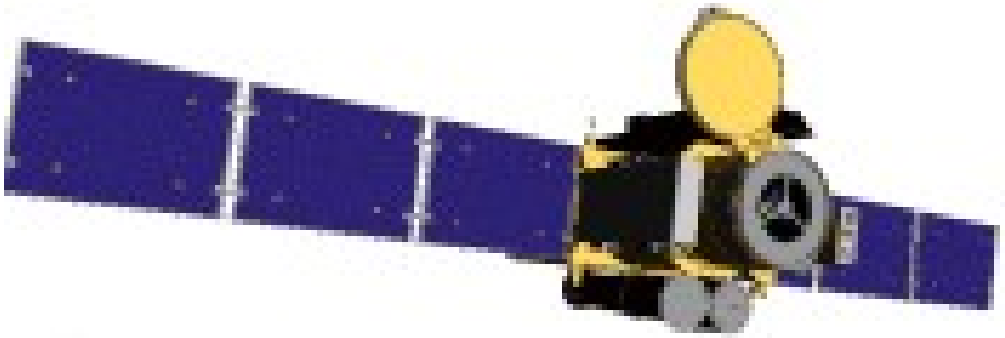


Hinode observations of an active region jet

Cristina Chifor (DAMTP, Univ. of Cambridge, UK)

P. R. Young (STFC RAL)
H. Isobe (Univ. of Tokyo)
H. E. Mason (DAMTP, Univ. of Cambridge)
D. Tripathi (DAMTP, Univ. of Cambridge)
I. G. Hannah (SSL UCL, Berkeley)
G. Del Zanna (MSSL)
H. Hara (NAOJ)
S. Krucker (SSL UCL, Berkeley)
T. Yokoyama (Univ. Tokyo)

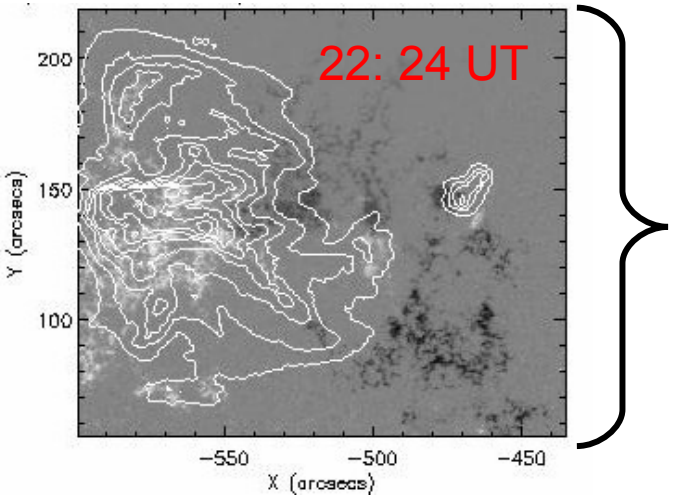
Also thanks to: K. Ichimoto & Y. Katsukawa (NAOJ)

XRT observed an AR recurrent jet

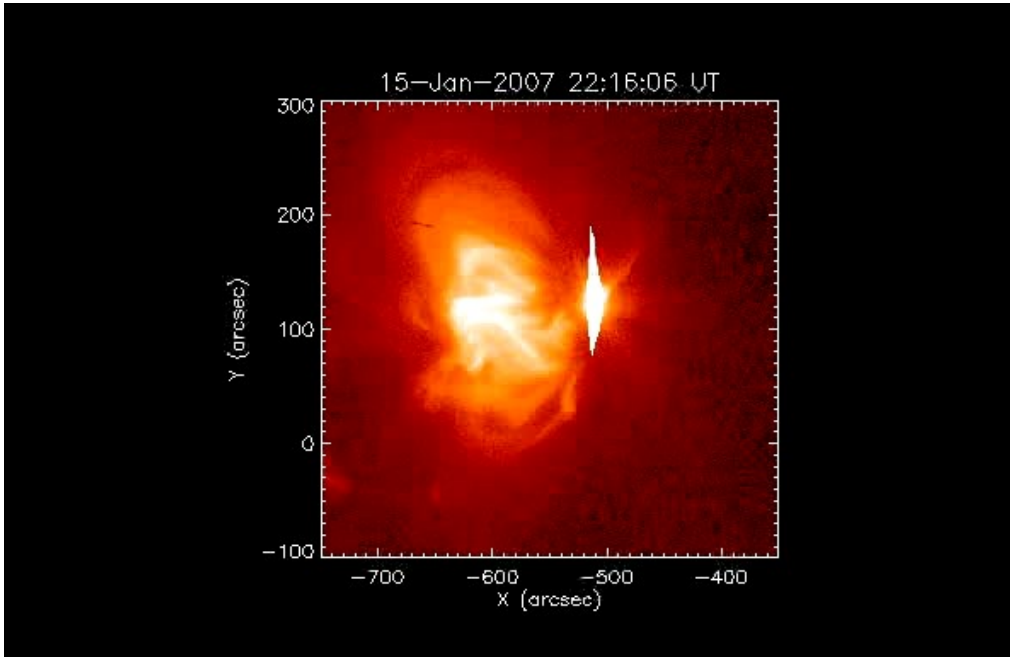
2007 Jan. 15 22:06 –Jan 16. 02:12 UT
West of NOAA AR 10938

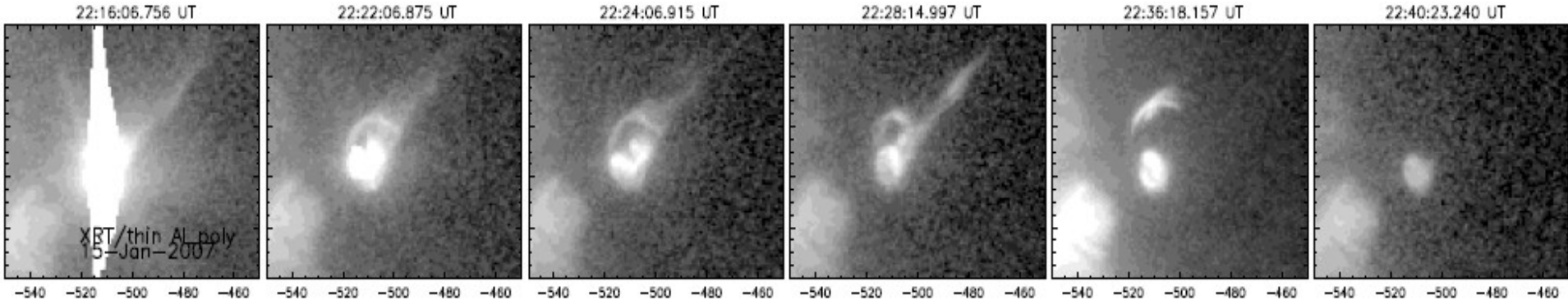
XRT ‘Thin Al_poly’ (2-10 MK)

