

# Recurrent solar jets

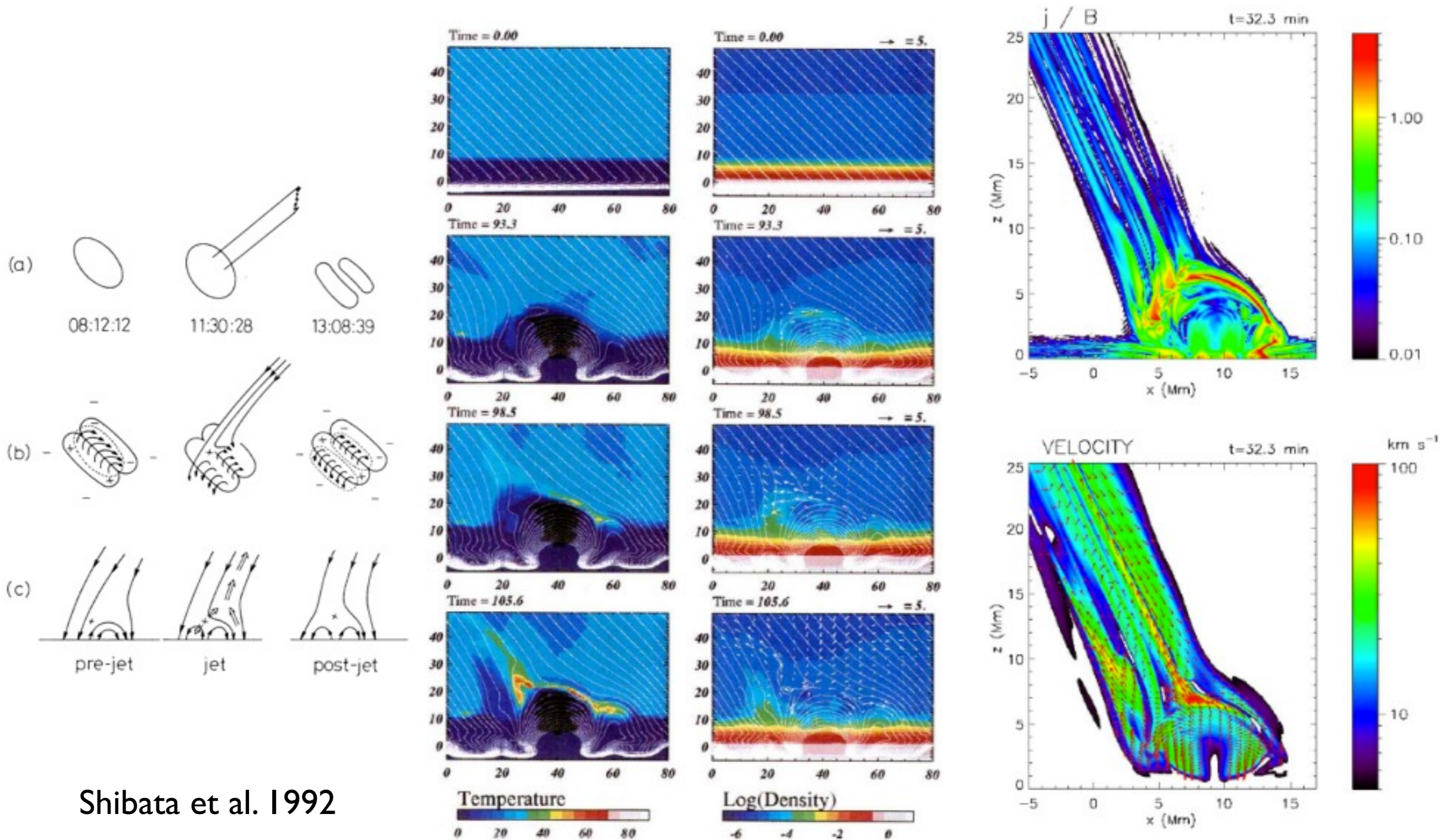


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# Outline

- Triggering mechanism of jets
- Observation of recurrent jets
- Magnetic evolution related to jets

# Triggering mechanism of jets---new flux emergence

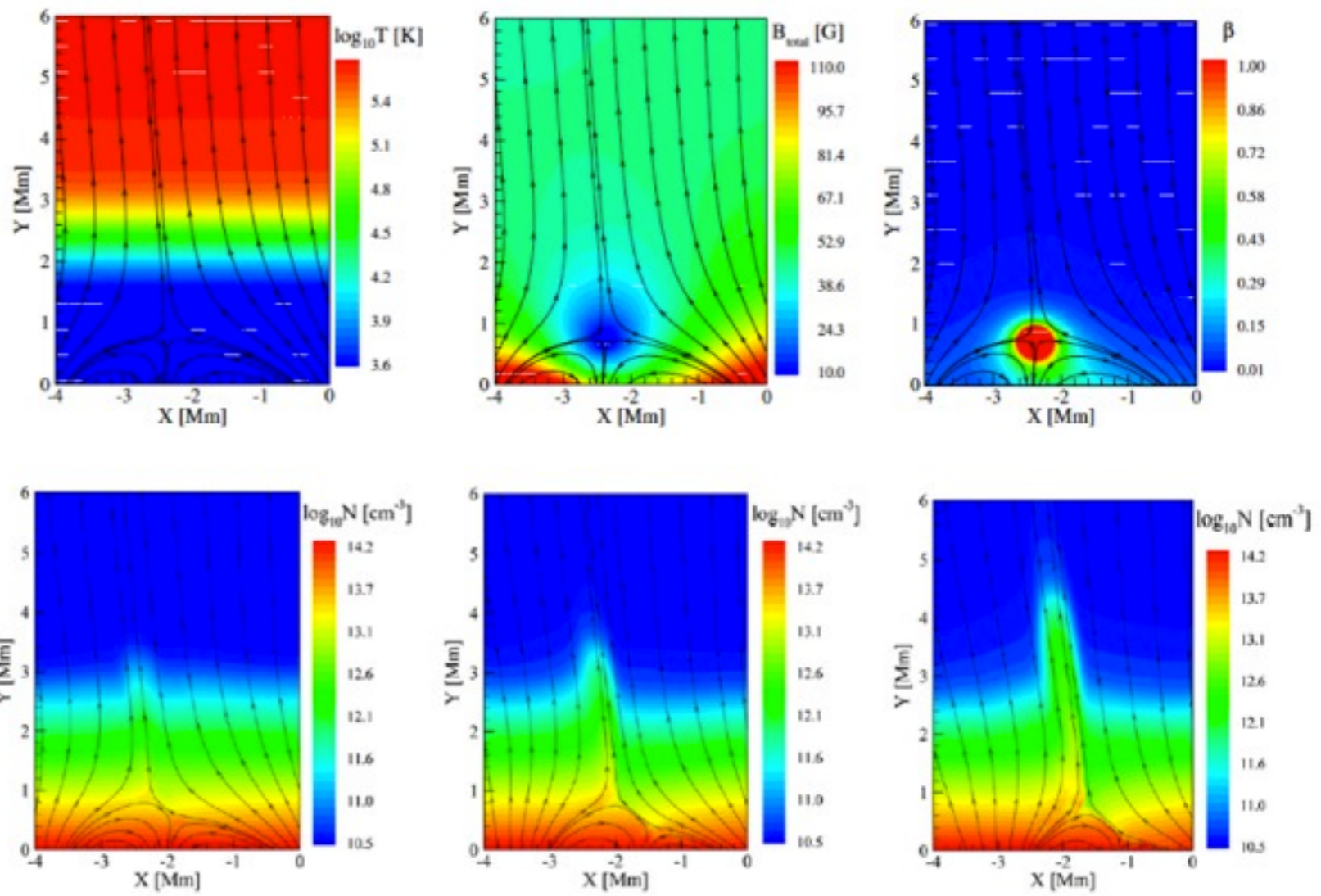
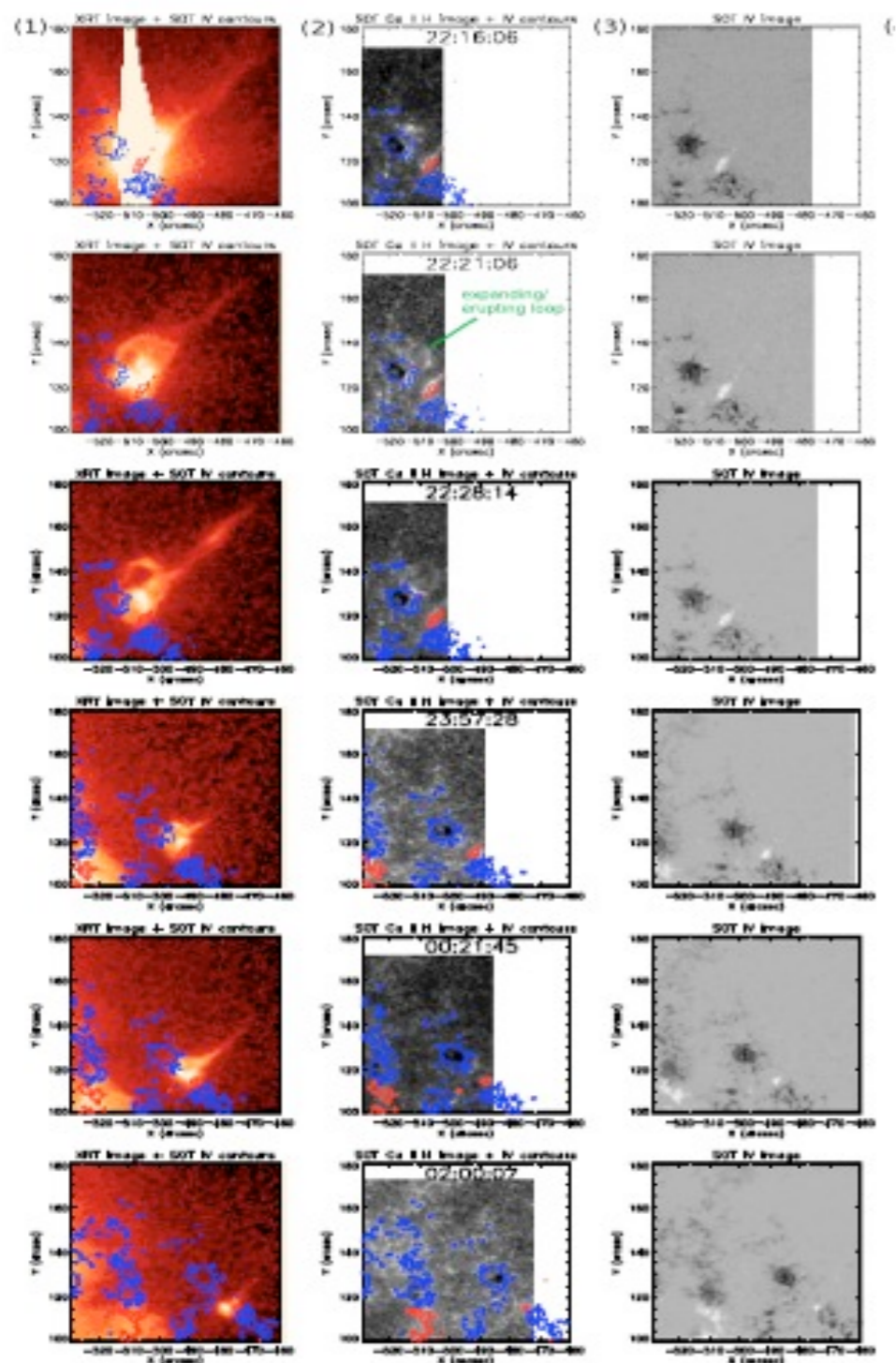


