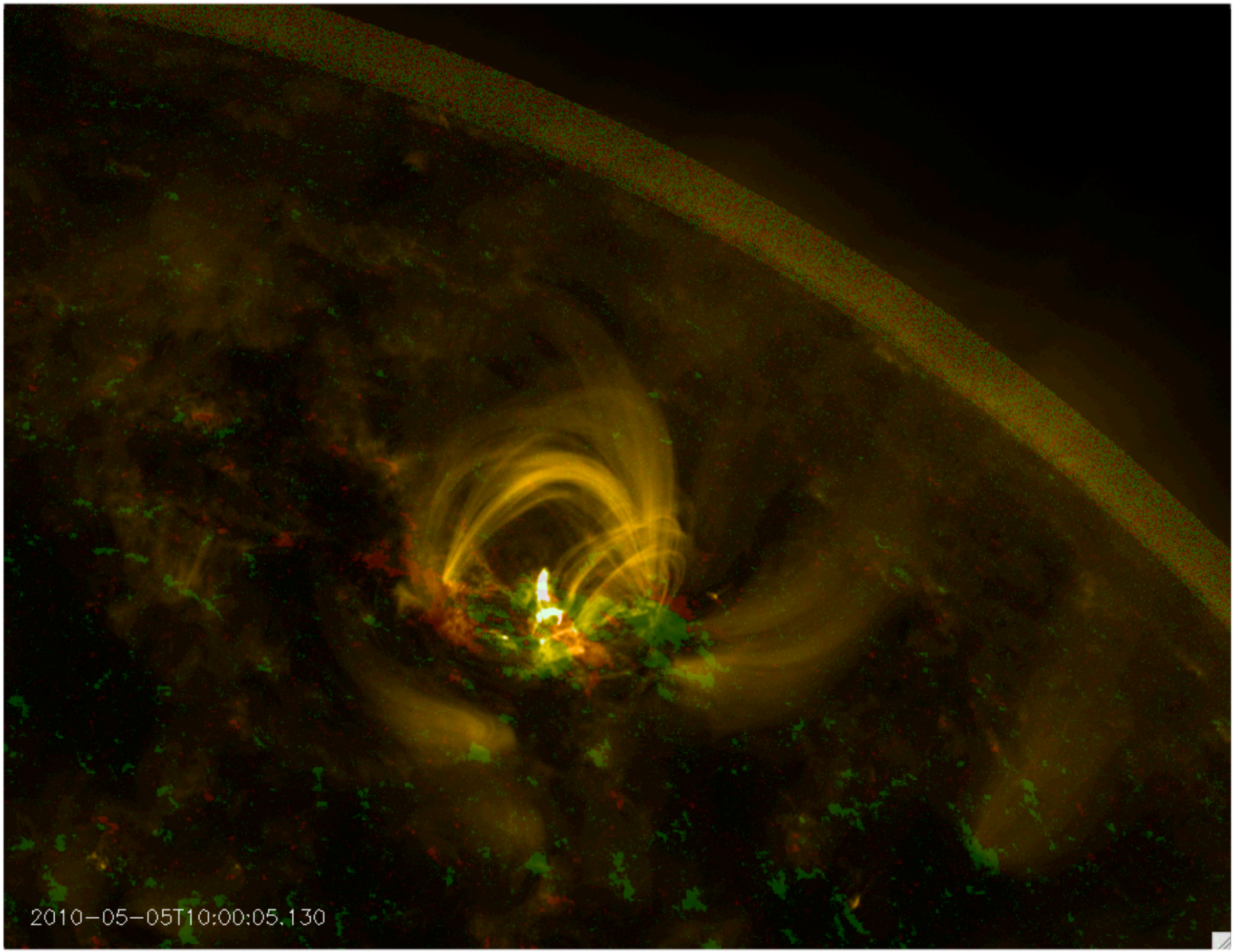
2-ribbon flares do not have a late phase.

Category 1 & 2 late phases come from eruptive compact flares.