1 min cadence, 2”/ pixel

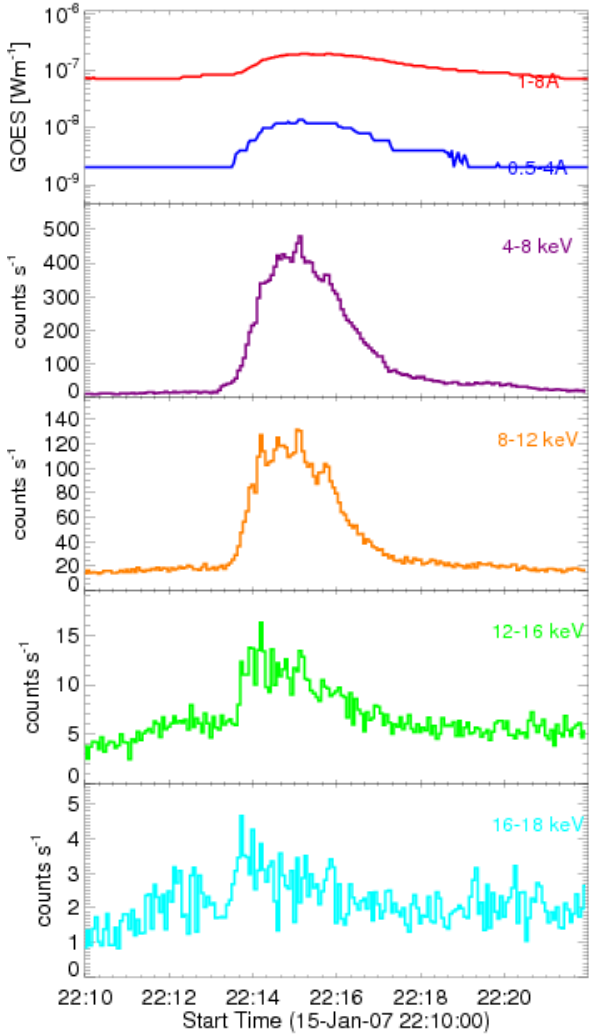


XRT overlay on SOT FG Stokes V





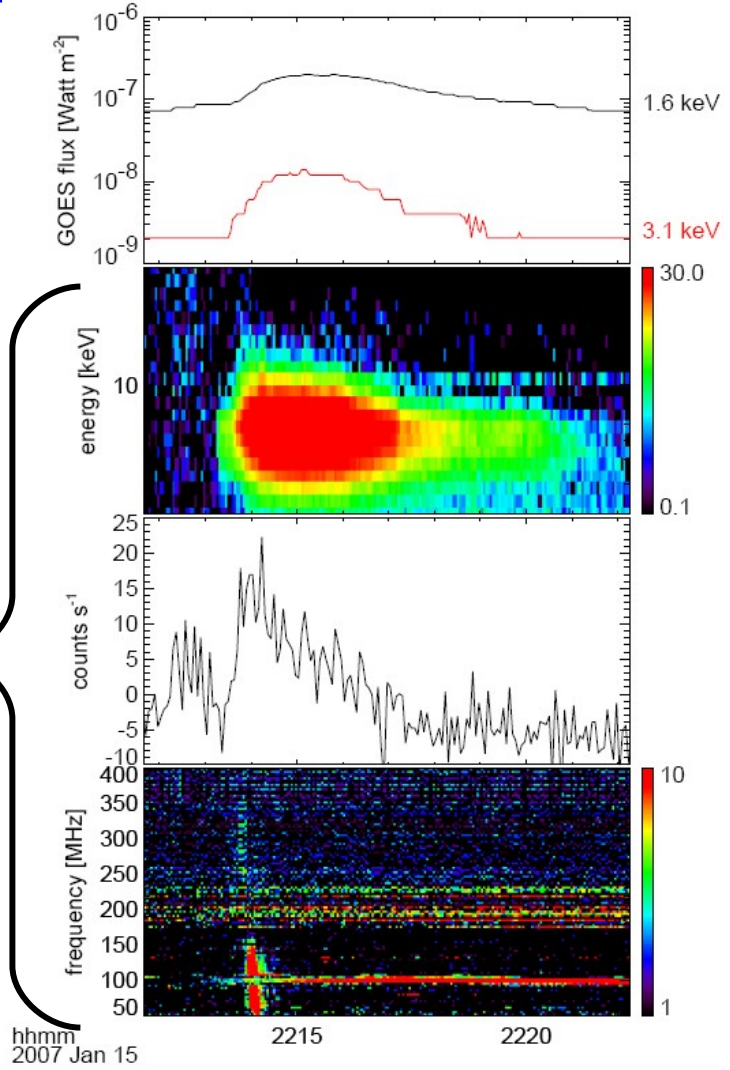
X-ray jet/microflare /type III bursts association