Shibata et al. 1992

Yokoyama & Shibata 1995

Moreno-Insertis & Galsgaard 2013

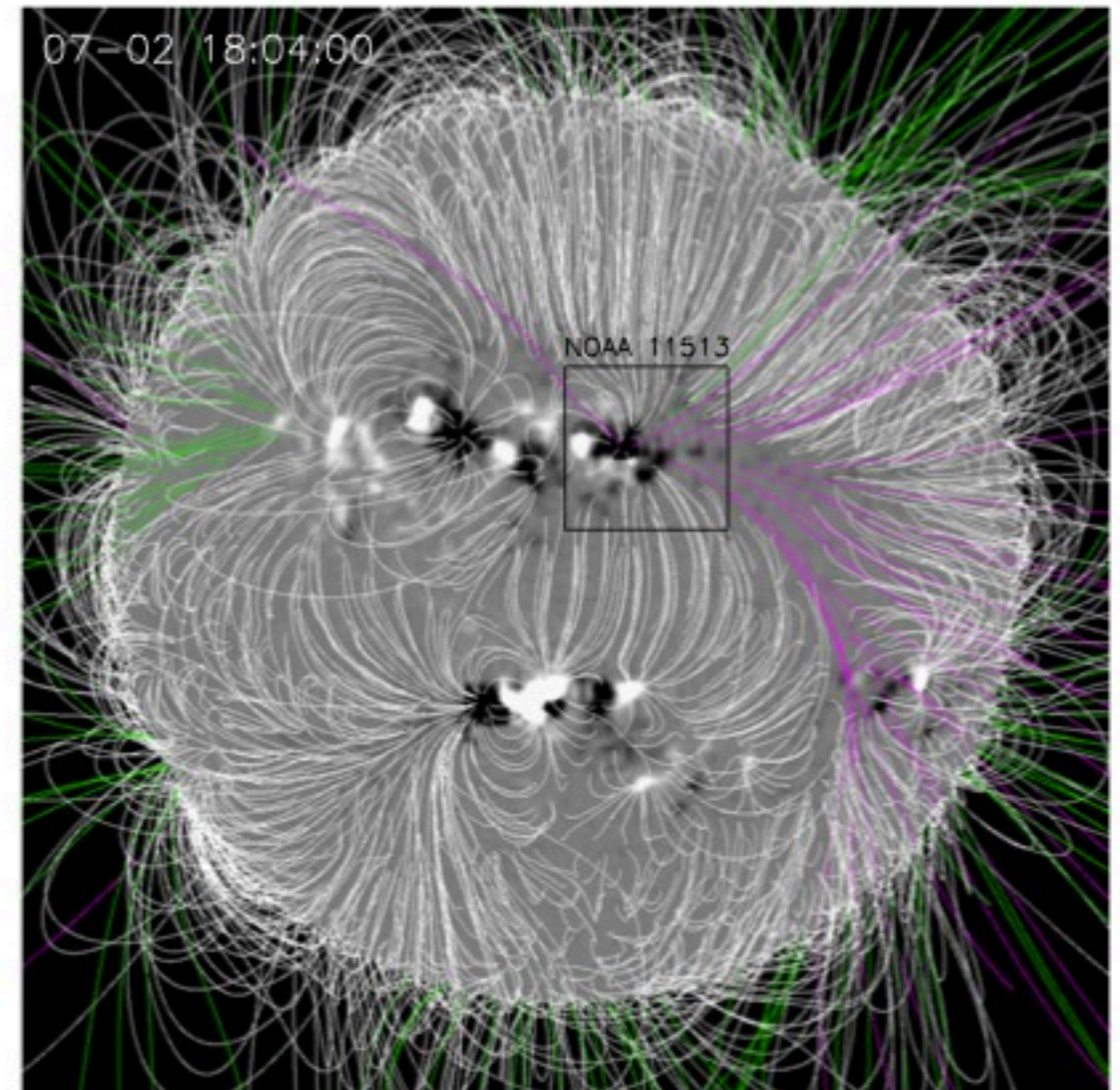
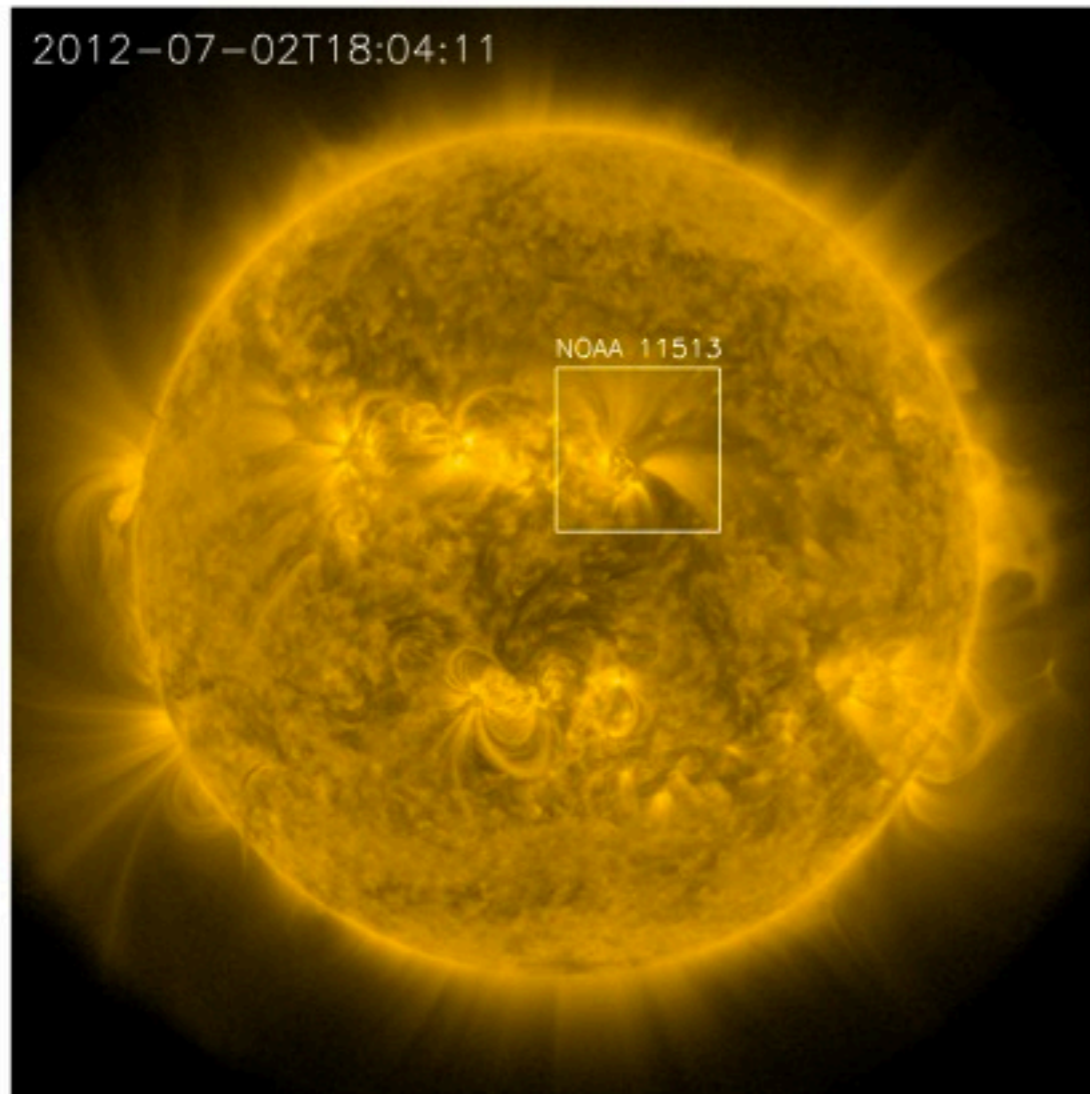
# Triggering mechanism of jets---magnetic cancellation



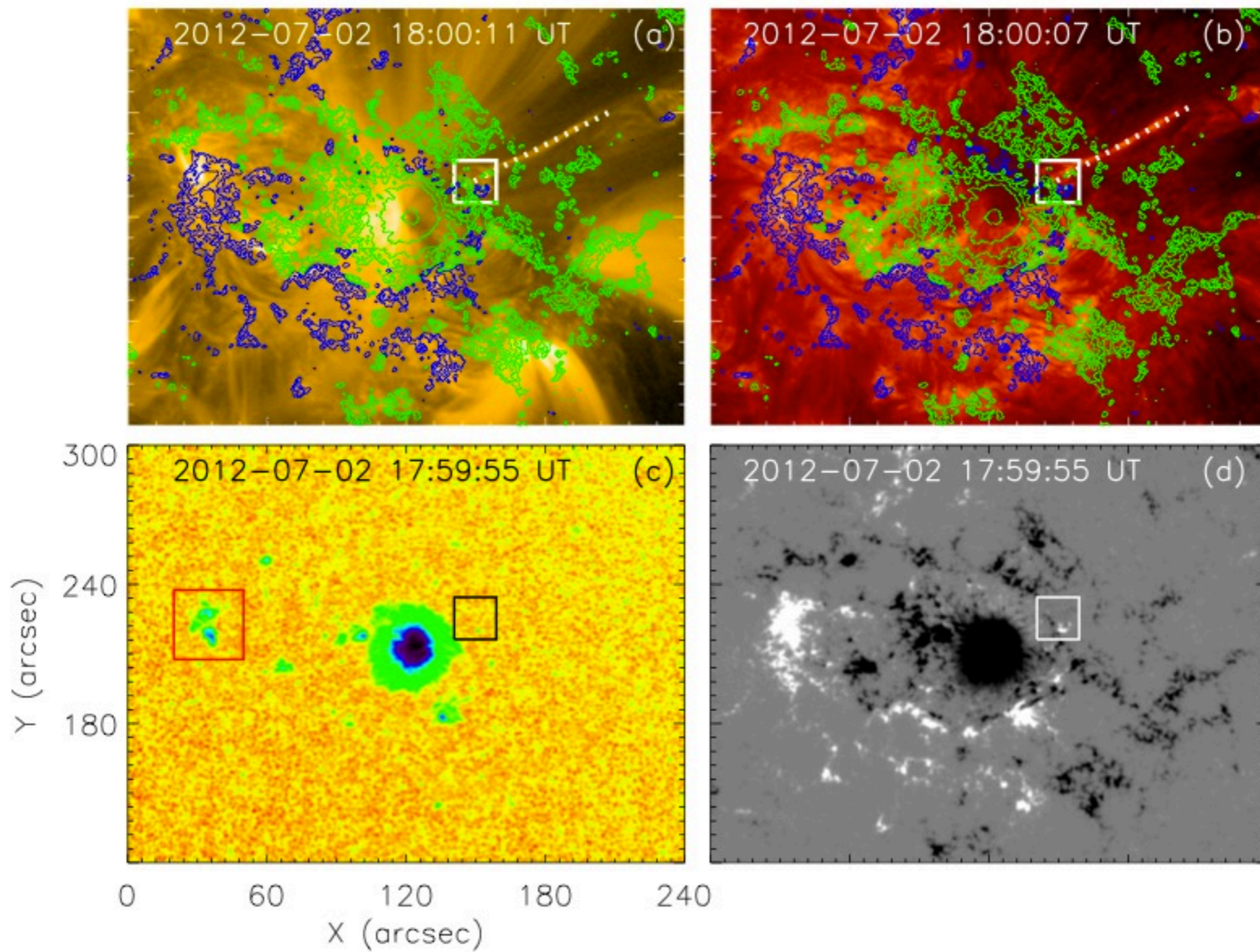
Chifor et al. 2008,2009

Yang et al. 2013

# Recurrent solar jets induced by a satellite spot and moving magnetic features

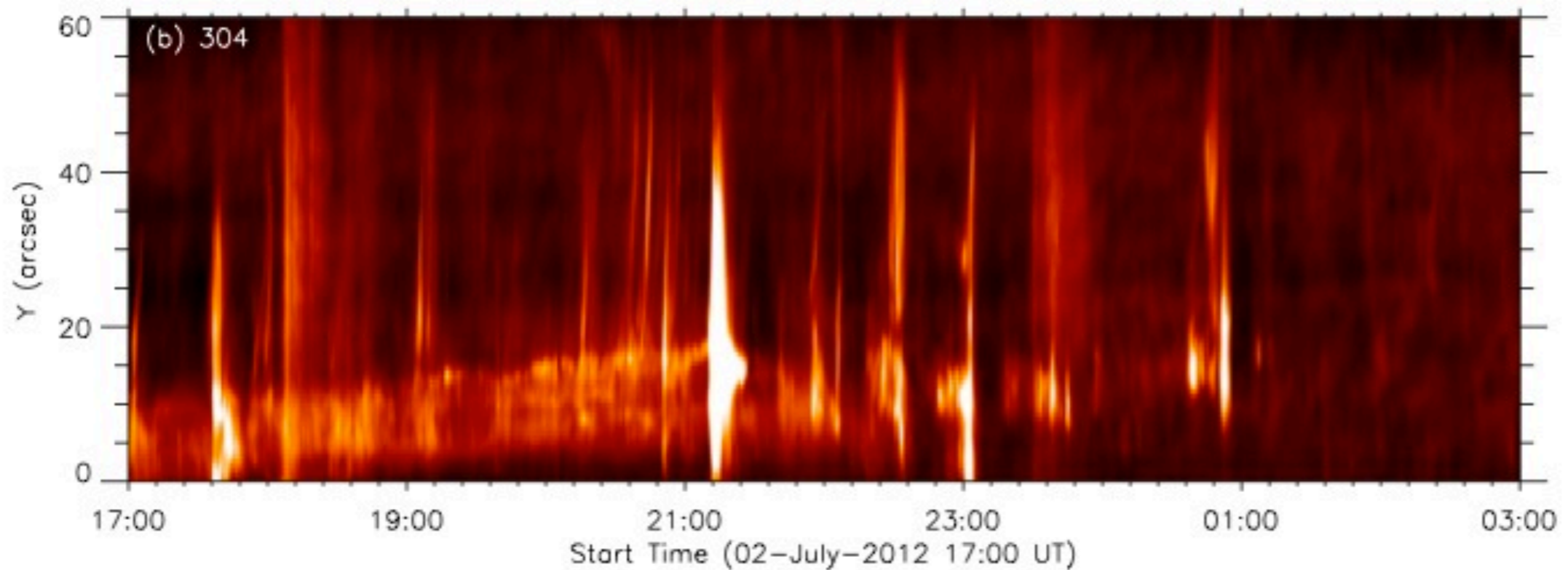
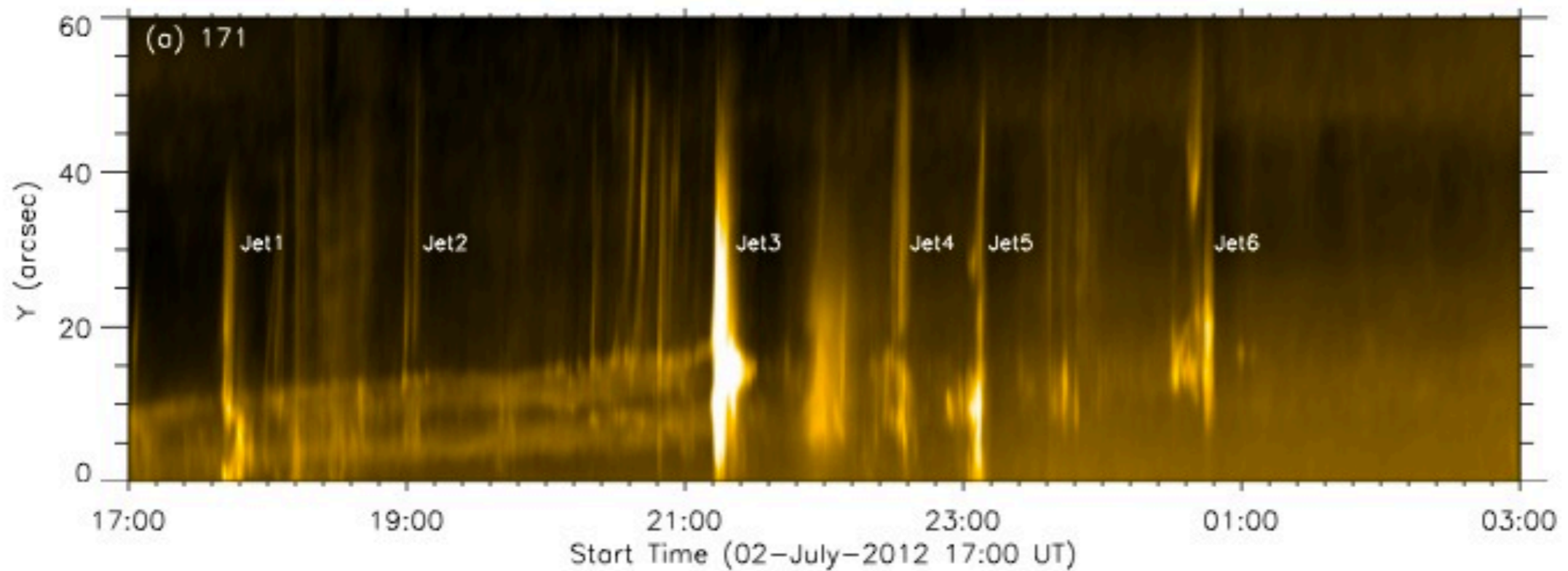


