



Different Patterns of Chromospheric Evaporation in a Flaring Region Observed with Hinode/EIS

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OUTLINE

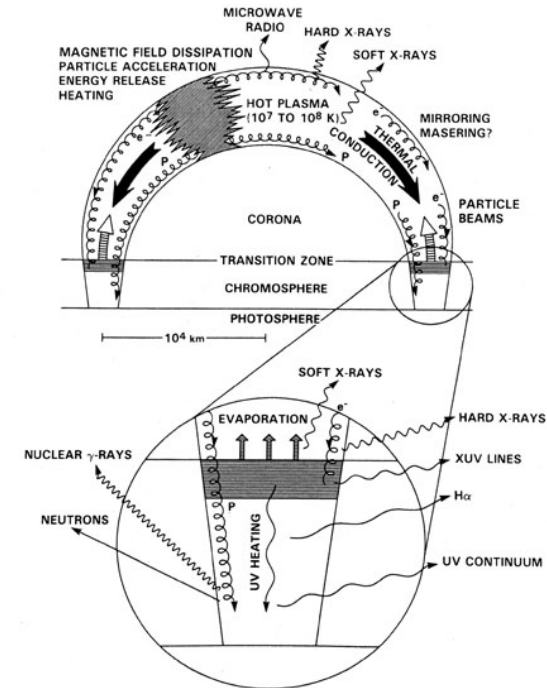
- Background
- Observations
- Results
- Discussion