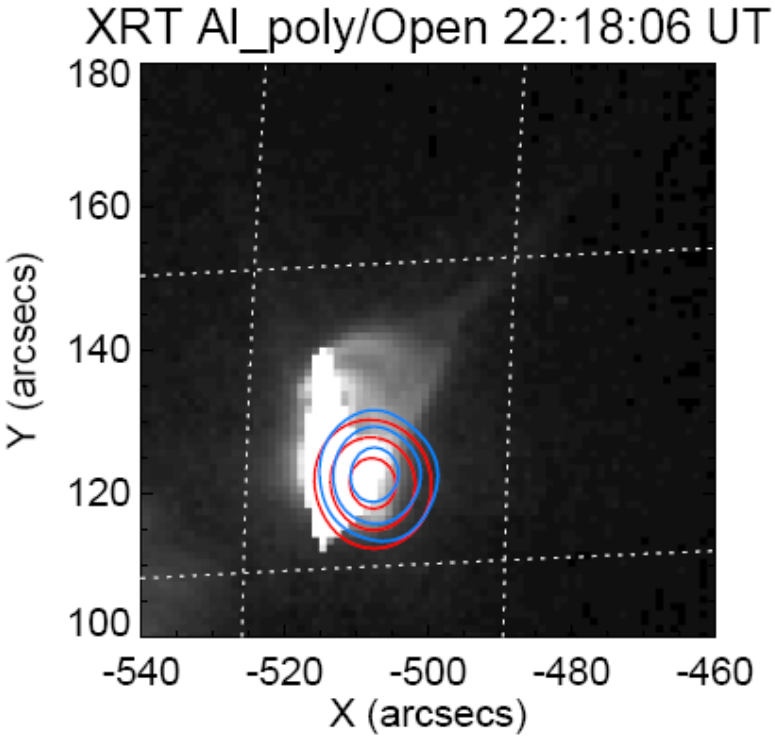
GOES B1.9 microflare

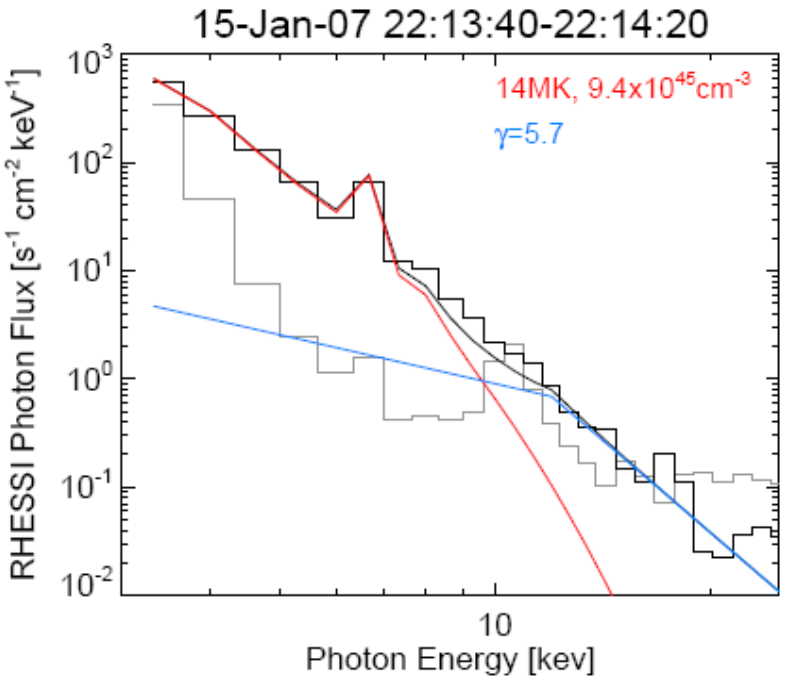
RHESSI

Wind radio spectrometer



RHESSI observed the microflare associated with the jet



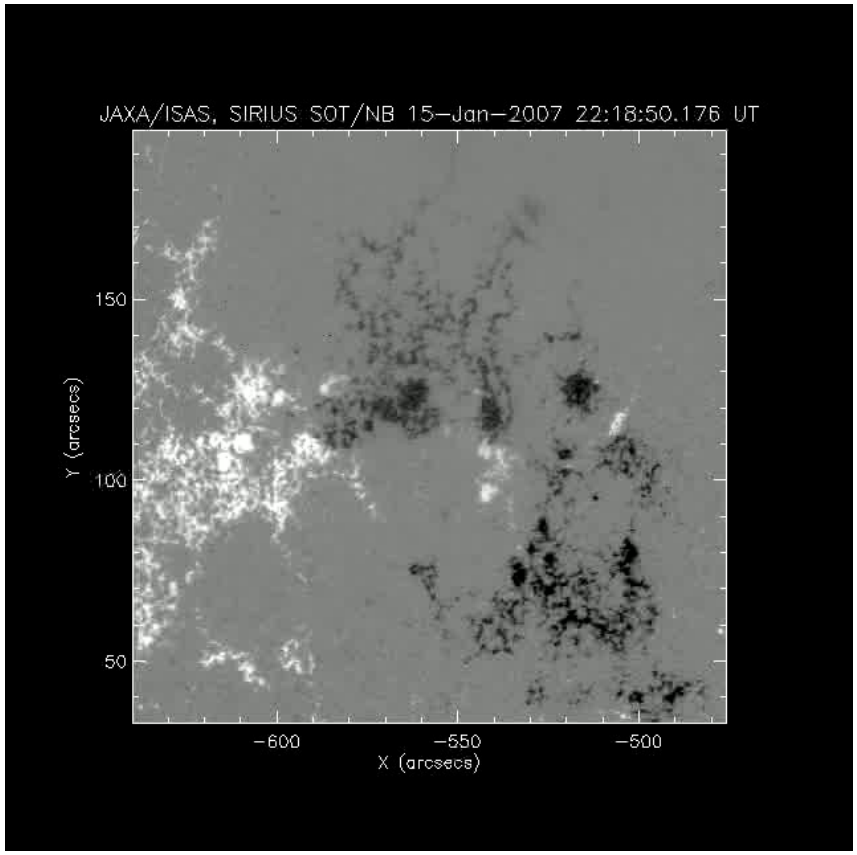


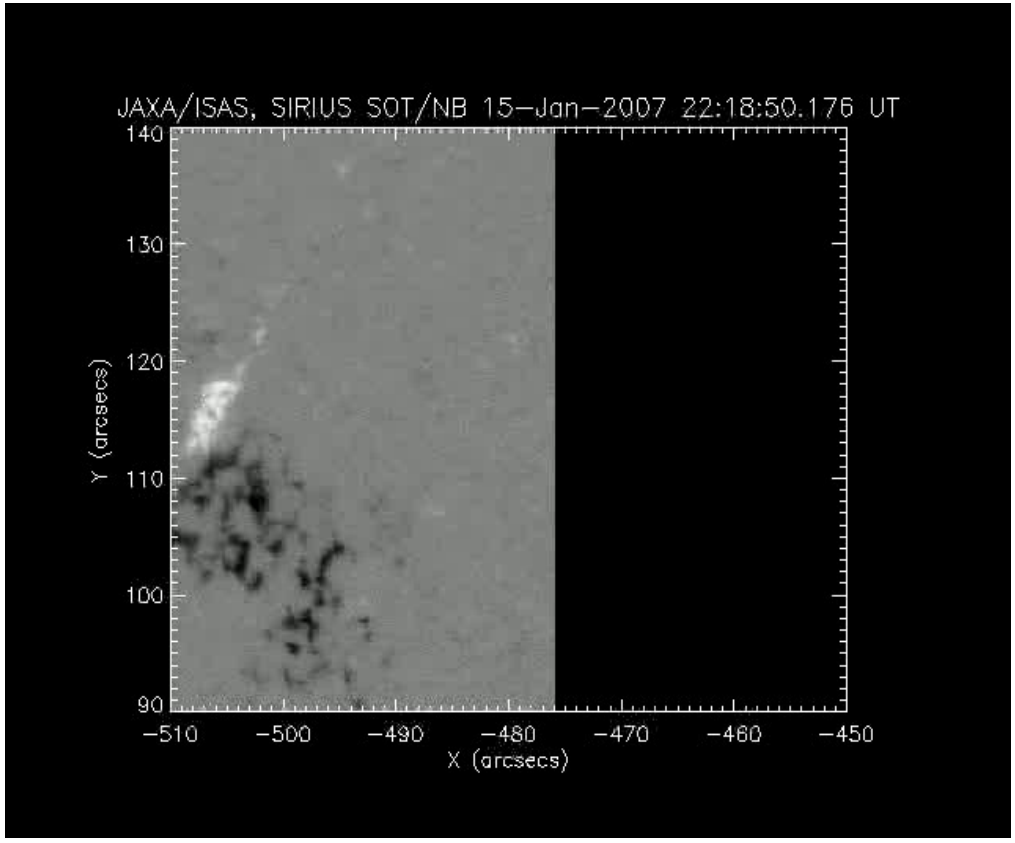
RHESSI (CLEAN)
4-8 keV and **12-16 keV** emission at the footpoint (?) of the cusp-shaped feature observed in XRT.

Little non-thermal emission from spectral analysis
BUT the associated type III burst gives supporting evidence.