5-May-2010 C8.8 Case Example



- Category I Late Phase with coronal dimming
- Multipolar region
- Eruptive with CME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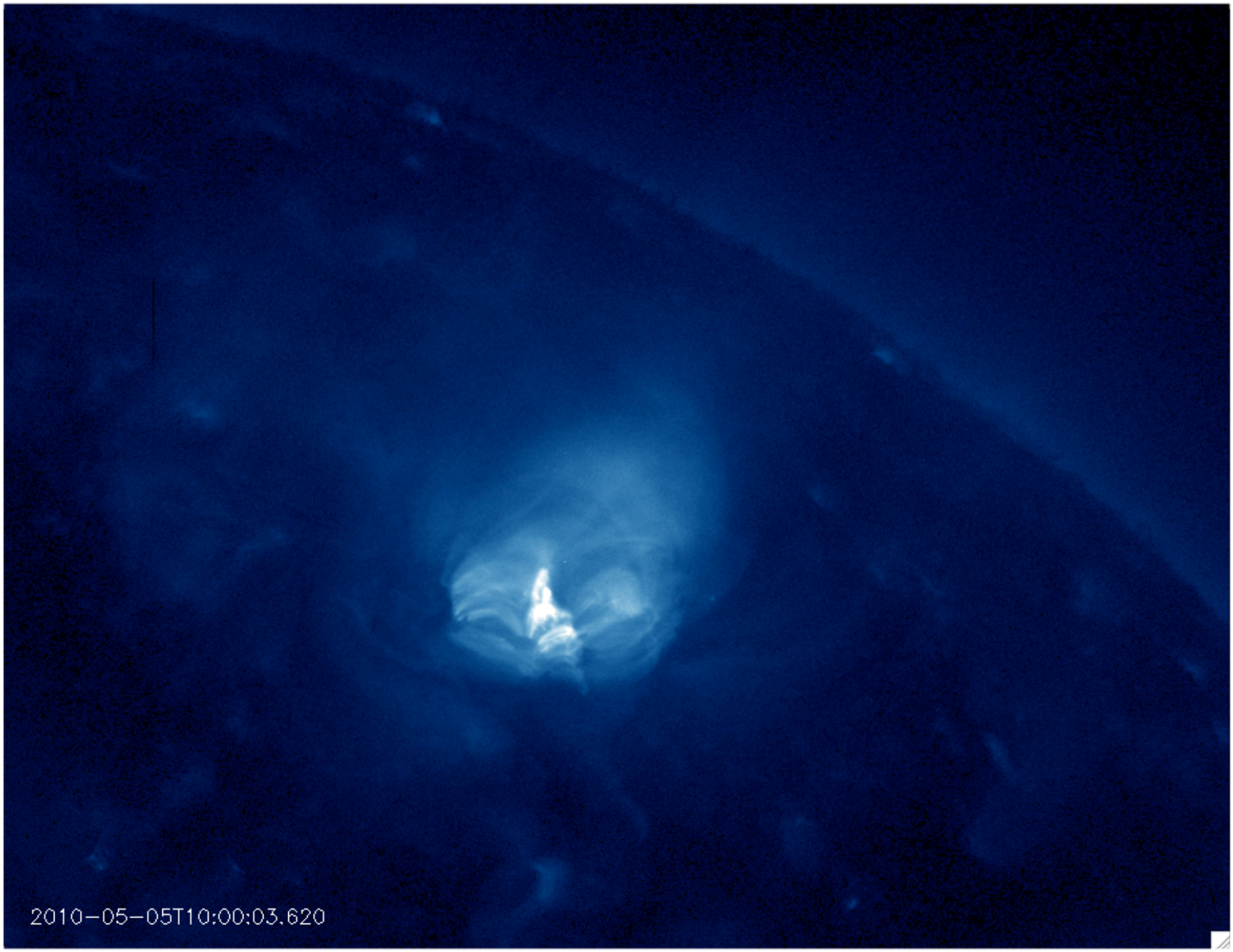
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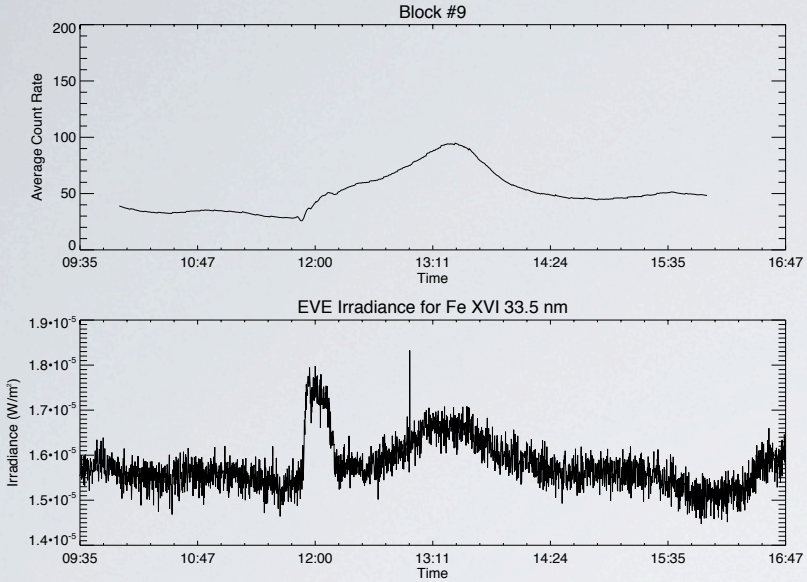
