Trigger Shy?

A "Rosetta-Stone" Solar Eruption

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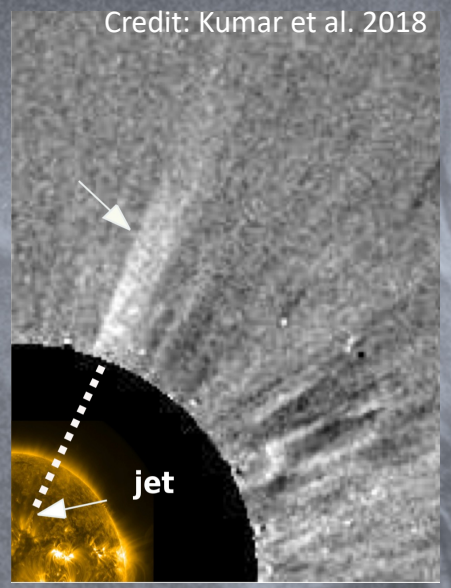
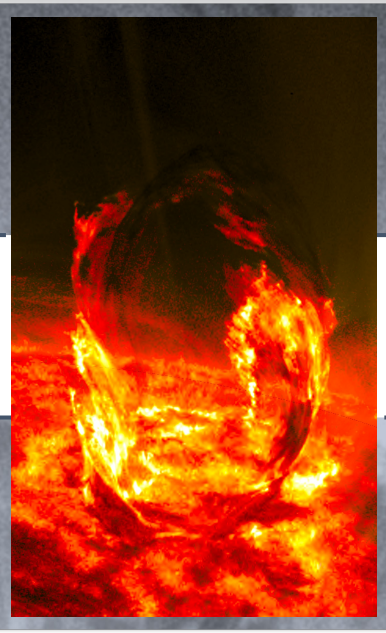
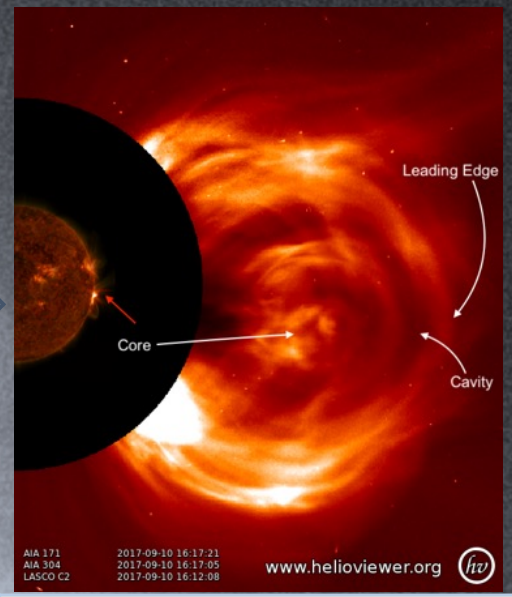
Background: Solar Eruptions



Jets
Slow
Narrow
Small
Only ejects plasma



2016/03/13 event is the missing link: **solar eruption characteristics are determined by source region size**



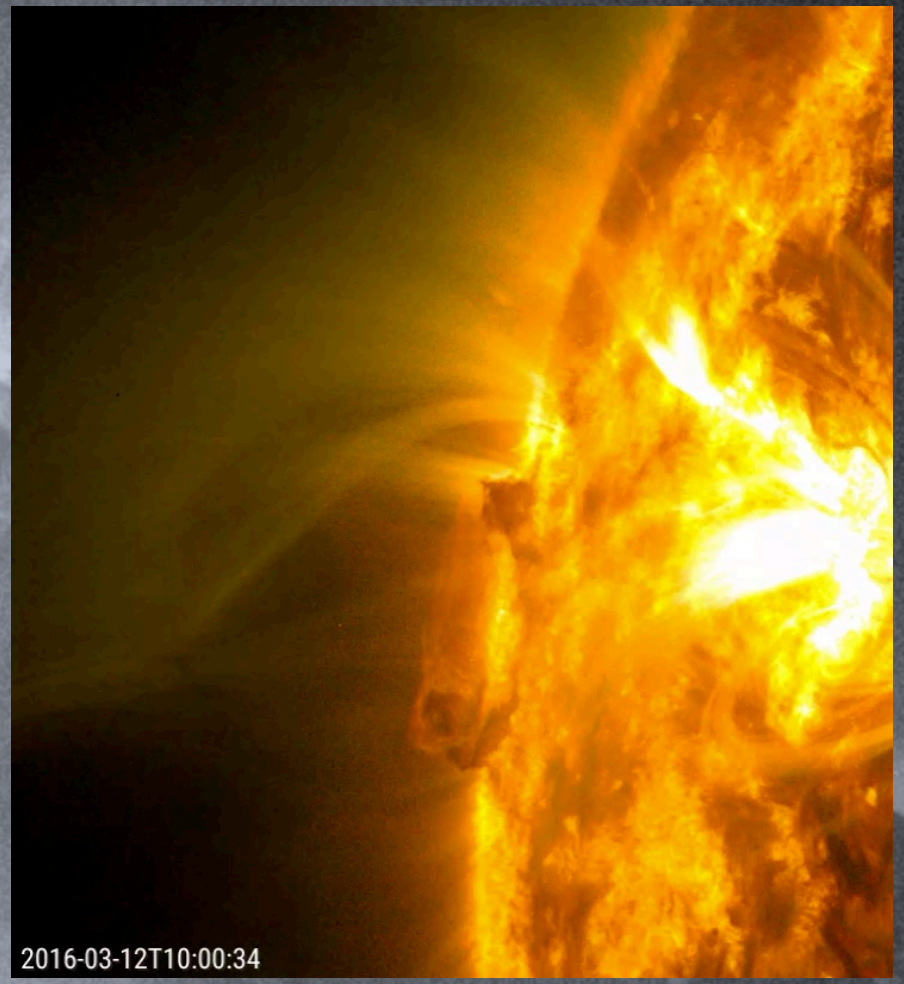
CMEs
Fast
Wide
Large
Ejects plasma **and** magnetic field