Magnetic field evolution in SOT (NFI) images

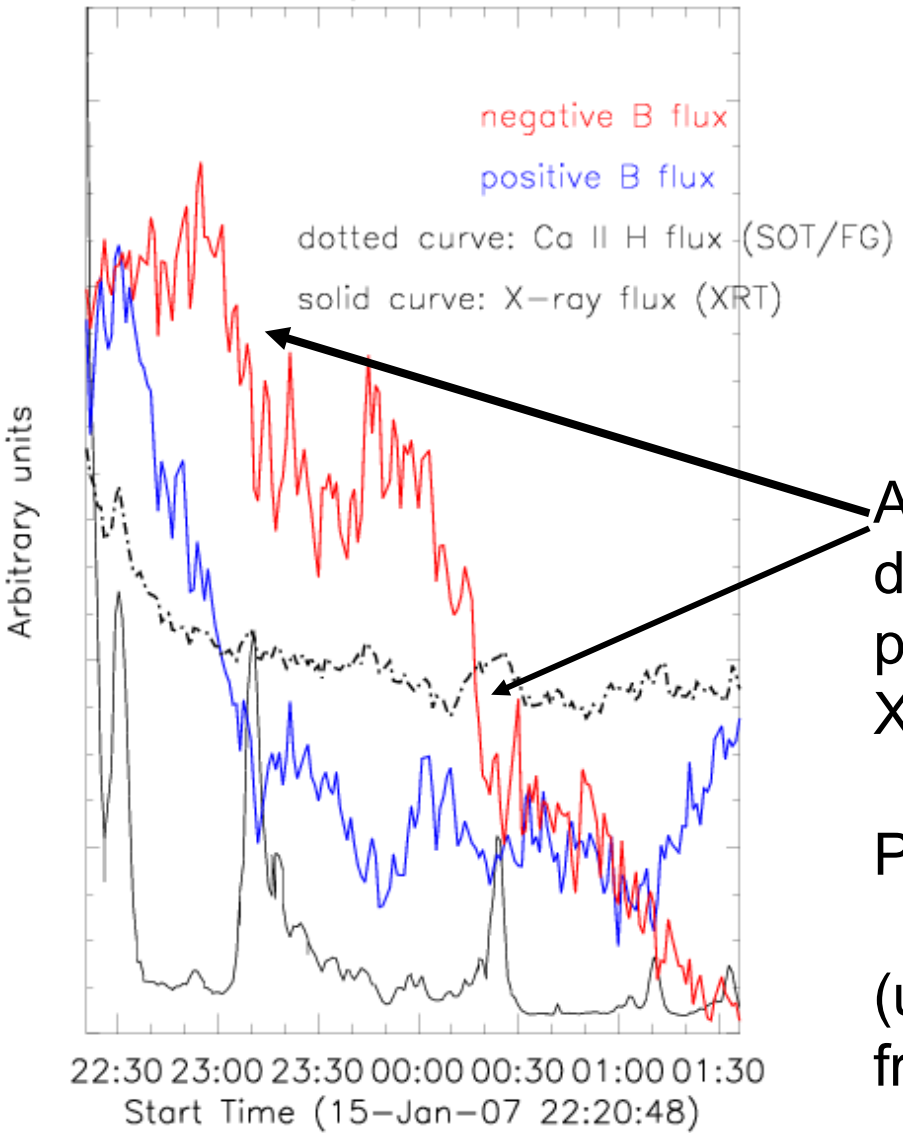
Fe 6302 Stokes V **1 min cadence; 0.16”/pixel**



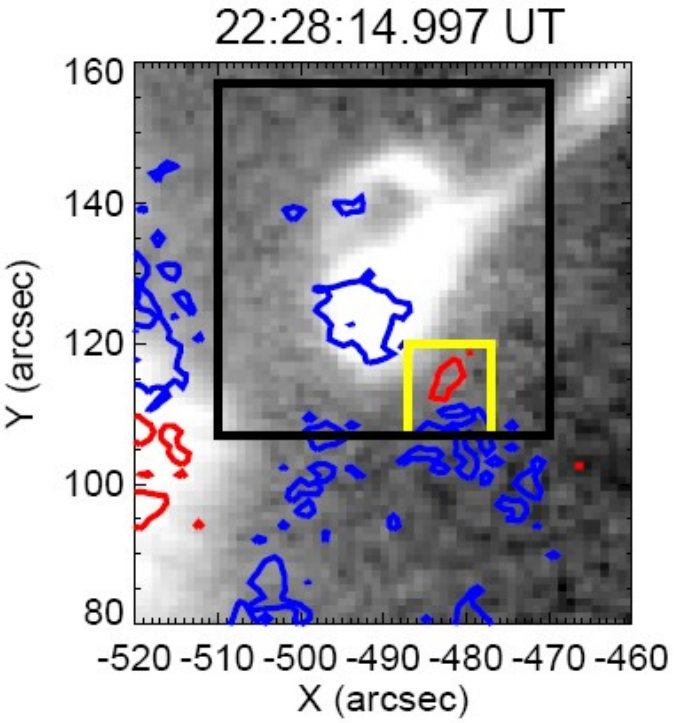


Negative polarity (white) decreases, then dissapears !

Correlation: cancelling B flux, the X-ray jet emission, and Ca II H brightenings

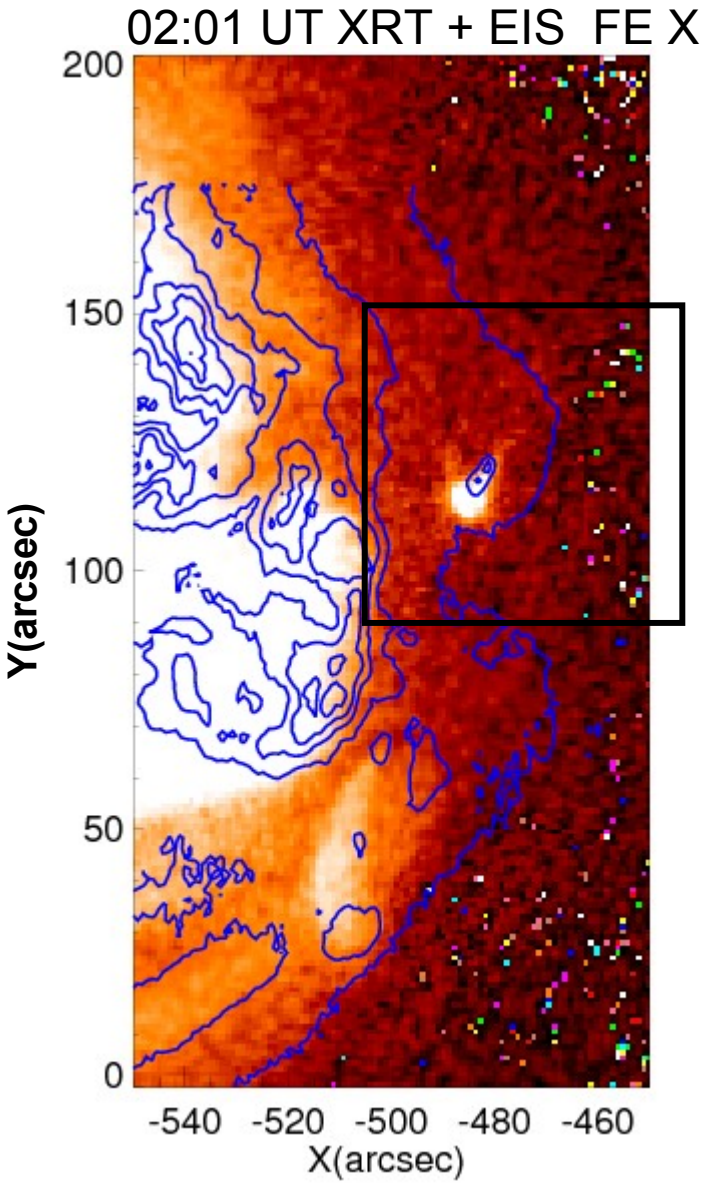


Abrupt B decrease prior to each X-ray jet



Preliminary result:
~2 x 10^{19} (Mx) drop in B flux
(using SOT NIS calibration from Chae et al. 2007, PASJ)