Background

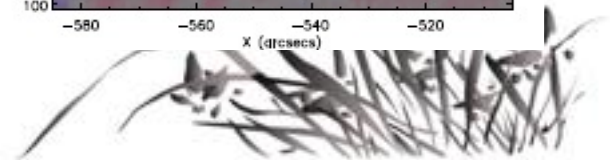
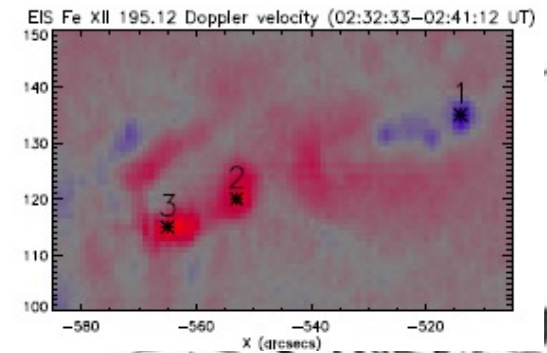
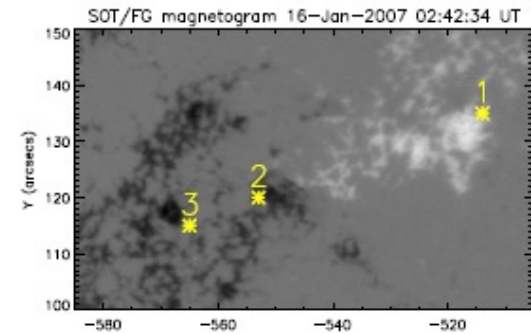
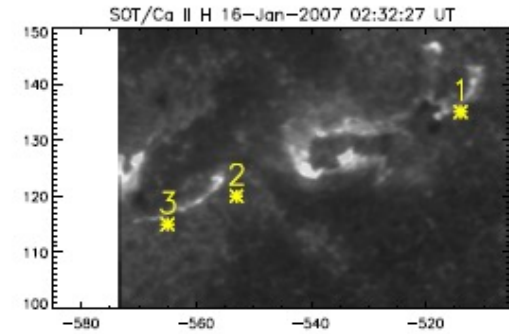
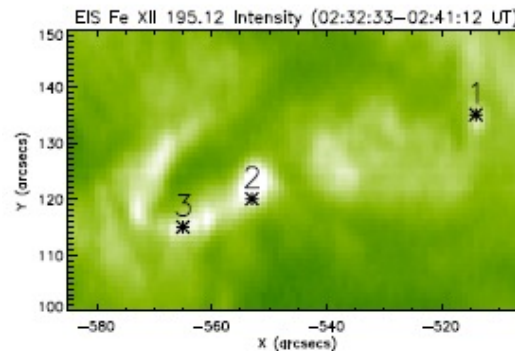
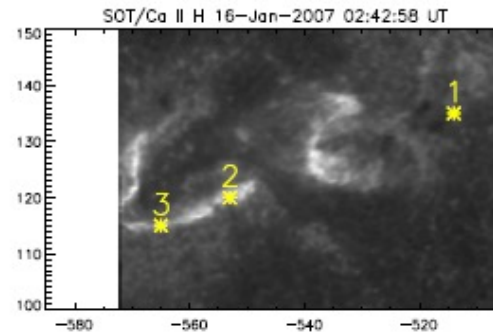
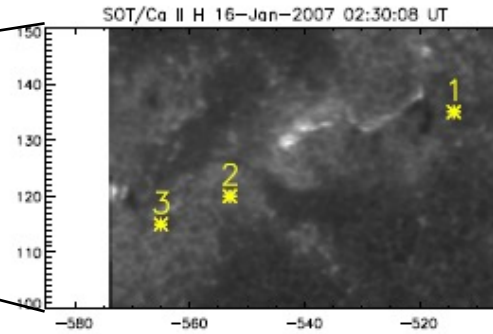
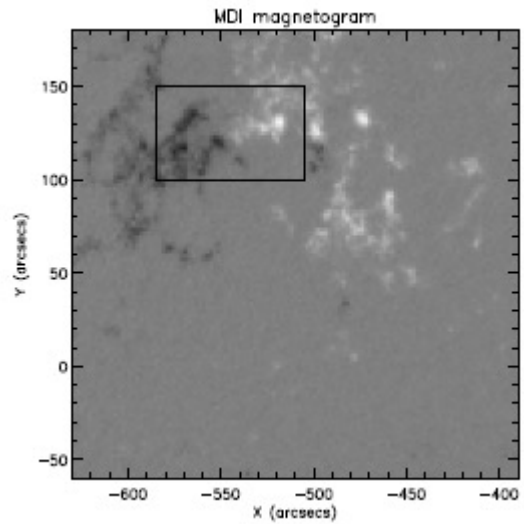
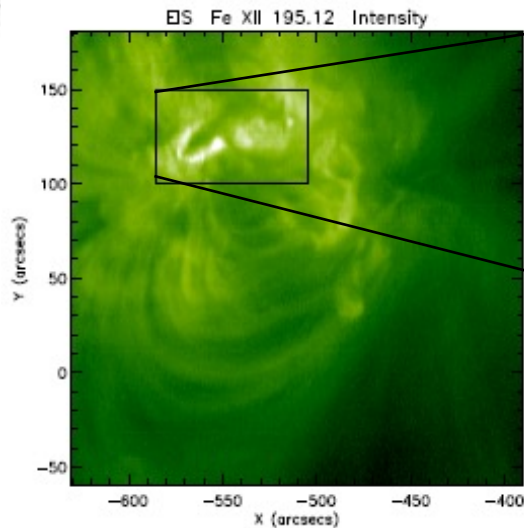
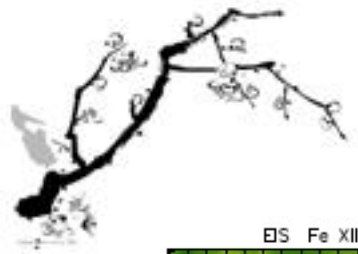
- **Chromospheric evaporation:**
upward mass motions in a flaring process
There may be also some downward motions.
- **Two types:**
explosive evaporation — *downflows & upflows*
gentle evaporation — *only upflows*
- **Problems:**
dominant stationary components;
high temperature downflows;
driving mechanisms;