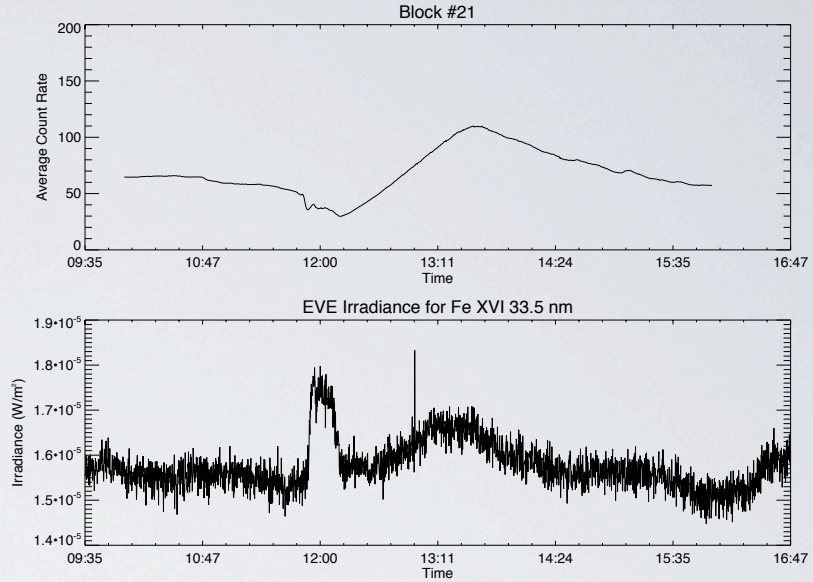
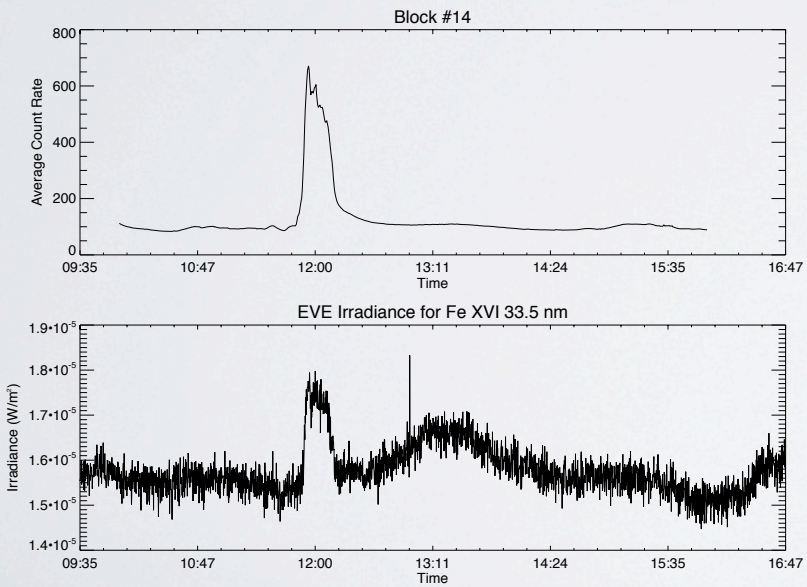
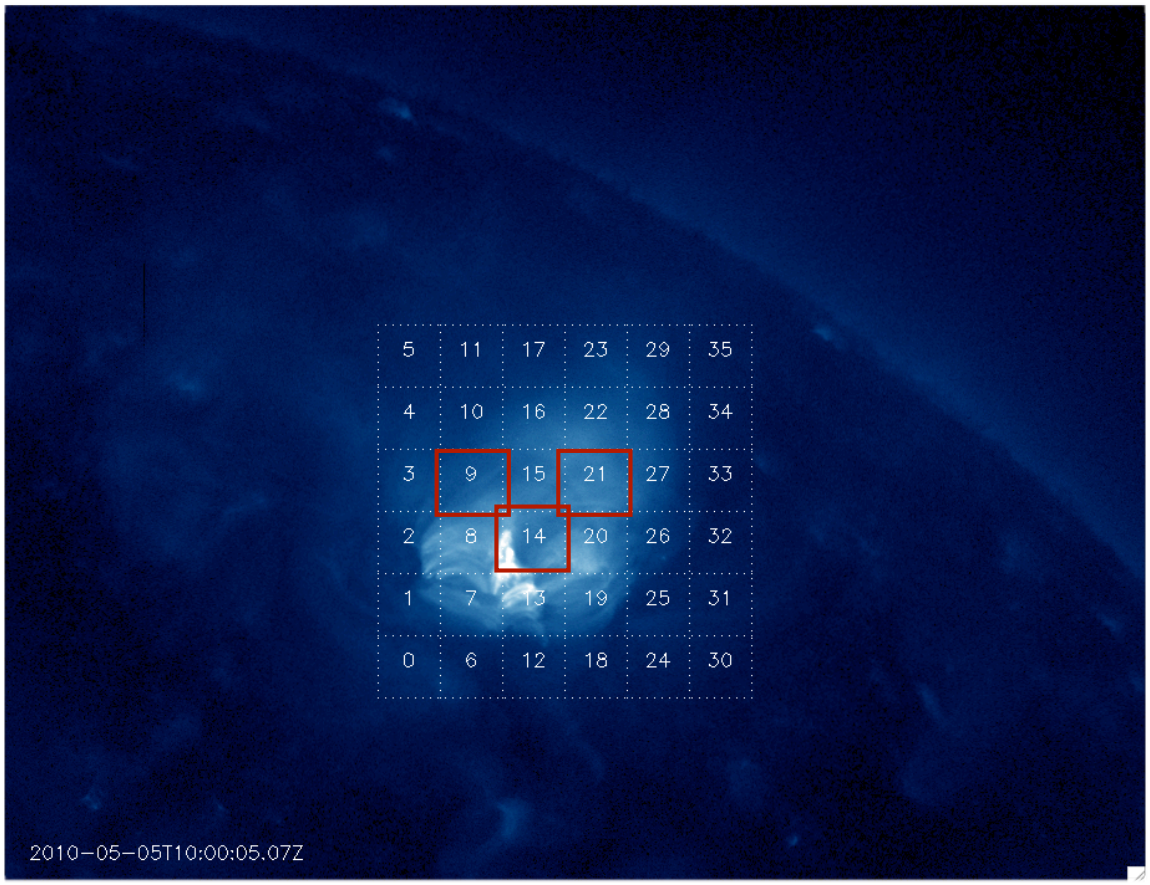
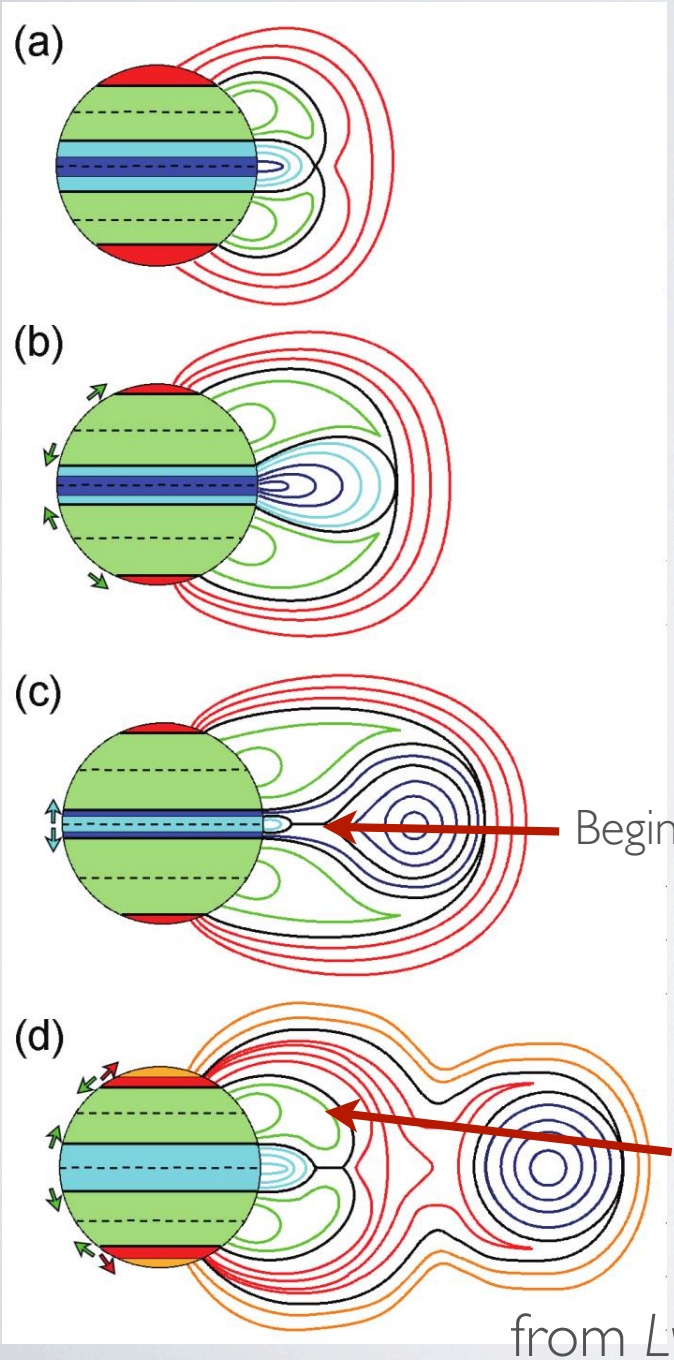

Block #9
Average Count Rate
Time
EVE Irradiance for Fe XVI 33.5 nm
Irradiance (W/m²)
Time


Block #21
Average Count Rate
Time
EVE Irradiance for Fe XVI 33.5 nm
Irradiance (W/m²)
Time


Block #14
Average Count Rate
Time
EVE Irradiance for Fe XVI 33.5 nm
Irradiance (W/m²)
Time


5 11 17 23 29 35
4 10 16 22 28 34
3 9 15 21 27 33
2 8 14 20 26 32
1 7 13 19 25 31
0 6 12 18 24 30
2010-05-05T10:00:05.07Z

ONE POSSIBLE PICTURE



Beginning of flare

"Antibreakout" reconnection

from *Lynch* et al. 2008

During an eruptive event, loops surrounding the flaring region are disrupted. After the flare, these loops relax back into an equilibrium state by undergoing reconnection. This reconnection, unlike the reconnection that caused the flare, is slower.