EIS observes a late instance of the jet

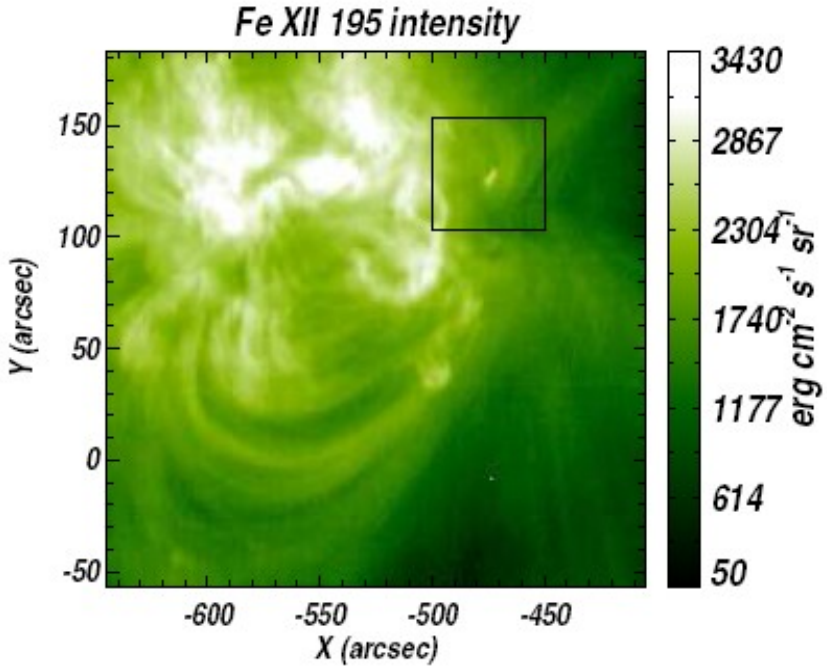


'HH_AR+FLR_RAS_N01(J)'

Raster times: 01:54 – 02:20 UT

1" slit, and 5s exposures

240" x 240" area



Jet Doppler-shifts and density

Instrumental corrections:

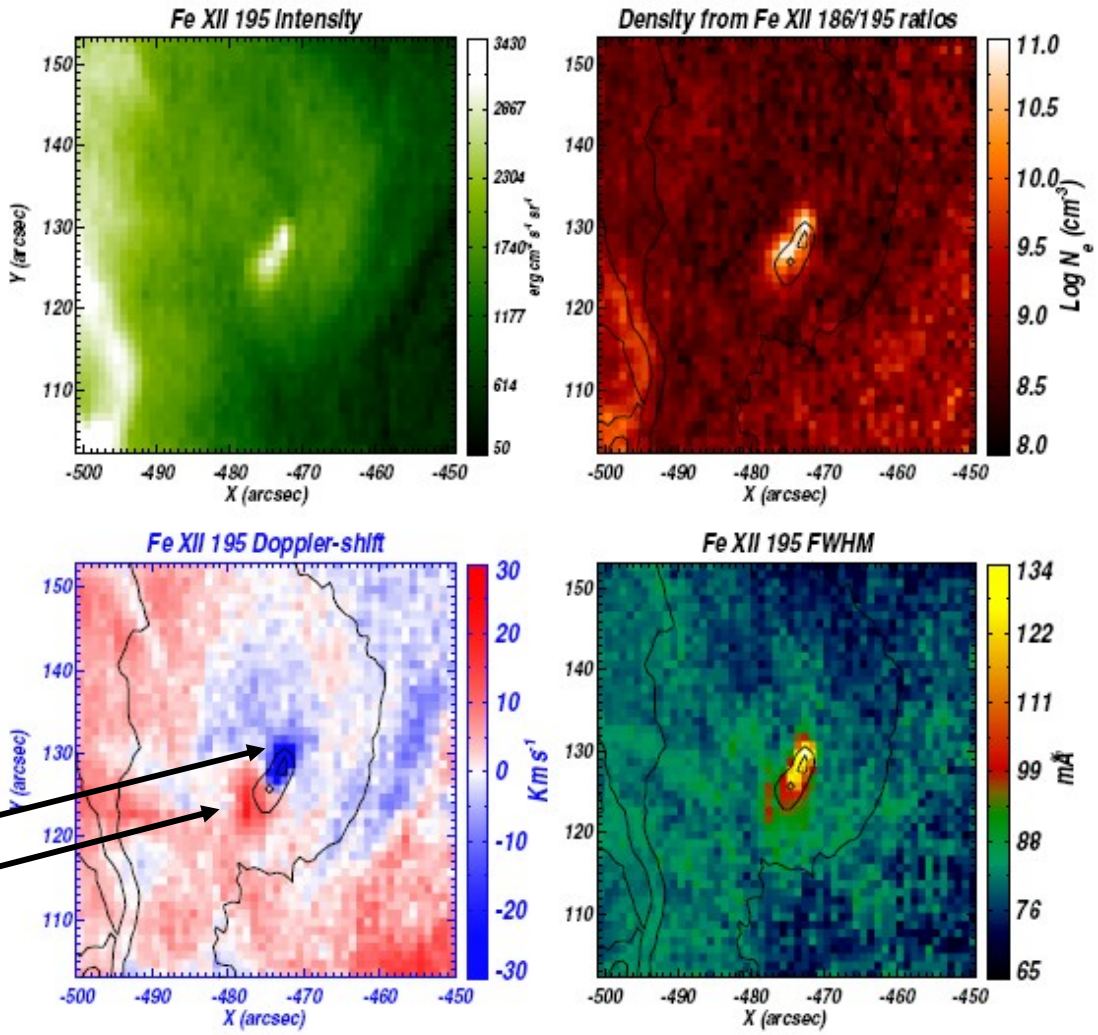
- EIS slit tilt
- Orbital variation

(using quieter raster region)