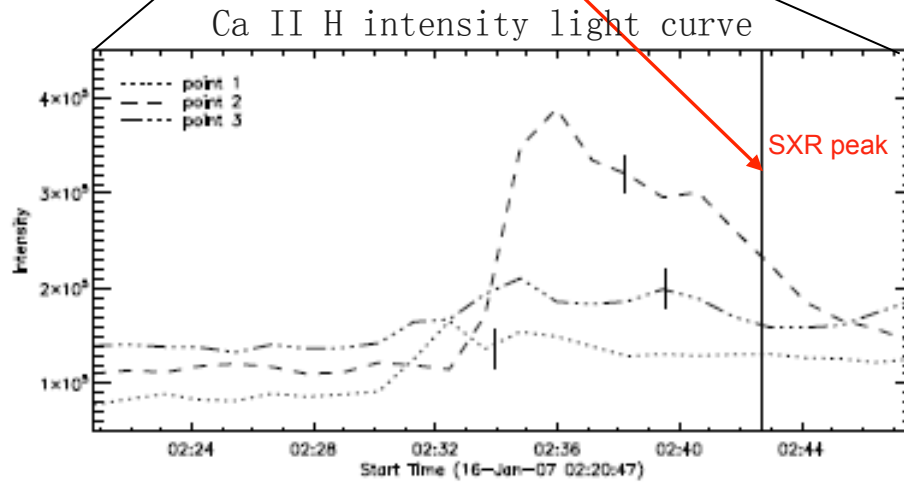
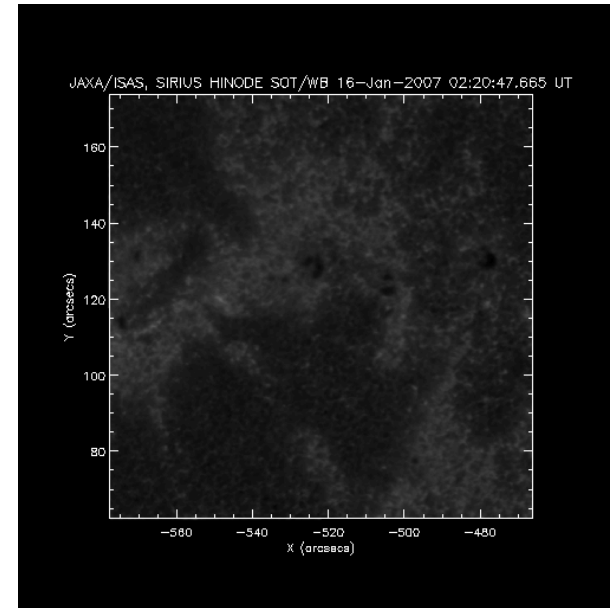
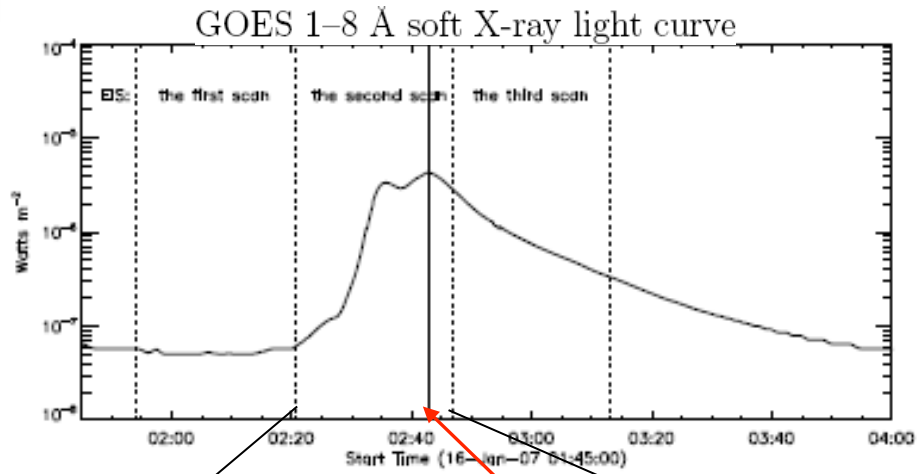