Chen, J.; Su, J.T.; Yin, Z. Q.; et al. *ApJ*, 2015, **815**, 71



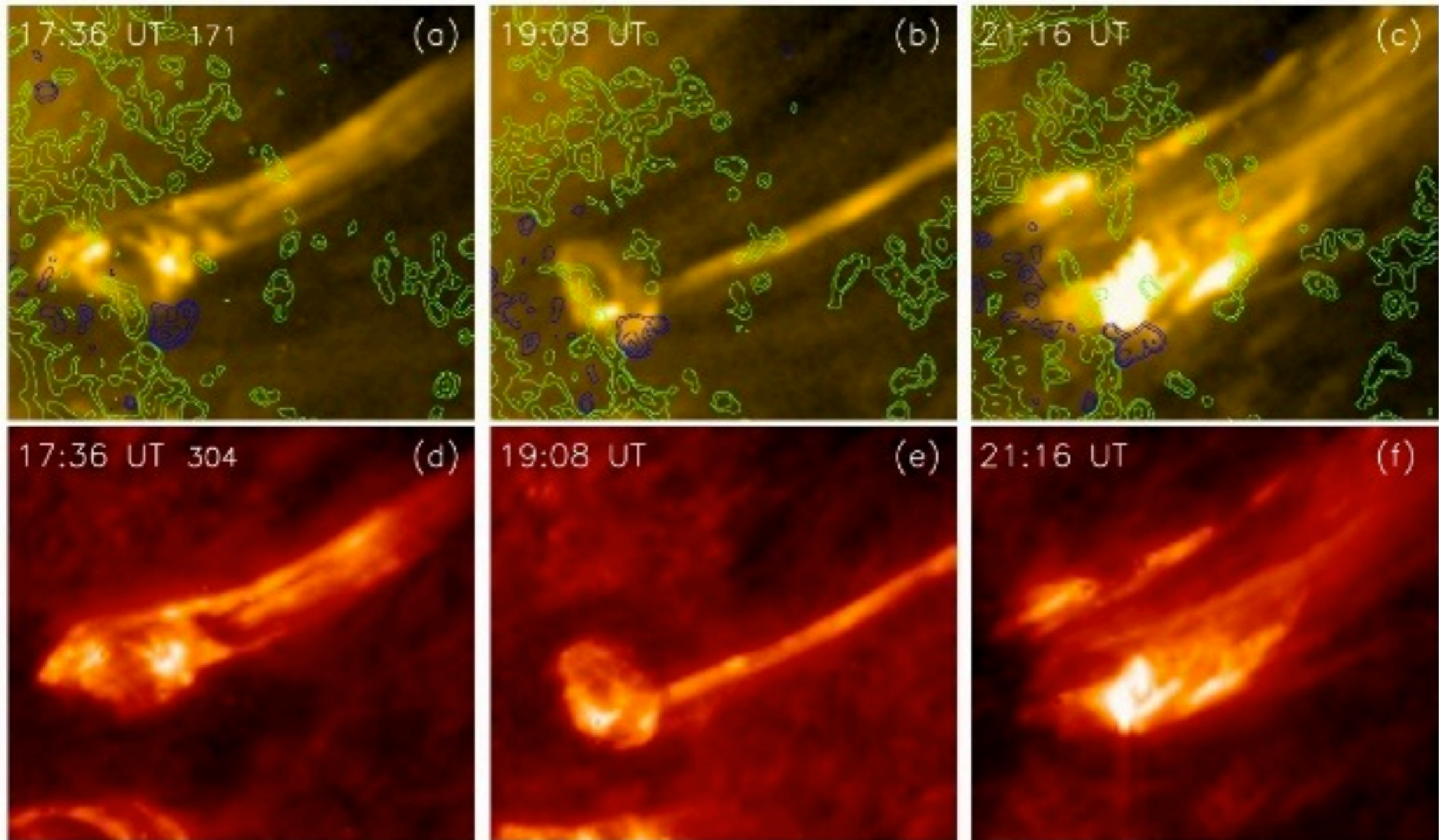
Chen, J.; Su, J.T.; Yin, Z. Q.; et al. *ApJ*, 2015, **815**, 71

# Time-distance diagrams of 10 hours



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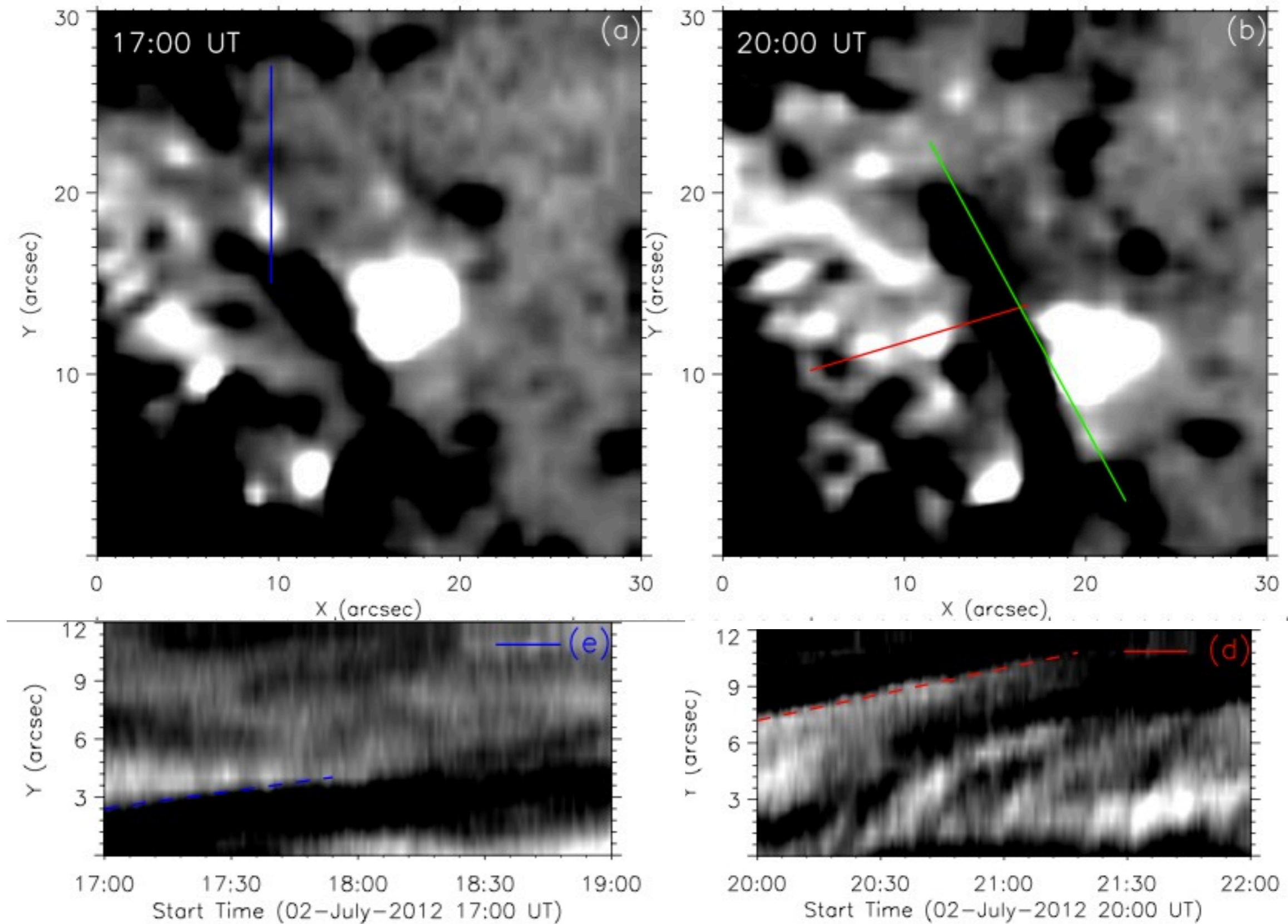
# Jet 1,2,3



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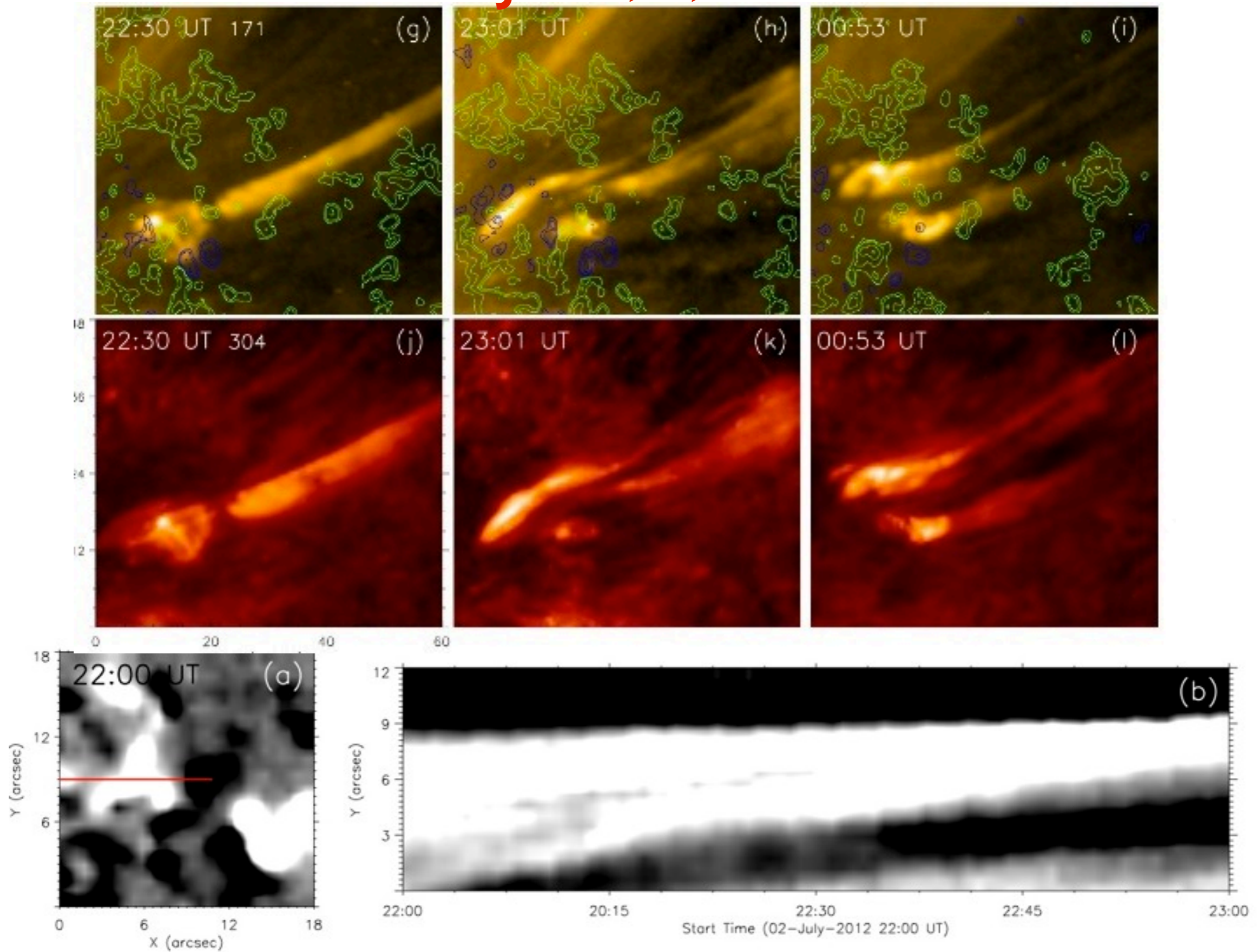