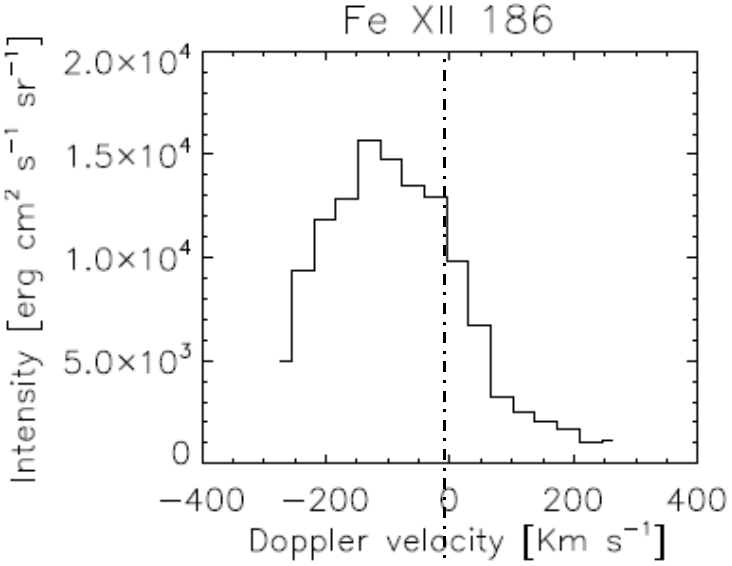
Reference wvl. = average in quieter area

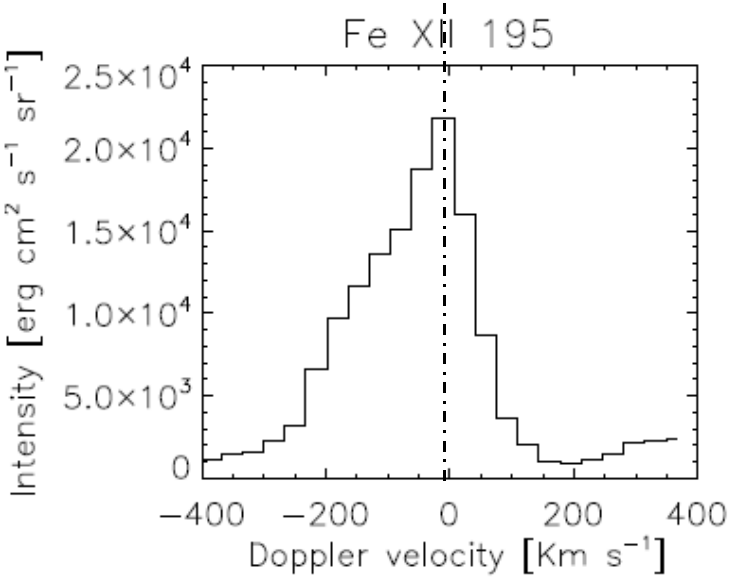
Strong blue-shift

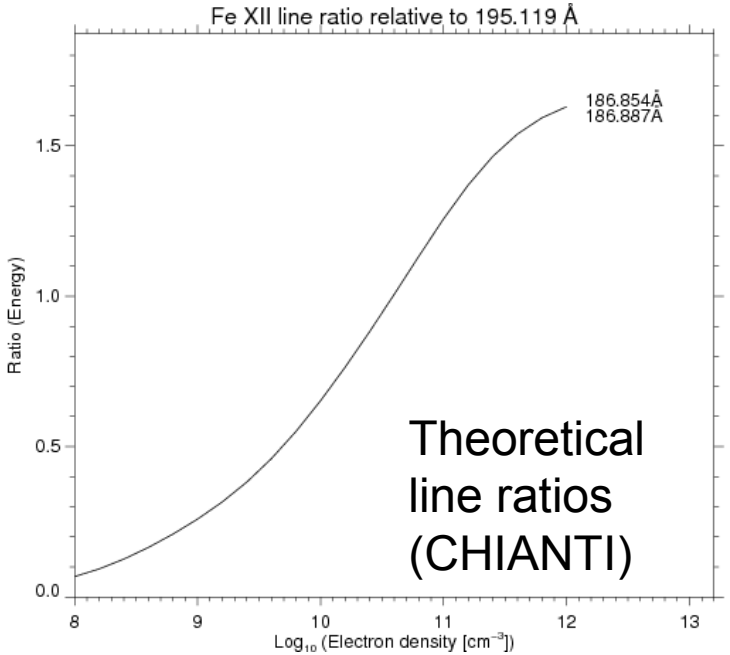
Red-shift at footpoint?



Fe XII 186/195 density diagnostics







Theoretical line ratios (CHIANTI)

Filling factor ~0.03

Using Fe XII 195

Assumptions:

Isothermal plasma (log T =6.1)

Coronal abund. (Feldman et al. 1992)

Summary of results

- Correlation between recurrent (quasi-periodic) B flux cancellation and X-ray jet (Ca II H) emission decreasing in strength with each jet.

- Non-thermal emission during the jet-associated microflare (RHESSI spectral analysis, Wind type III burst).

- A strong blue-shifted component (>150 Km/s) + an indication of a red-shifted component of the jet.

- Log N_e > 11 for the up-flow jet component;

  low filling factor < 0.03.

Conclusions so far…

- Magnetic cancellation associated with the jets + non-thermal emission + ‘gap’ between cancelling positive & negative polarities

=> magnetic reconnection at coronal heights.

- The large density / small filling factor + large Doppler-shift velocities

=> multiple small-scale B reconnection.

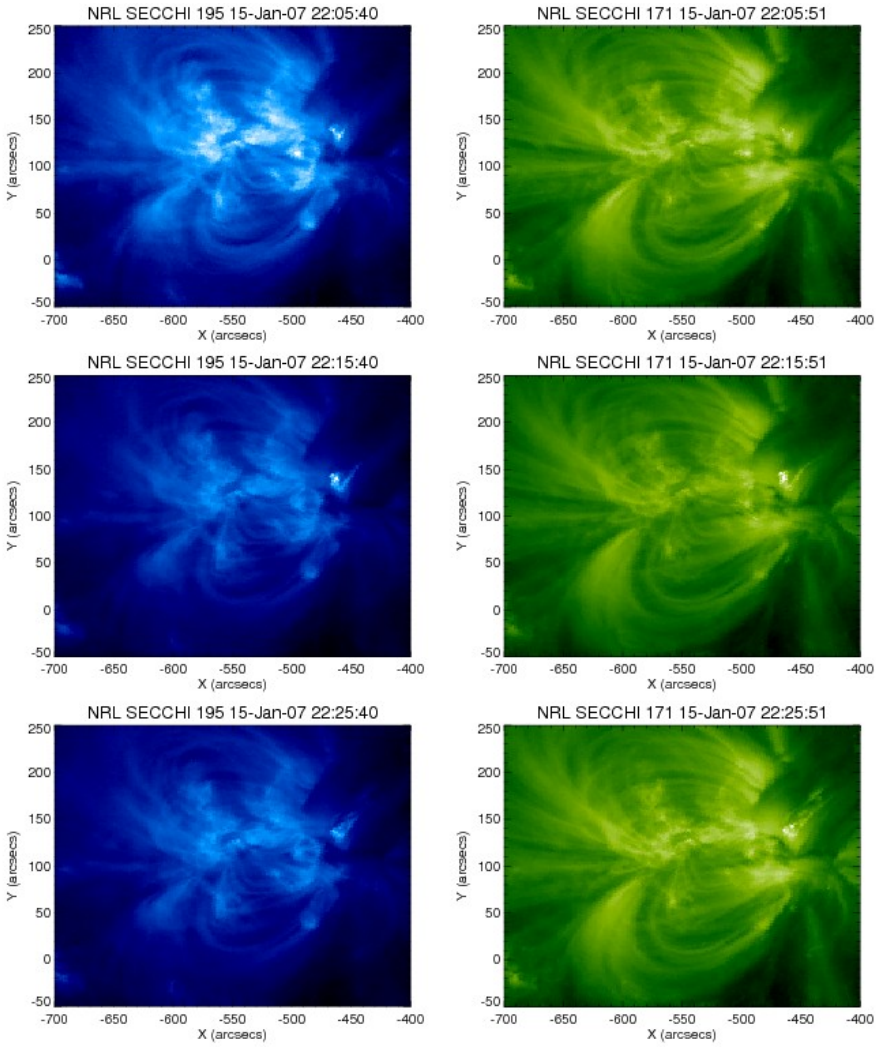
- High-velocity up-flows support an evaporation scenario for the jet acceleration.