From Hudson cartoon website

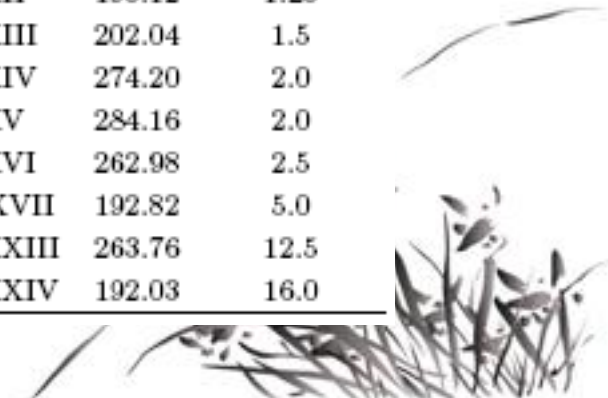


Observations

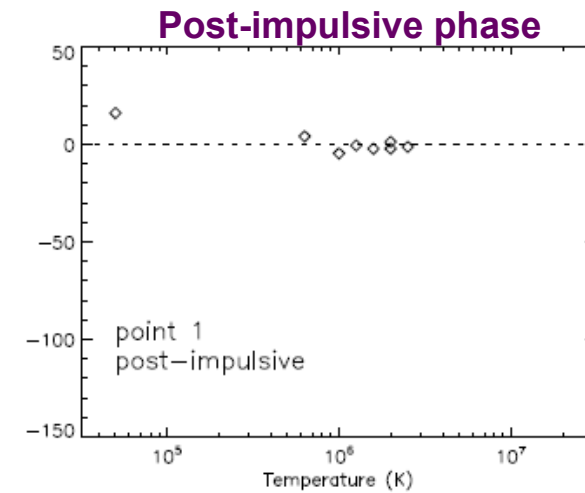
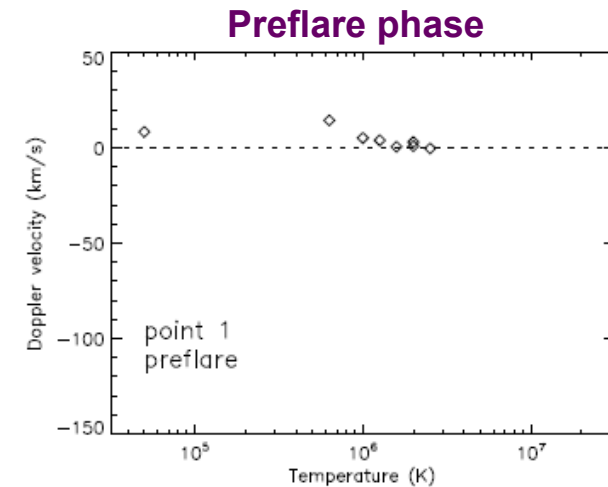
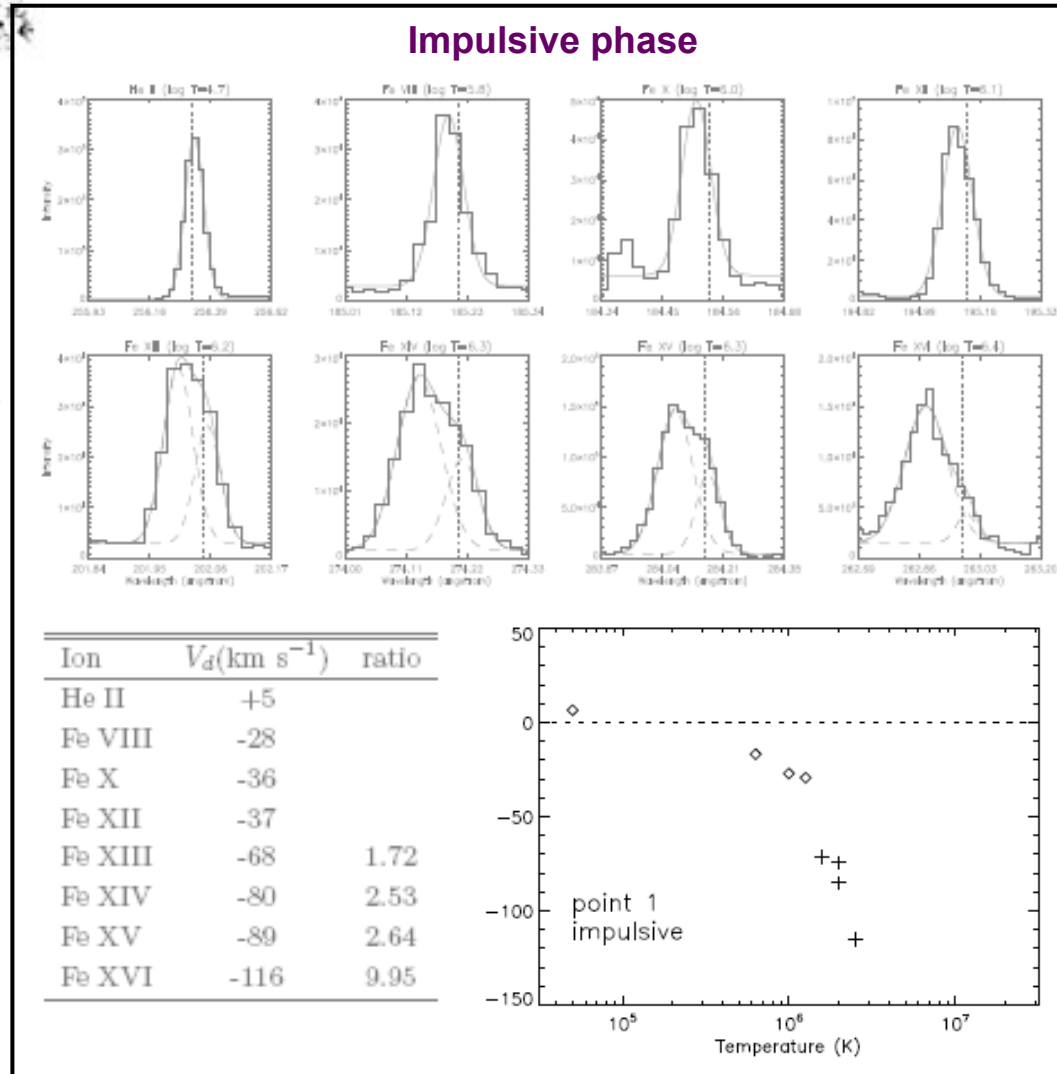