# Magnetic evolution of MMFs



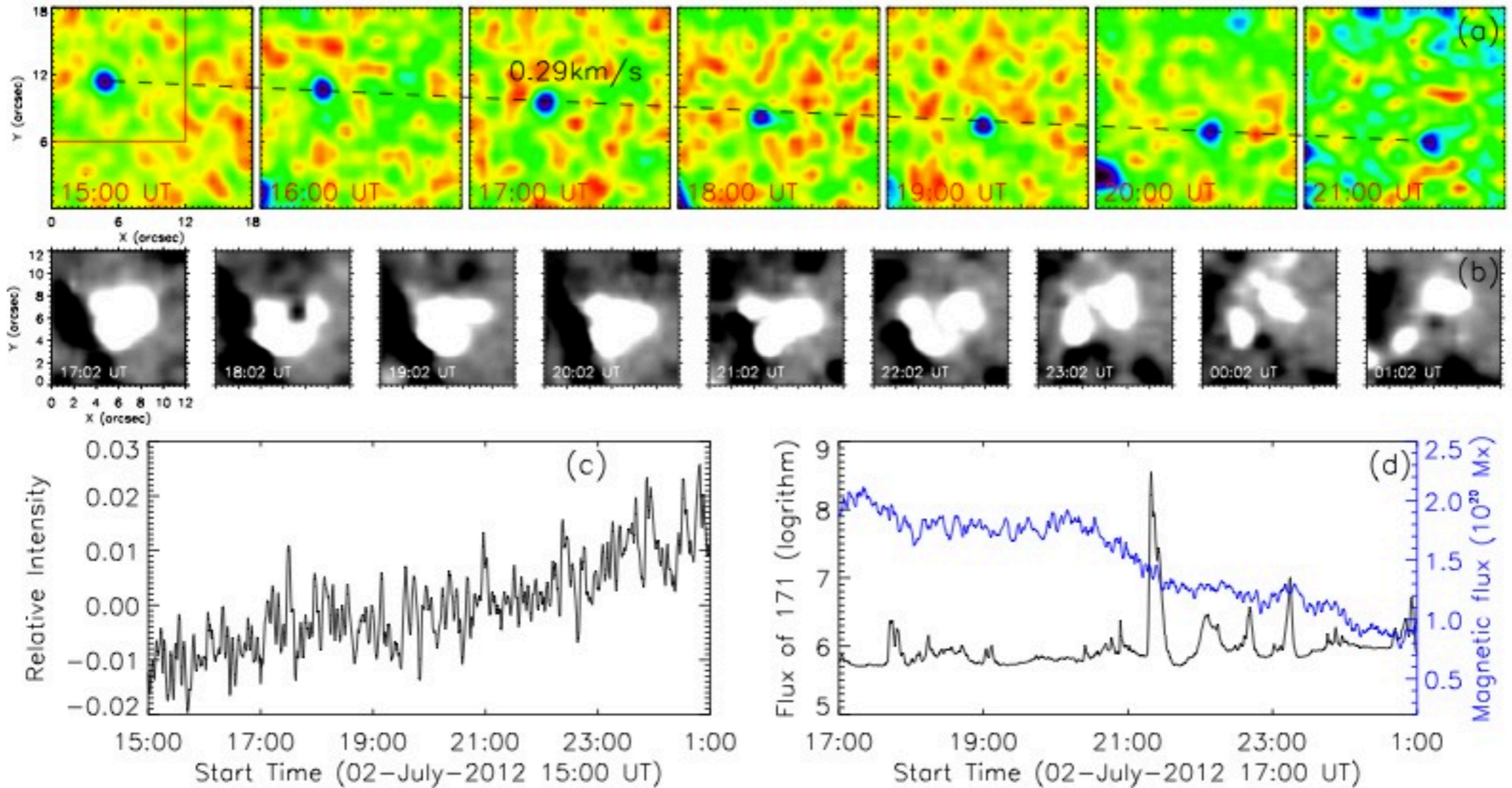
Chen, J.; Su, J. T.; Yin, Z. Q.; et al. *ApJ*, 2015, **815**, 71

# Jet 4, 5, 6



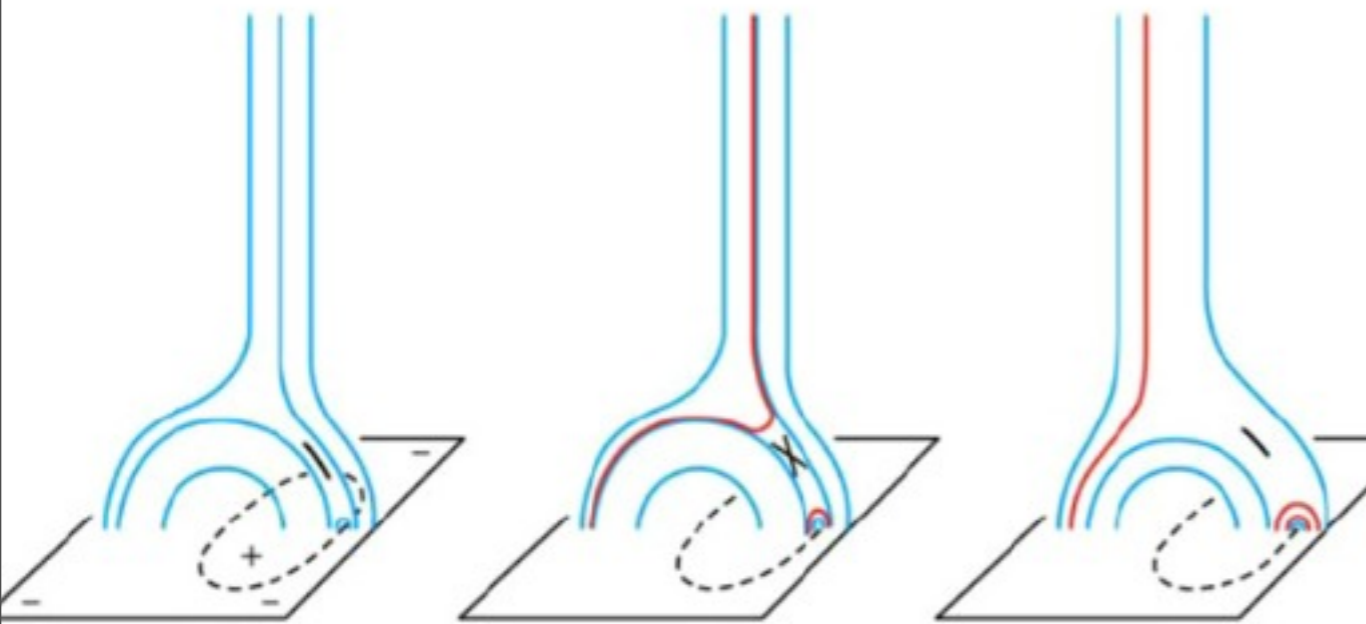
Chen, J.; Su, J.T.; Yin, Z. Q.; et al. *ApJ*, 2015, **815**, 71