Thank you very much !

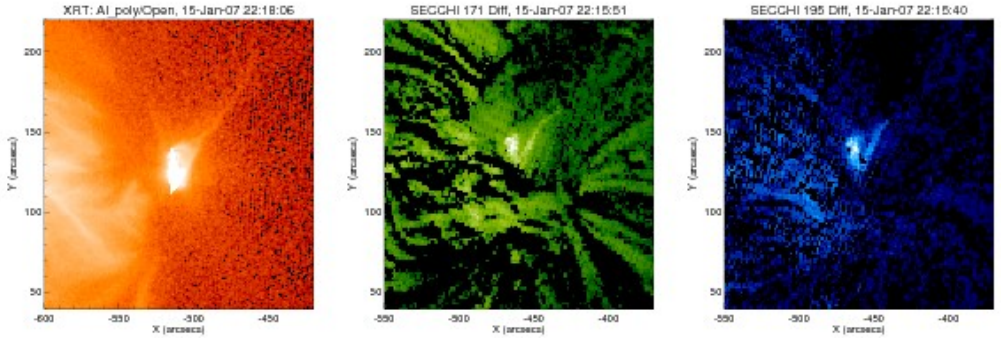
ありがとうございます。

EUV jets in Stereo/SECCHI/EUVI

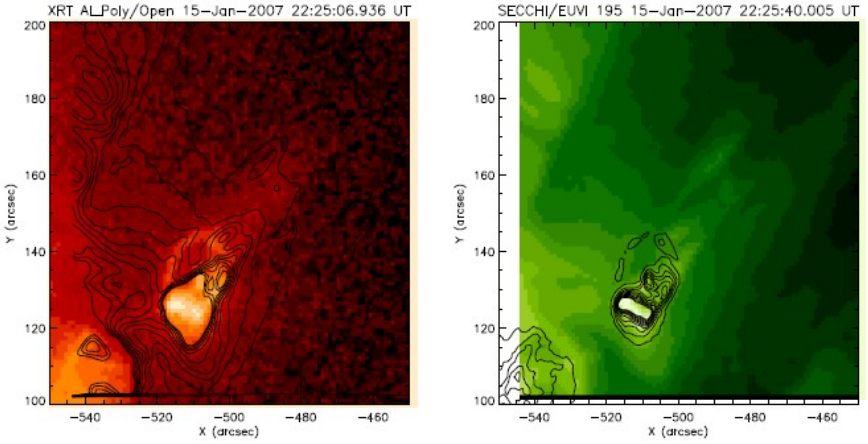
SECCHI Fe XII 195 **SECCHI Fe IX/X 171**