Why This Eruption?

Shows characteristics of CMEs, jets, and failed/partial eruptions

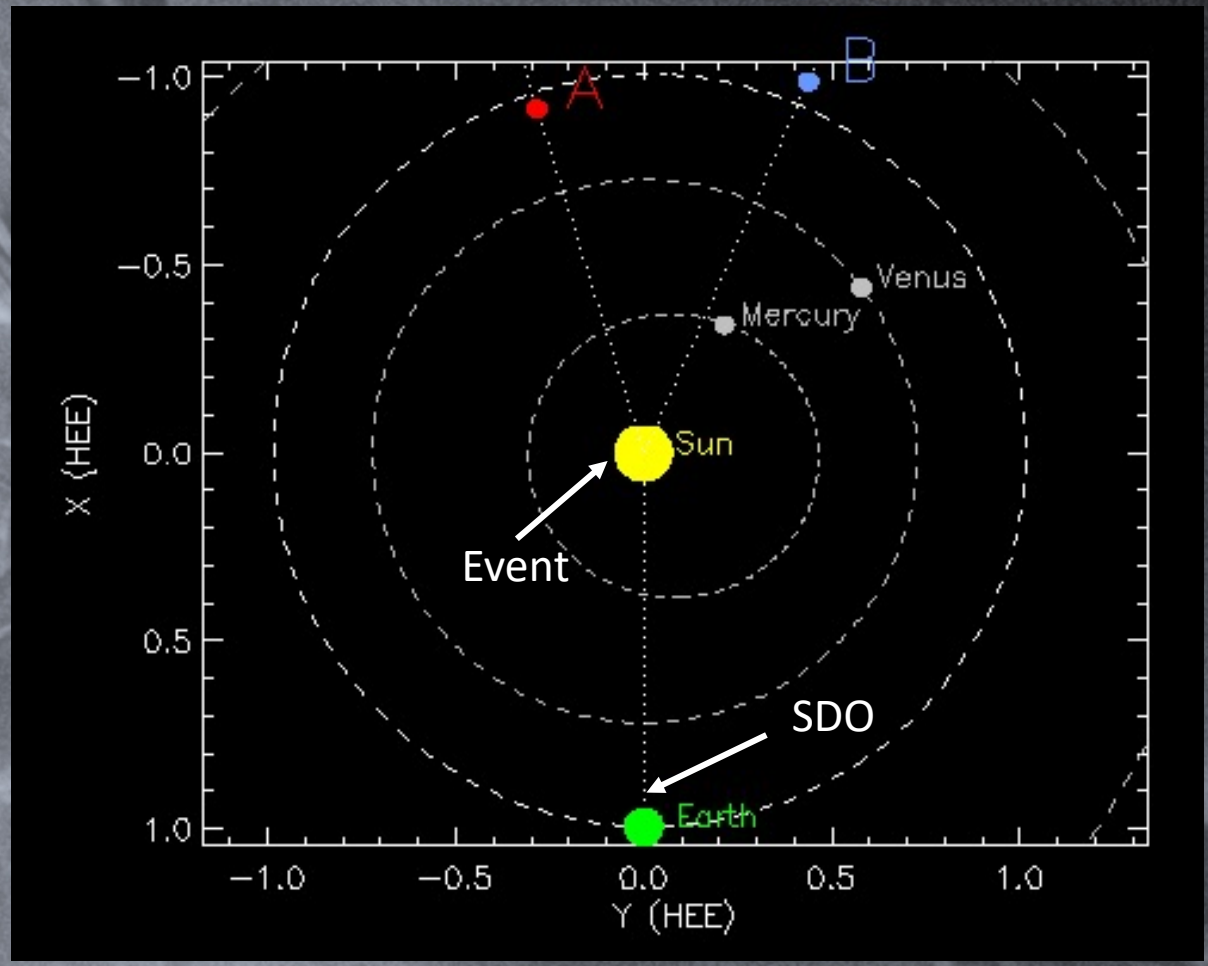
Gives physical insight to open questions:

- What determines which type of eruption results?
- How does the surrounding magnetic field affect eruption likelihood and dynamics?
- Why do they erupt at all?



2016 March 12-13 Eruption

STEREO-A was well-positioned to view eruption on the limb



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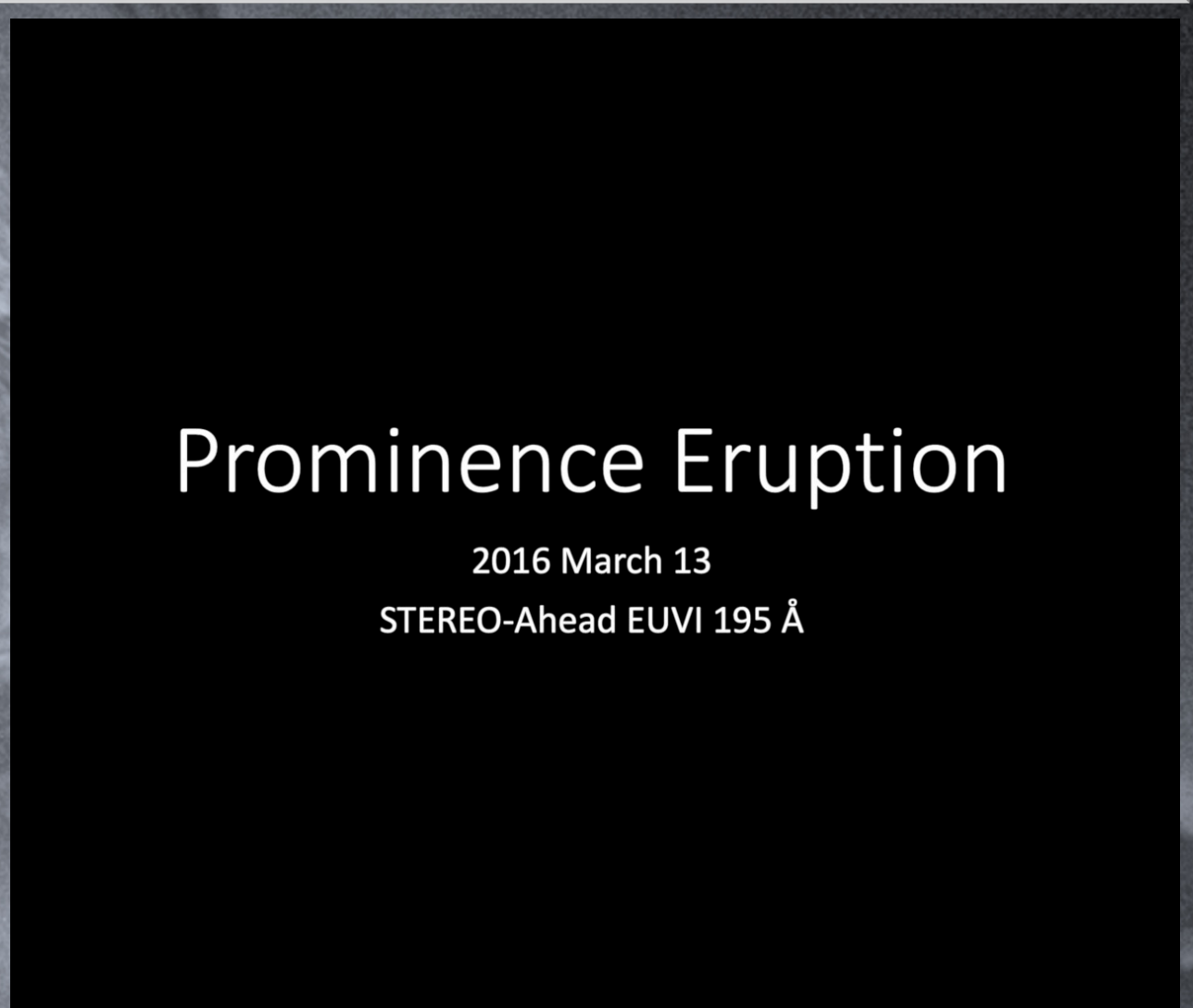
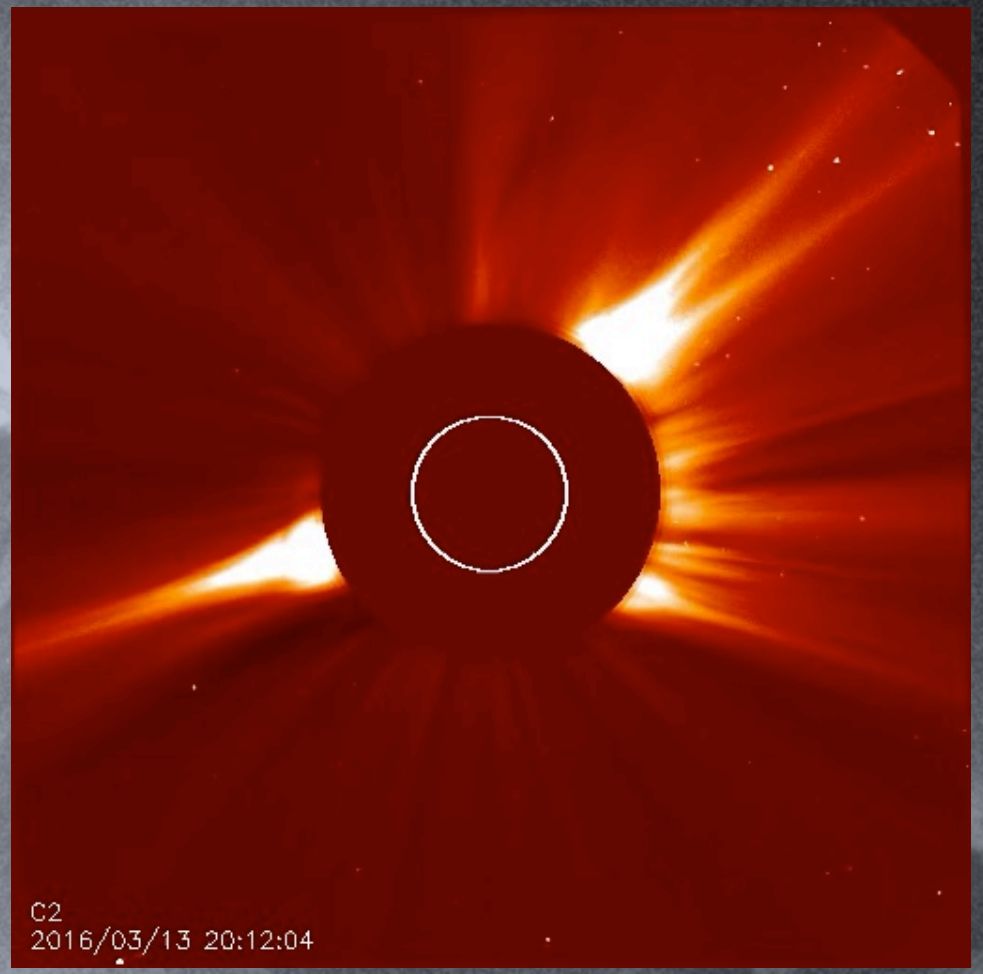


2016 March 12-13 Eruption

SOHO LASCO C2 captured the CME resulting from this failed eruption

- Too wide for a jet; too narrow for a CME
- Poorly structured, but some magnetic field did escape too



Prominence Eruption

2016 March 13

SDO AIA 171 Å

Implications

- 2016 event is not unique; represents a class of intermediate eruptions that fill in the blank spots in the jet/CME continuum
- We can now apply what we know about jets to CMEs, aiding in the effort to understand eruption triggers and move towards true predictive space weather capabilities
- The failure of the prominence to erupt presents a problem; it does not fit into any of our current eruption theories

Summary

"Rosetta Stone" event bridges jet-CME continuum

Mystery of failed prominence eruption complicates space weather prediction

Next step to make magnetohydrodynamic simulation of event, already underway

Paper accepted to Astrophysical Journal Letters: https://arxiv.org/abs/2105.09164

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