# Evolution of the satellite spot

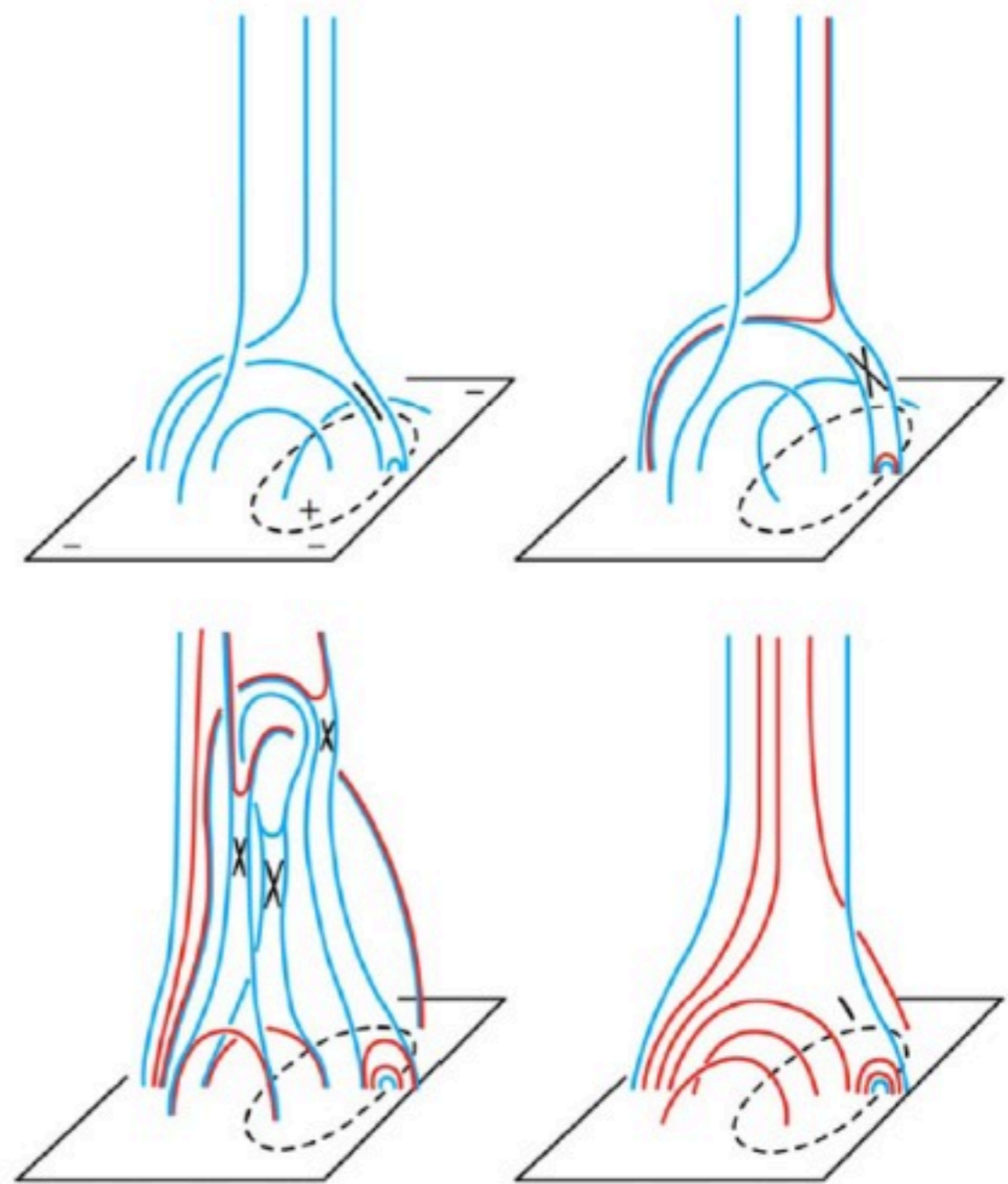


Chen, J.; Su, J.T.; Yin, Z. Q.; et al. *ApJ*, 2015, **815**, 71

## Standard jet

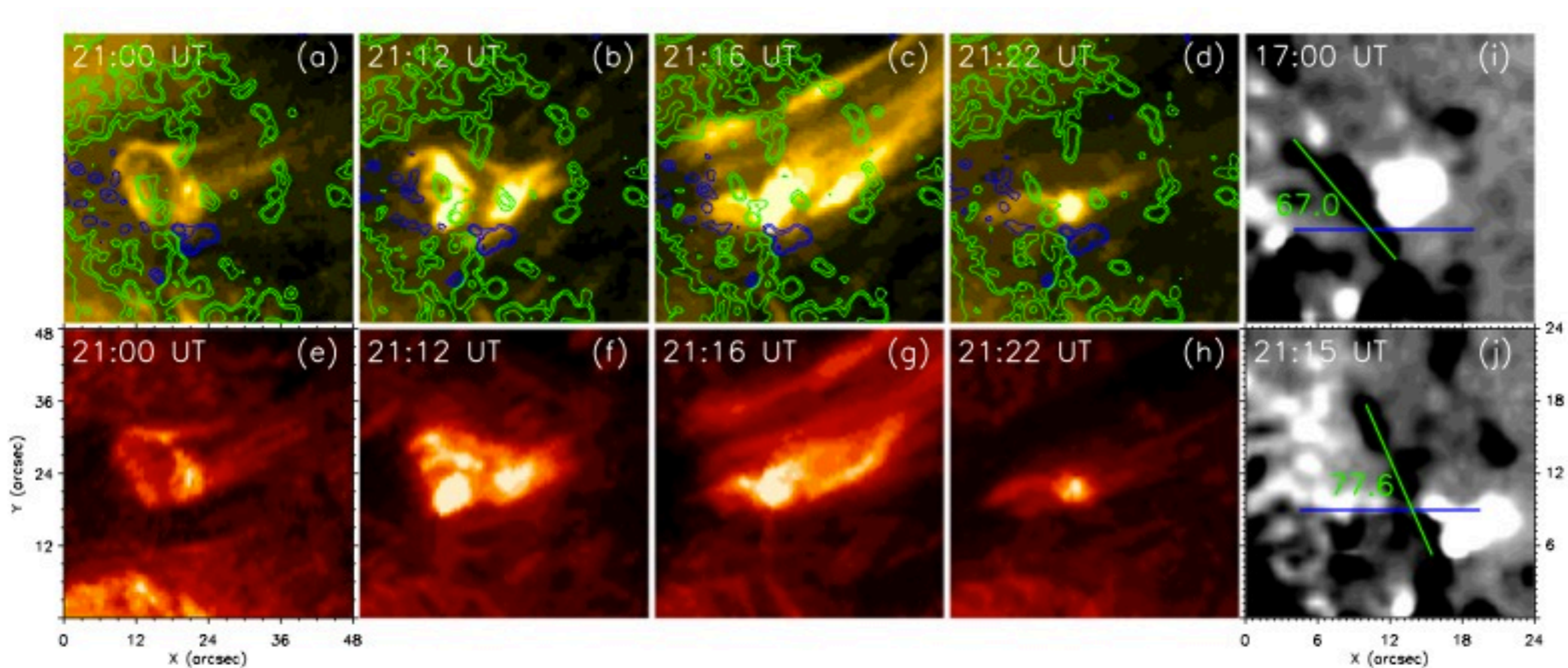


## Blowout jet



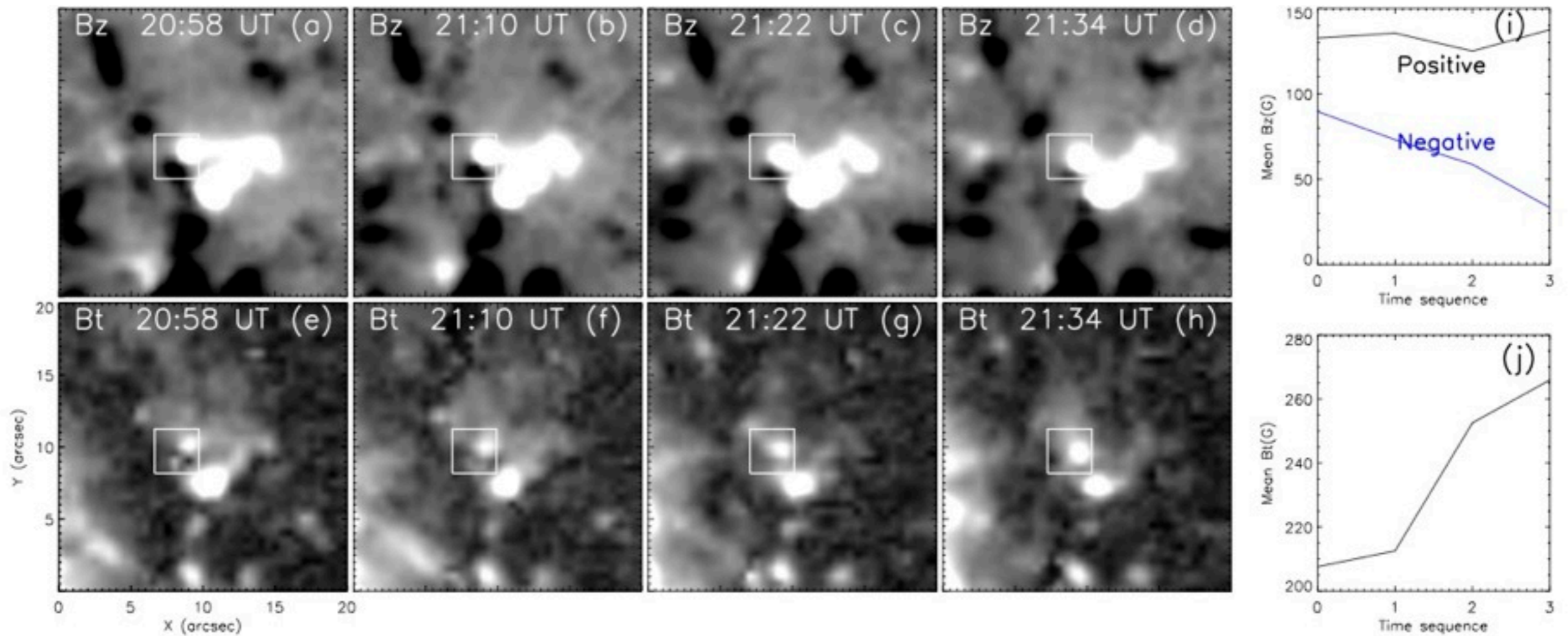
Moore et al. 2010

# Evolution of Jet 3 (a blowout jet)



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# Evolution of the magnetic field related to Jet 3

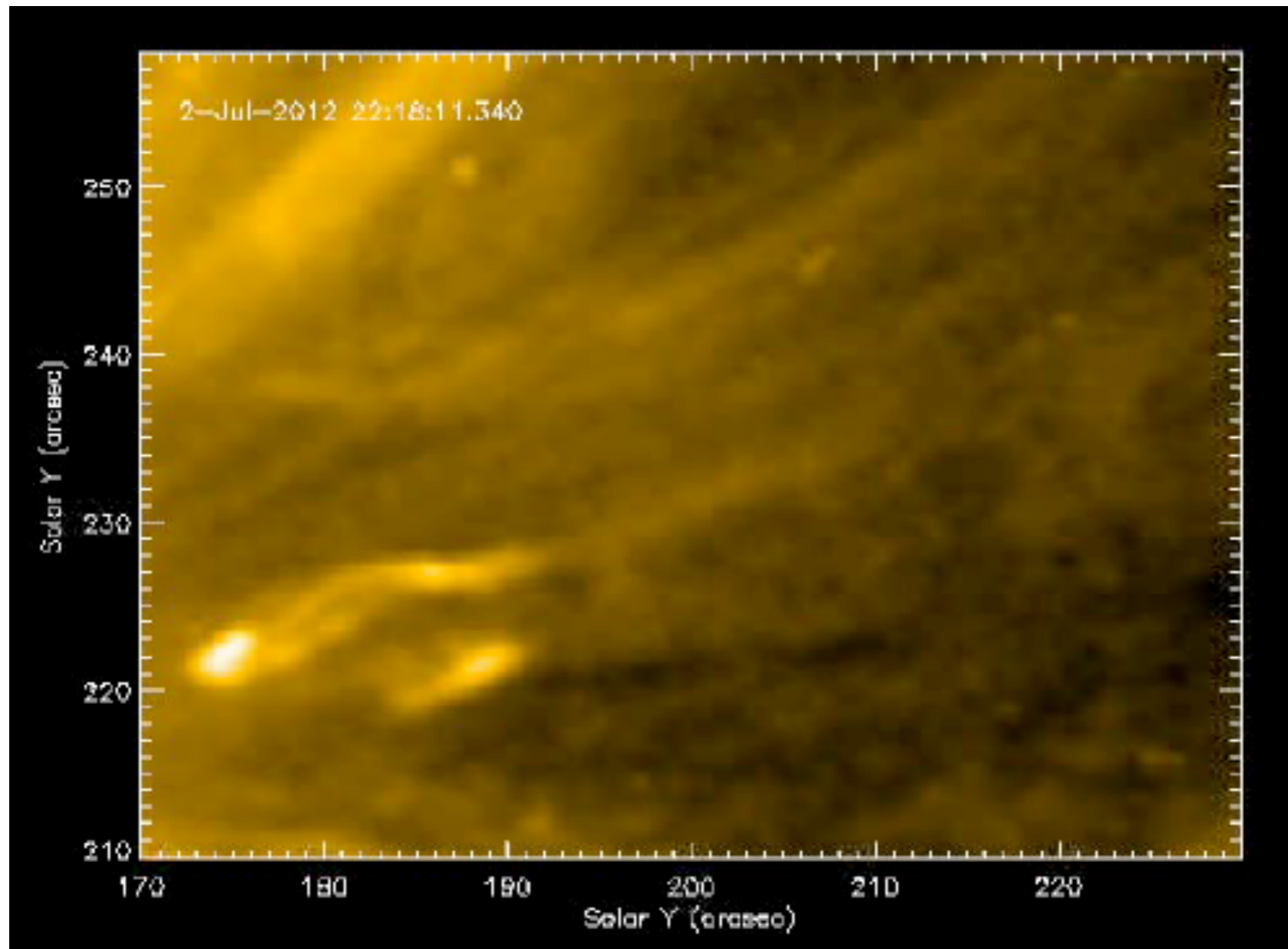


Chen, J.; Su, J.T.; Yin, Z. Q.; et al. *ApJ*, 2015, **815**, 71

# Summary

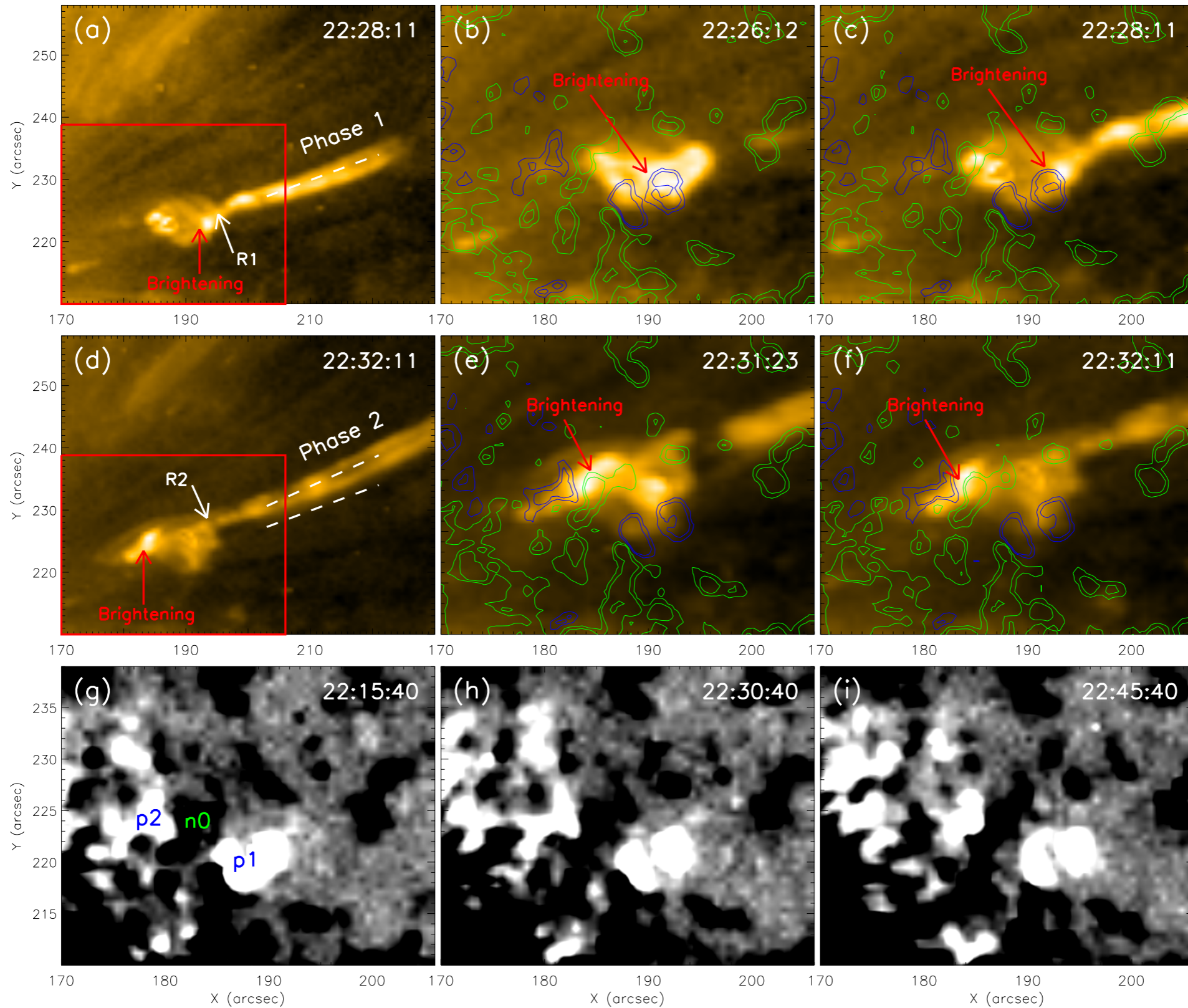
- The recurrent jets were due to the continuous magnetic reconnection in the mixed magnetic polarity regions. There are two kinds of magnetic cancellation: one is the continuous magnetic cancellation between a satellite spot and pre-existing opposite polarity magnetic field, which causes the magnetic flux of the satellite spot to decrease and its intensity to increase. The other is the continuous cancellation between MMFs and pre-existing opposite polarity magnetic field.
- The eruption process of a blowout jet is observed. The rotation of the magnetic field and the shear motion of the satellite spot build up free magnetic energy, which can make give the jet the ability to transform from standard to blowout. After the jet eruption, the transverse magnetic field increases and the longitudinal magnetic field decreases.