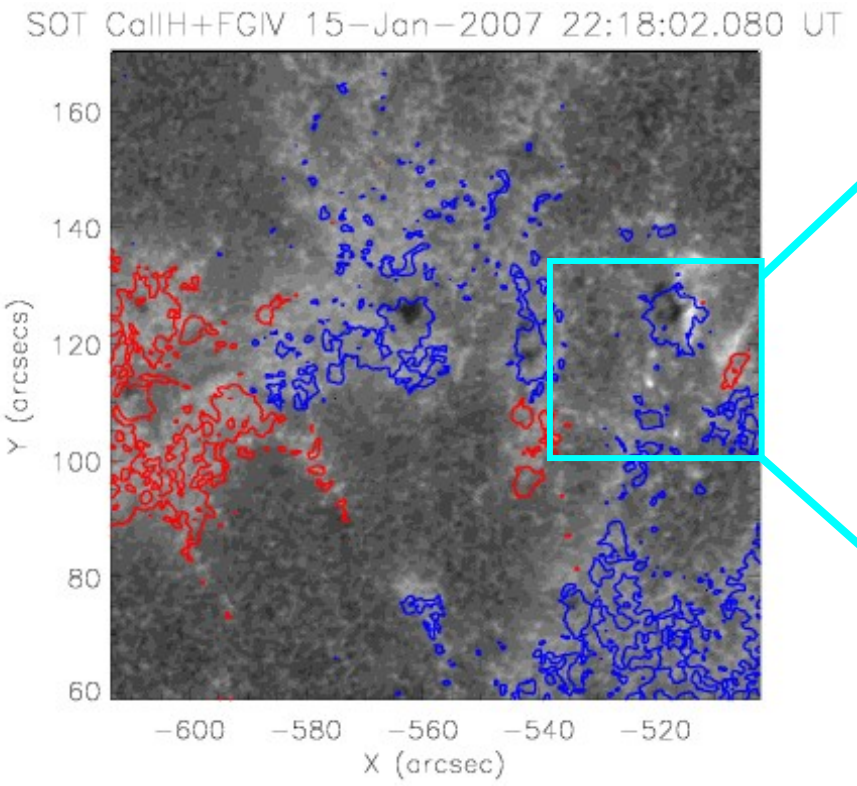
XRT jet + SECCHI EUVI diff. images

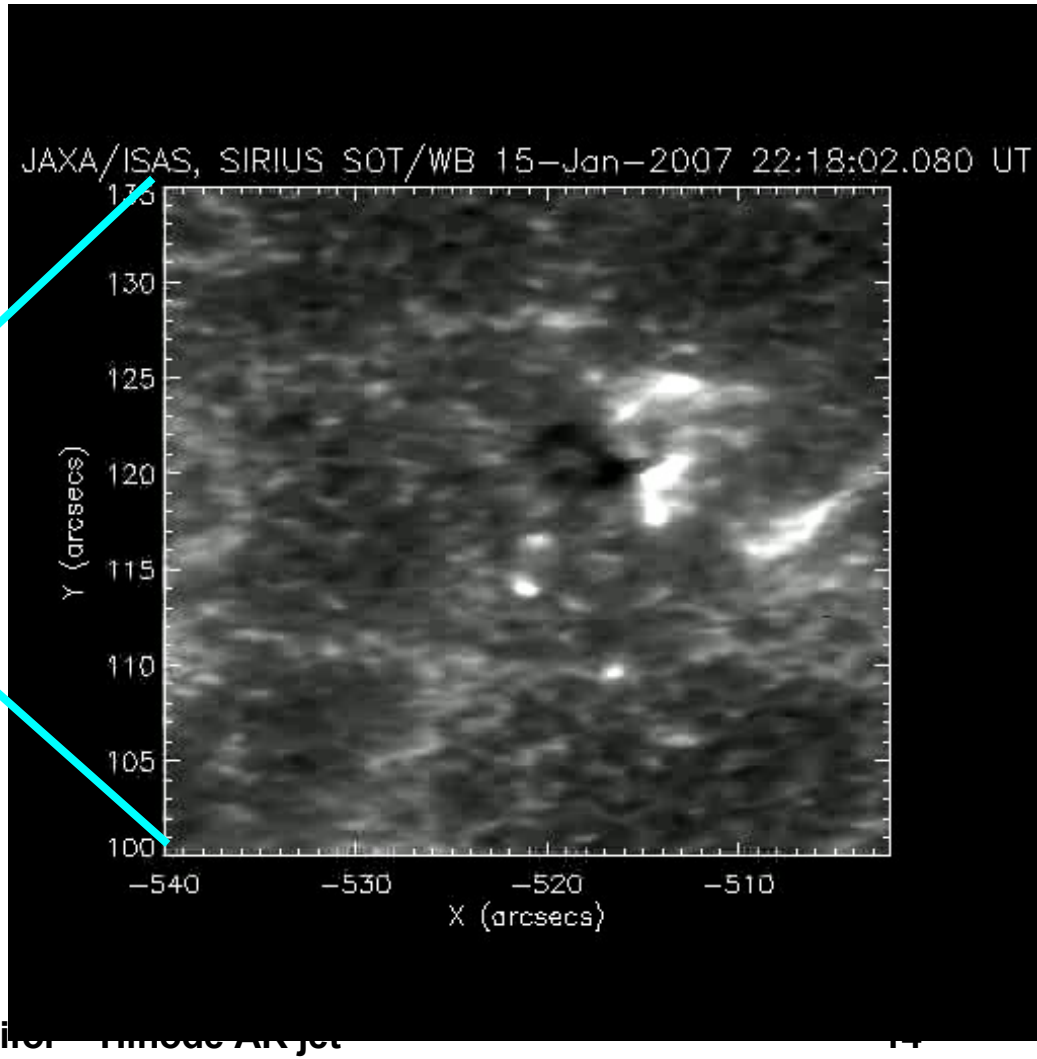


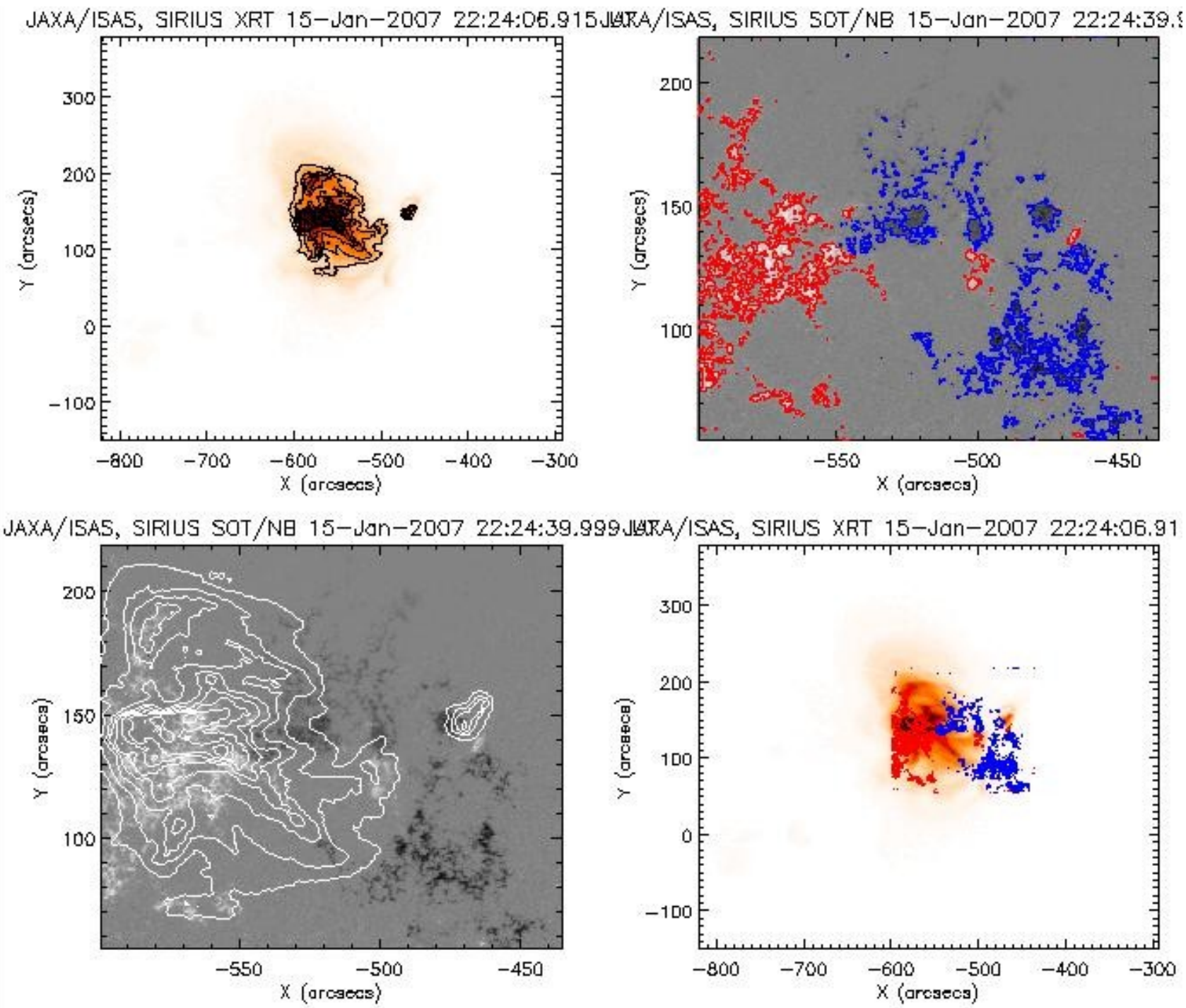
XRT jet vs. SECCHI EUVI 171



Jet evolution in Ca II H SOT (BFI)






JAXA/ISAS, SIRIUS XRT 15-Jan-2007 22:24:06.915
JAXA/ISAS, SIRIUS SOT/NB 15-Jan-2007 22:24:39.9
JAXA/ISAS, SIRIUS SOT/NB 15-Jan-2007 22:24:39.999
JAXA/ISAS, SIRIUS XRT 15-Jan-2007 22:24:06.91
Y (arcsecs)
X (arcsecs)

No