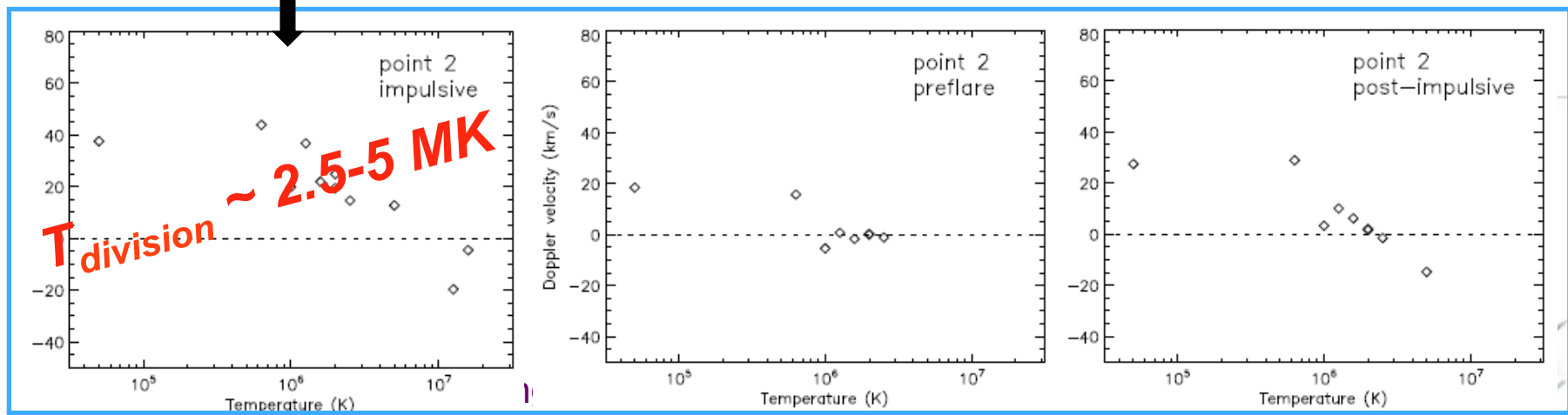
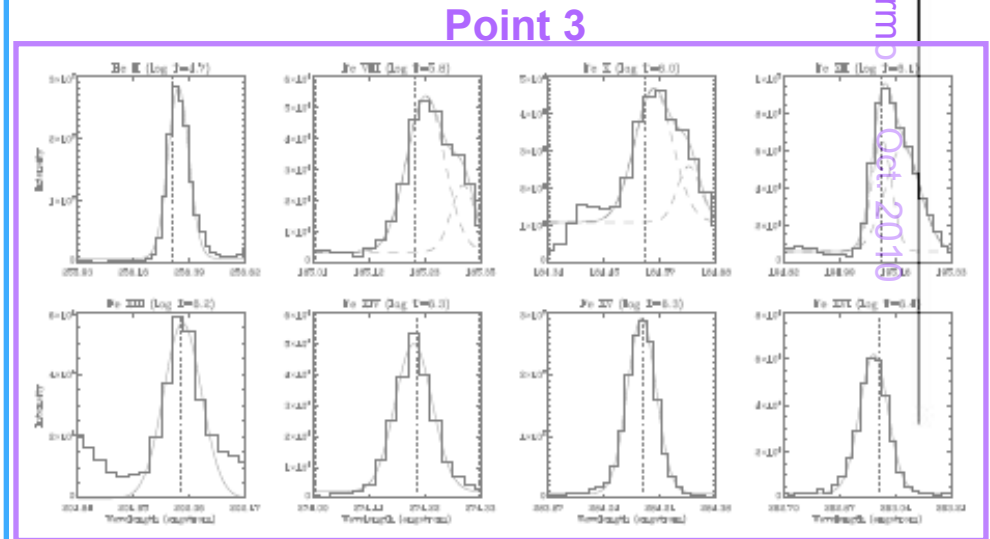
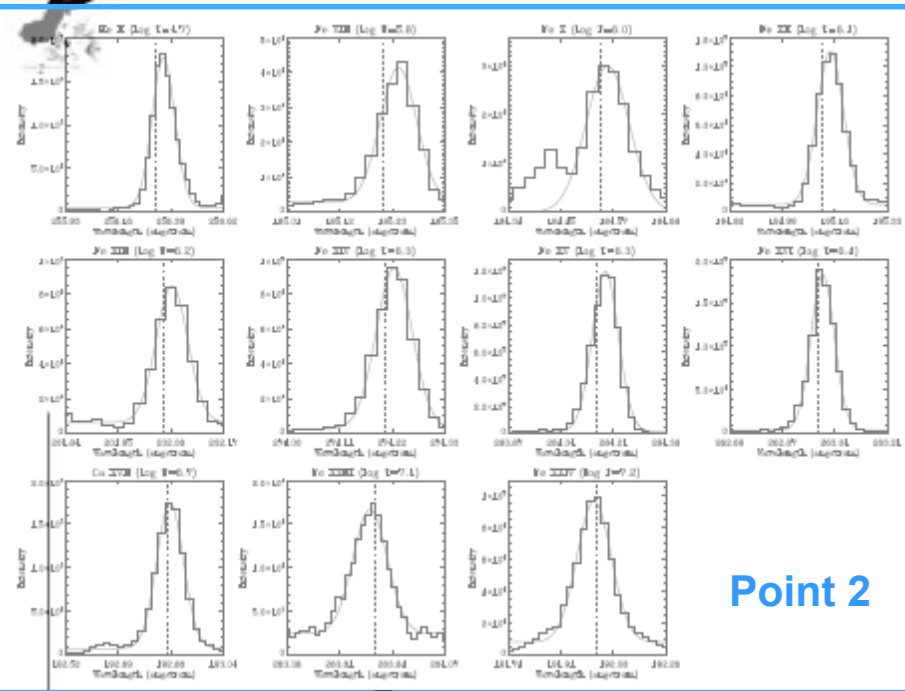
Ion	$\lambda(\text{\AA})$	T_{max} (MK)
He II	256.32	0.05
Fe VIII	185.21	0.6
Fe X	184.54	1.0
Fe XII	195.12	1.25
Fe XIII	202.04	1.5
Fe XIV	274.20	2.0
Fe XV	284.16	2.0
Fe XVI	262.98	2.5
Ca XVII	192.82	5.0
Fe XXIII	263.76	12.5
Fe XXIV	192.03	16.0



Results --point 1 in the positive magnetic polarity



Results --point 2&3 in the negative magnetic polarity





Results --summary

- (1) The flare ribbons with different magnetic polarities can show **different patterns of upflows or downflows** in the impulsive phase of the flare;
- (2) The line profiles at one point of positive magnetic polarity are mostly blue shifted, with **the blue-shifted component dominating over the stationary one** for especially hotter lines;
- (3) **Downflows** are detected at the points of negative magnetic polarity in lines of **relatively high temperatures** (up to 2.5–5.0 MK);
- (4) There exist **multi-velocity components** in some lines, either cooler or hotter, depending on the points in the flaring regions.



Discussion

- Point 1: gentle evaporation
The dominance of blue-shifted components in the line profiles is well consistent with the prediction of theoretical dynamic models (Fisher et al. 1985a,b,c).
- Point 2: explosive evaporation
High temperature downflows:
 - * rather high energy deposition site
 - * warm rain
- The three points are located in different magnetic polarity regions. The heating mechanisms and atmospheric conditions may vary from point to point.





Thanks for your attention!

Thank the meeting organizers!