# A complex solar coronal jet with two phases

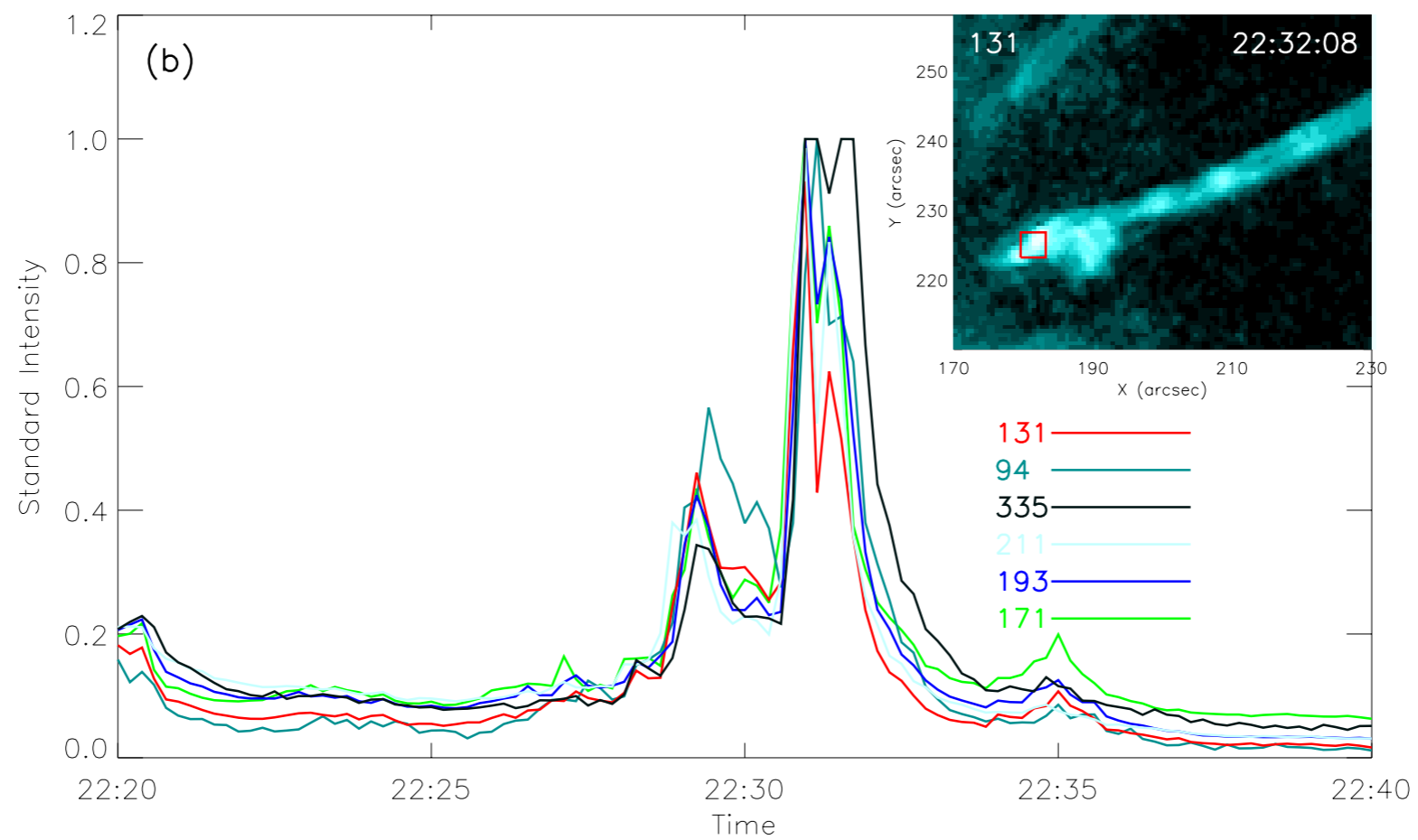
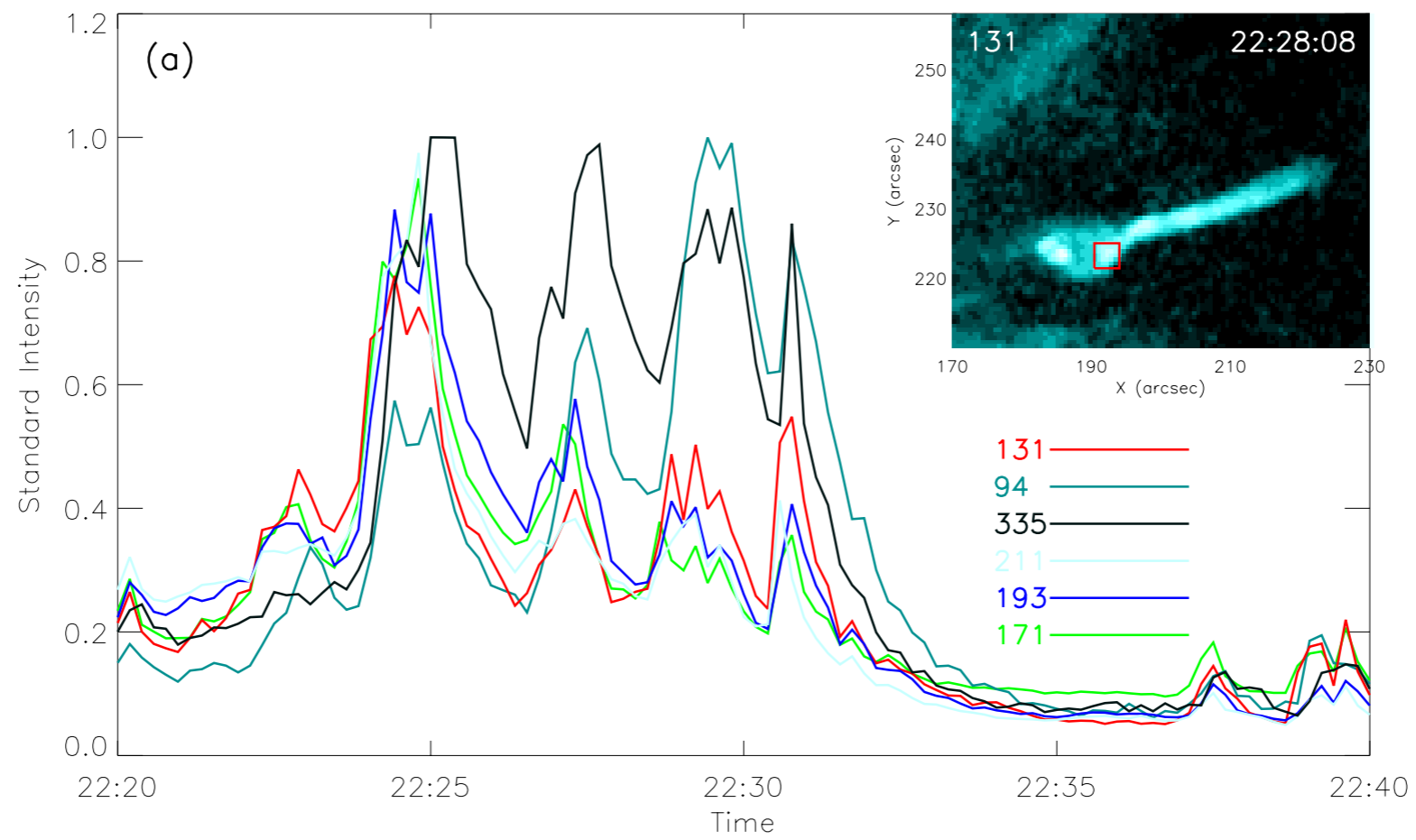


Chen, J.; Su, J.T.; Deng, Y.Y., Priest, E. R. submitted to ApJ Letter

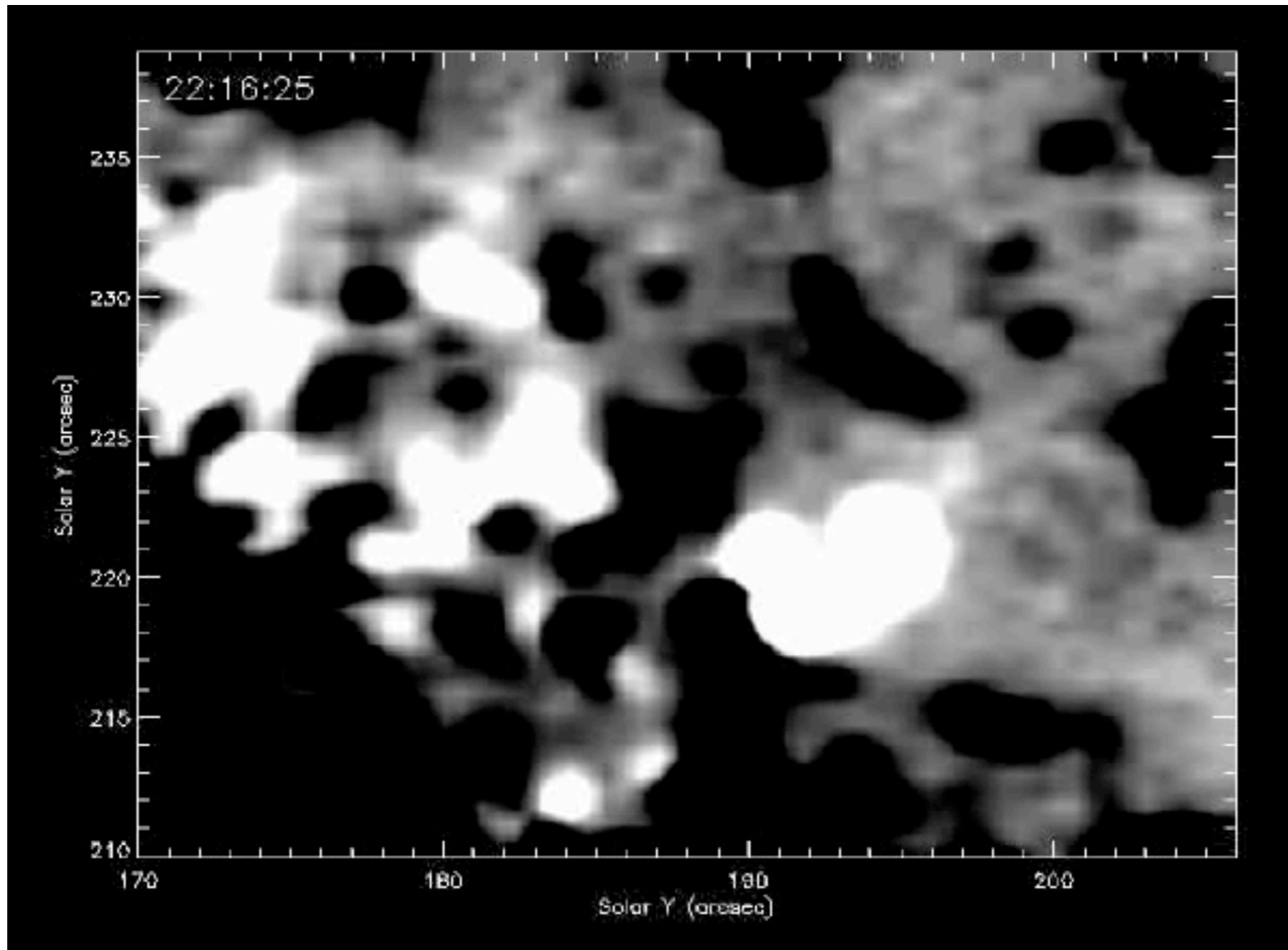




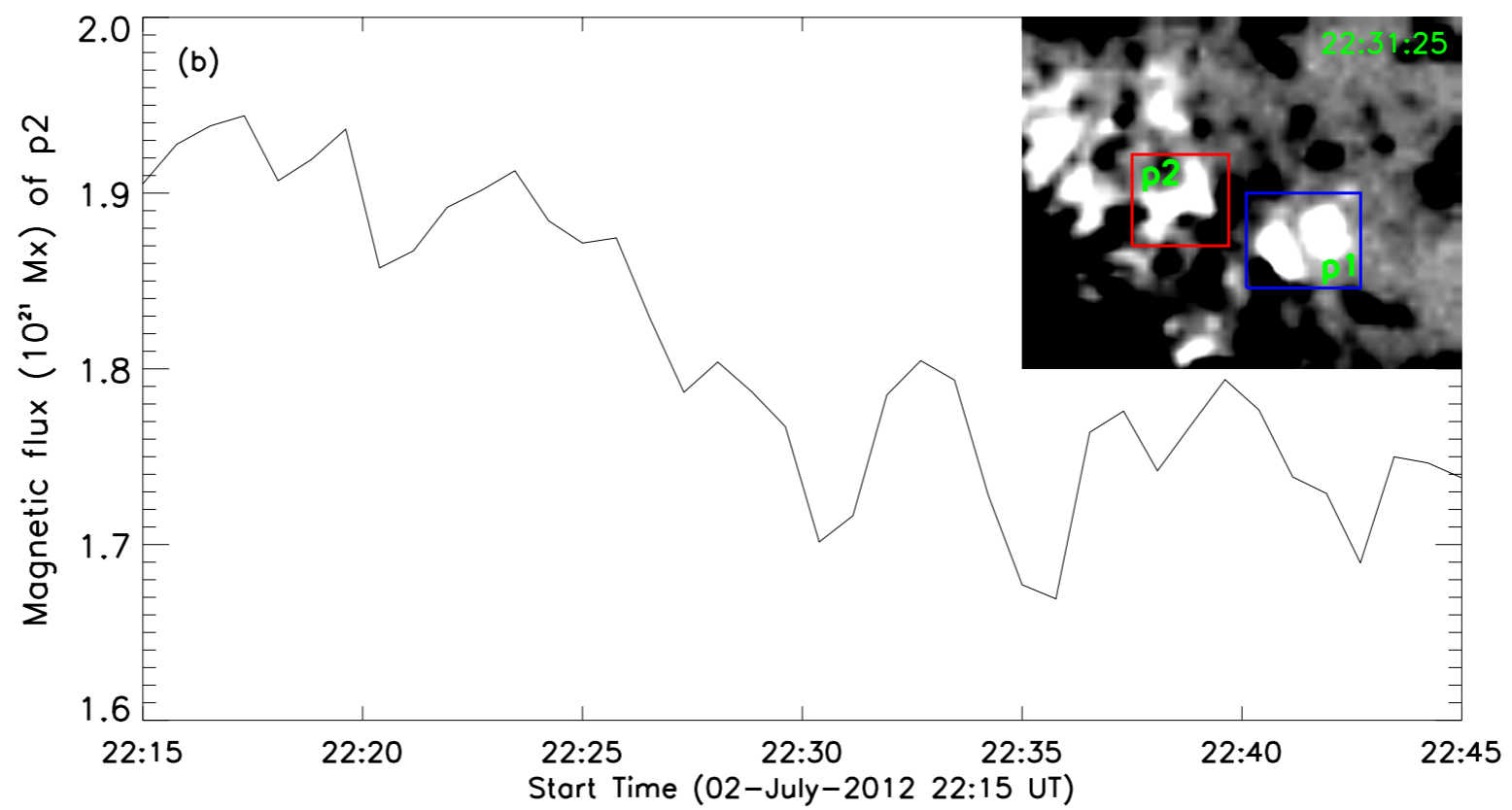
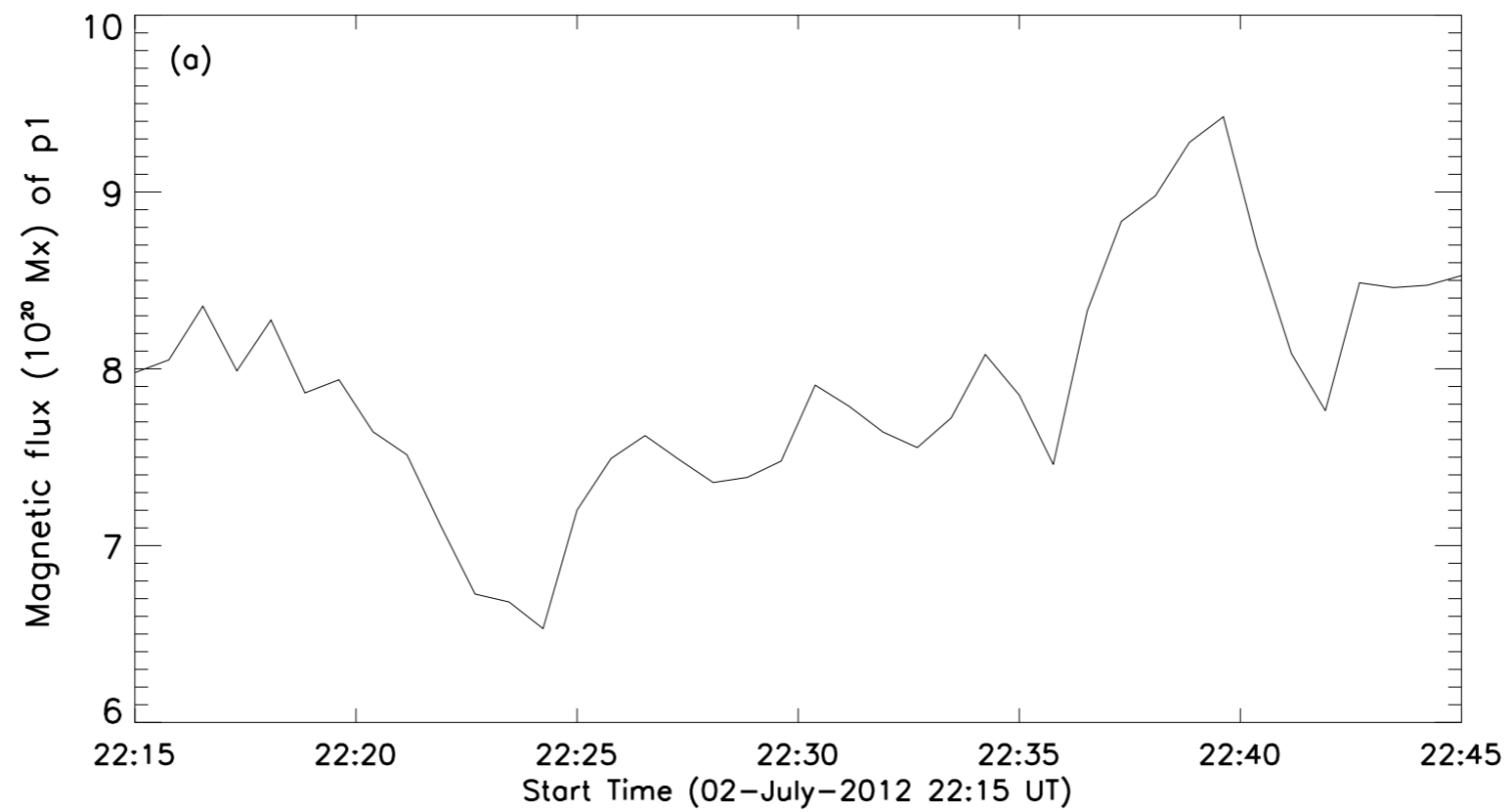
Chen, J.; Su, J.T.; Deng, Y.Y., Priest, E. R. submitted to ApJ Letter



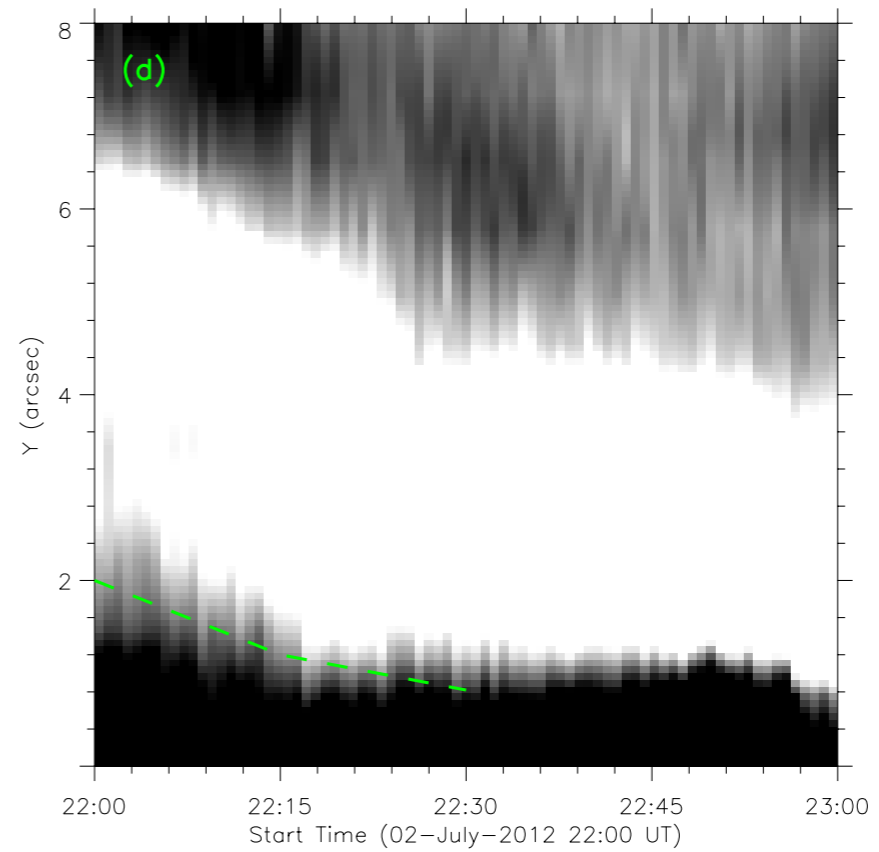
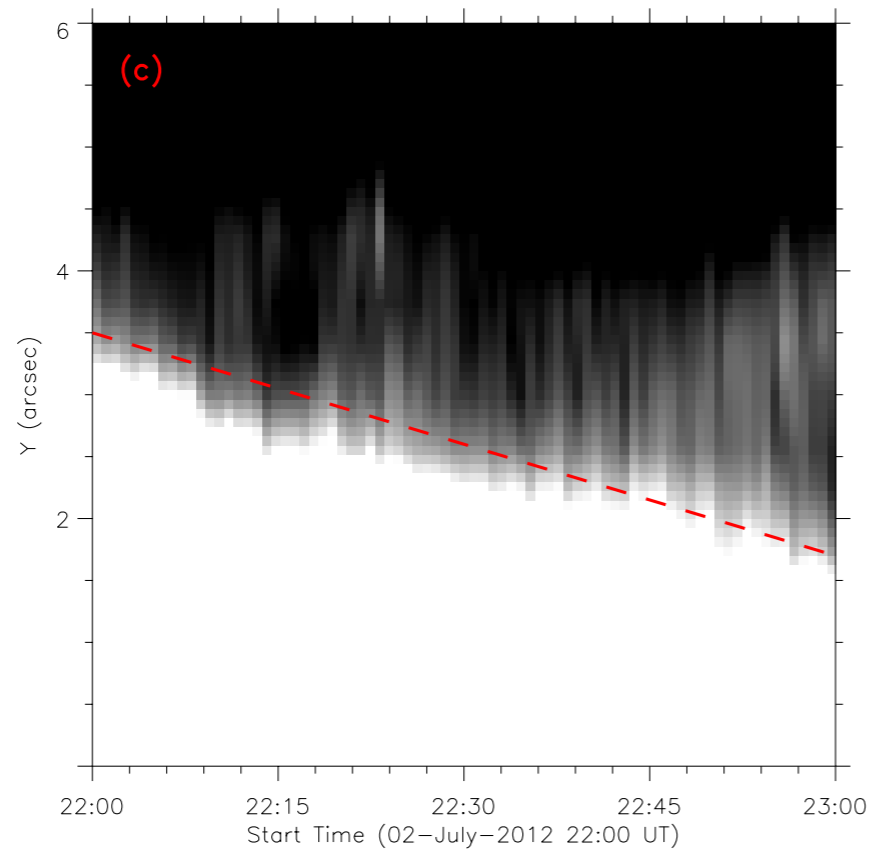
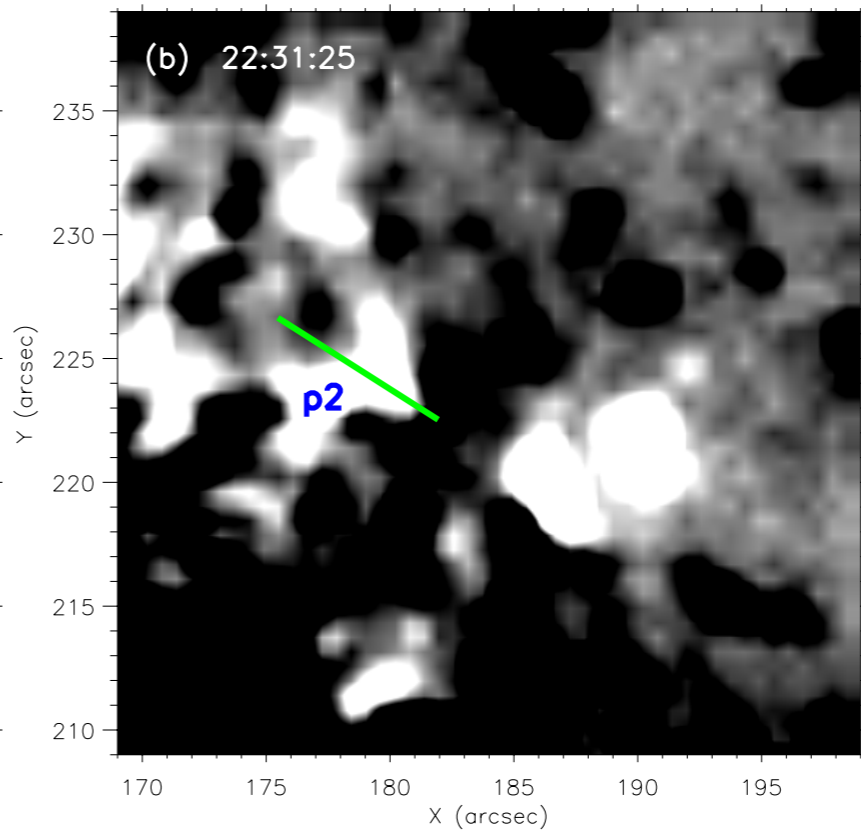
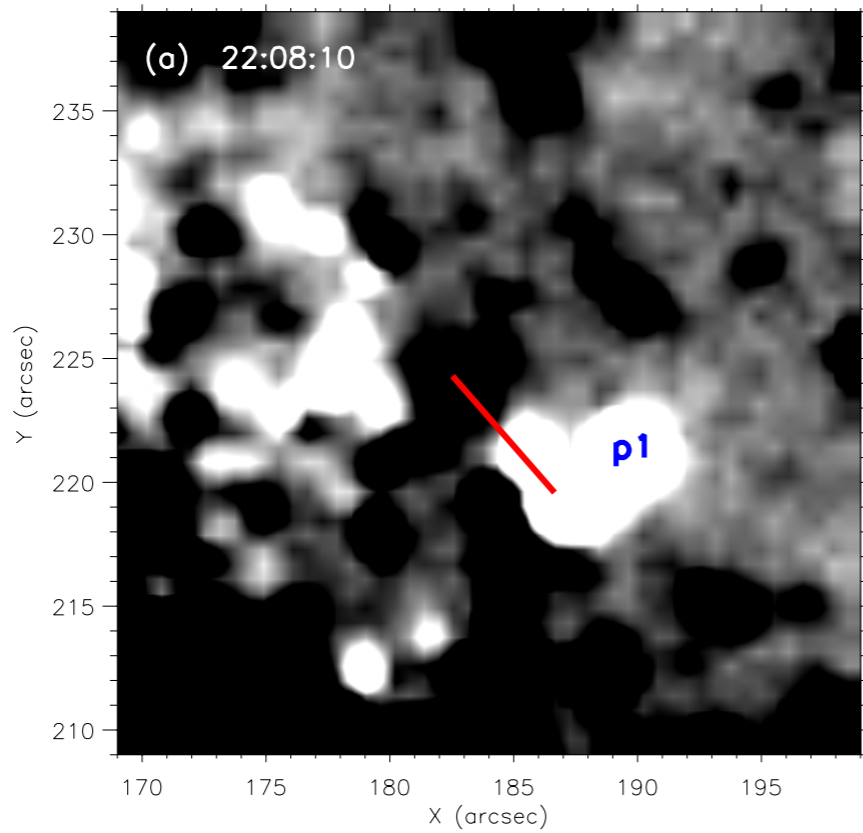
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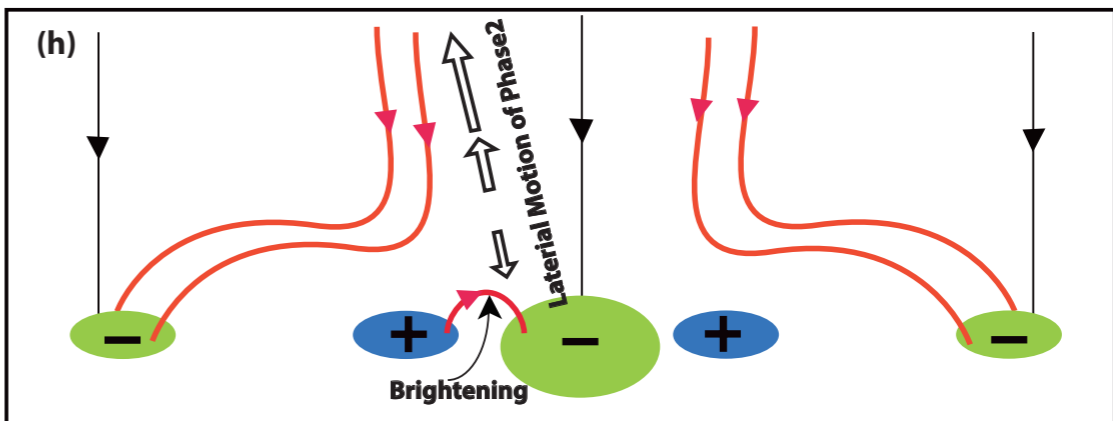
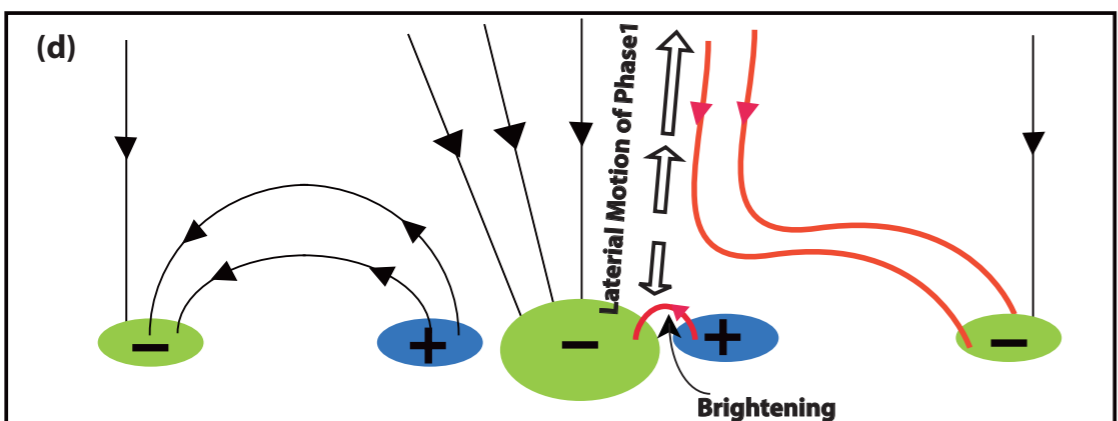
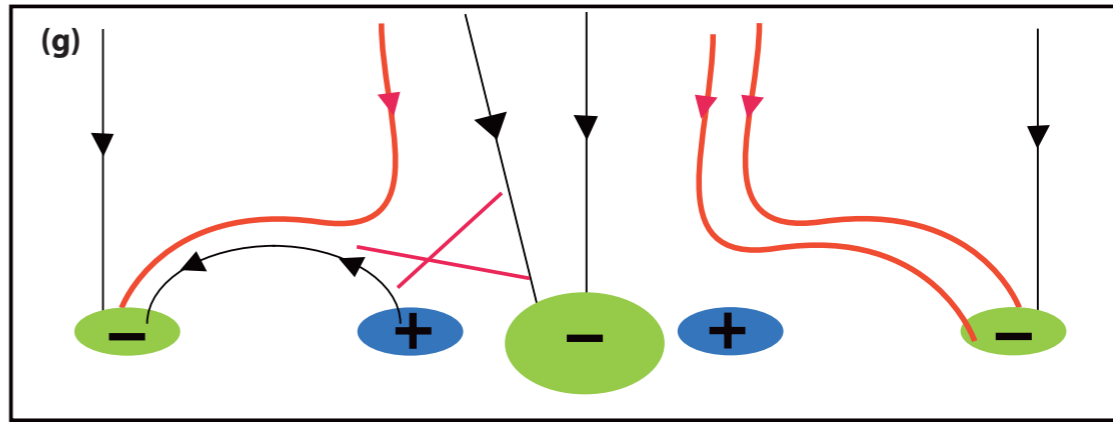
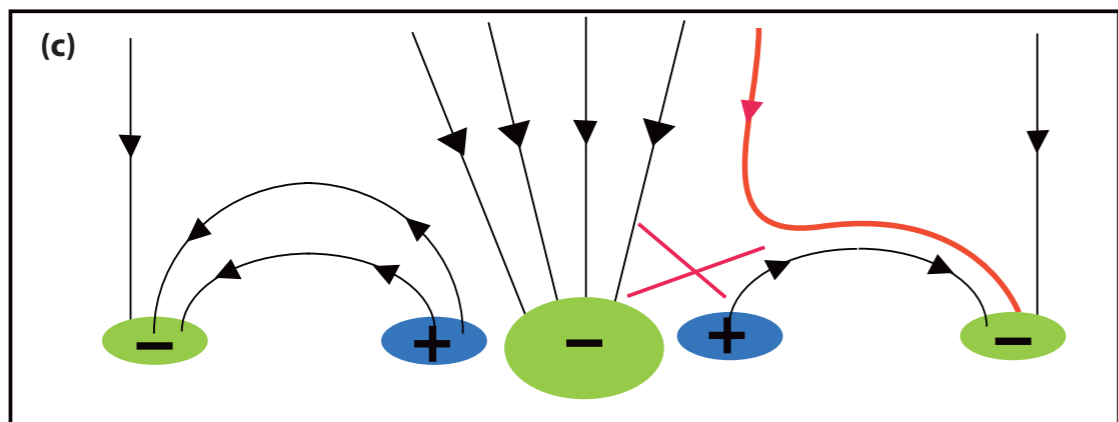
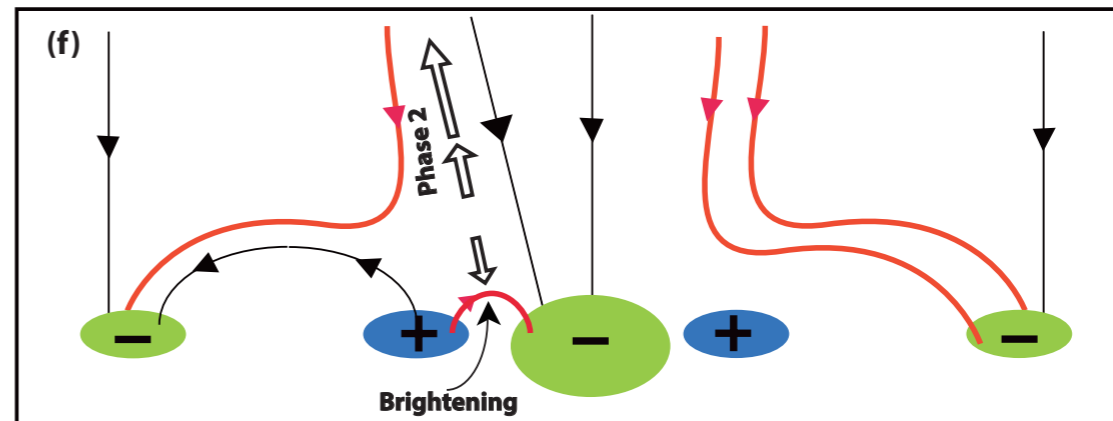
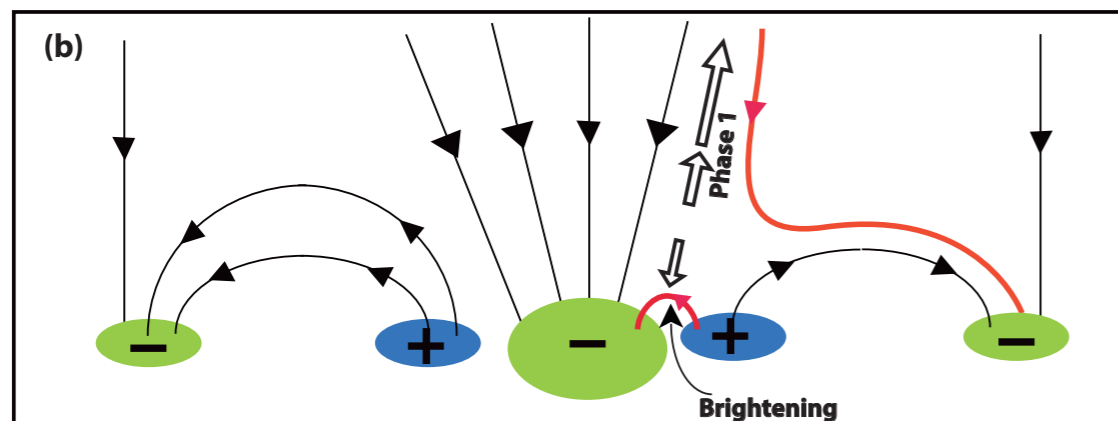
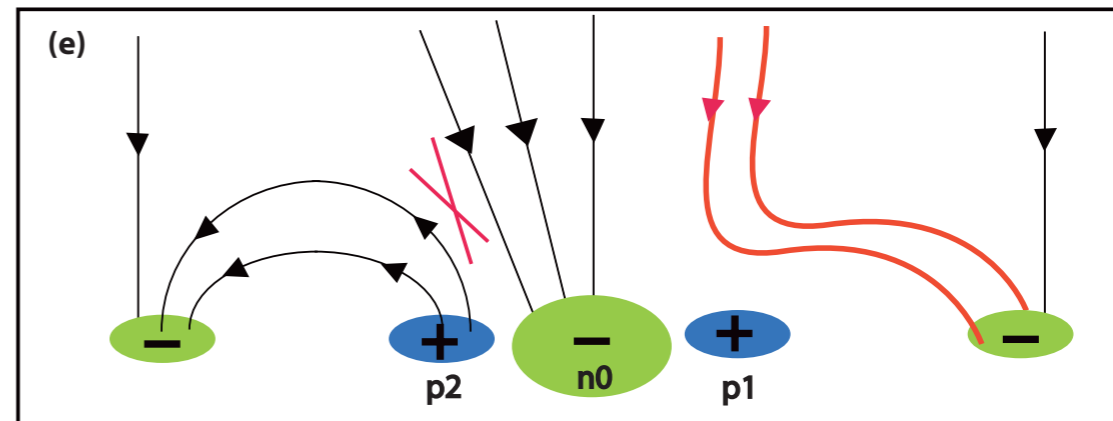
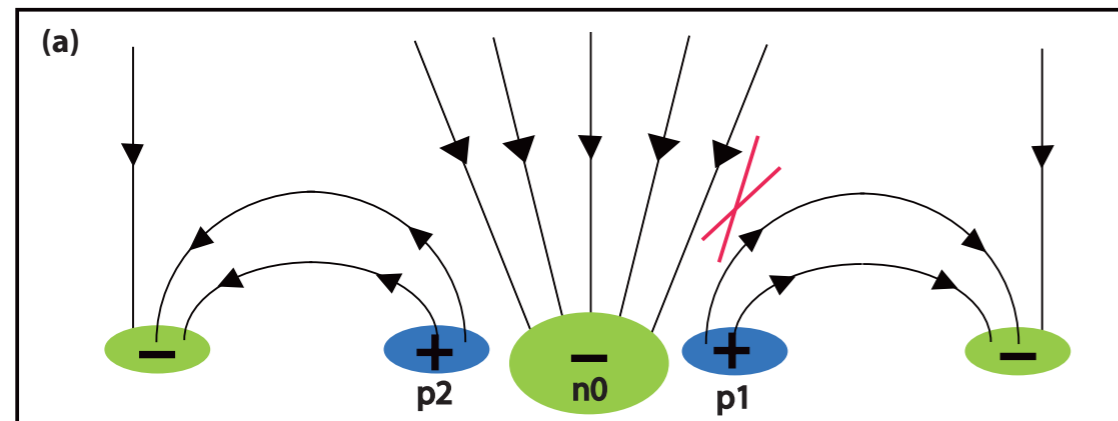
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# Summary

We observed the formation and evolution of two successive phases of a jet. The two patches  $p_1$  and  $p_2$  are very close.

At high resolution we find Phases 1 and 2 have different configurations: the root of Phase 1 is in the southwest, the root of Phase 2 is in the northeast.

The locations of brightening of the feet of two phases are different: the location of the brightening of the footpoint of Phase 1 is in the middle of  $p_1$  and  $n_0$ ; the location of brightening of the footpoint of Phase 2 is between  $p_2$  and  $n_0$ .

The two phases and the brightening of their footpoints appear over a wide temperature range.

We suggest that the two phases are driven by magnetic flux cancellation but they originate from different nearby locations rather than originating from the same place.

Thank you!



