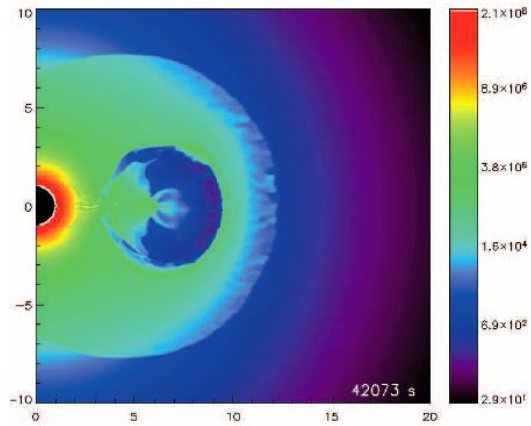
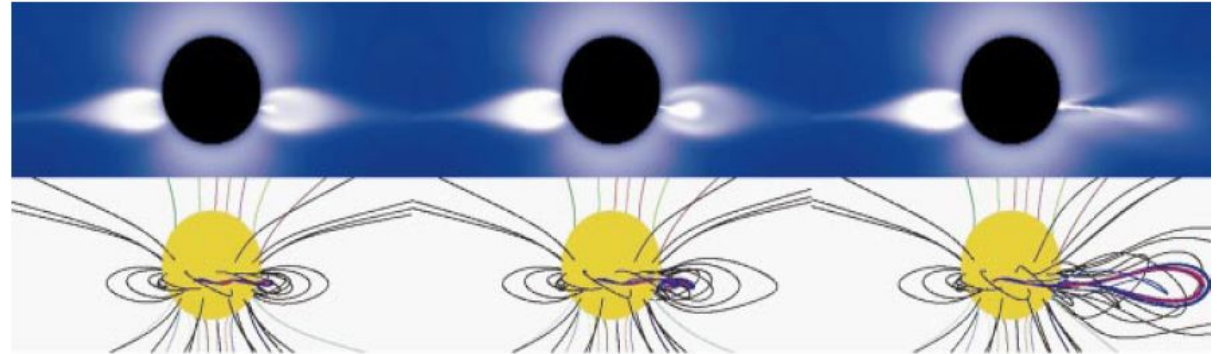


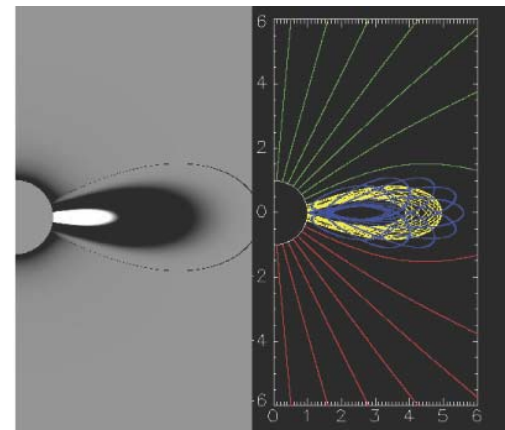
Controversy: is there a precursor flux rope, or is it formed during the CME?



Lynch et al. (2004)

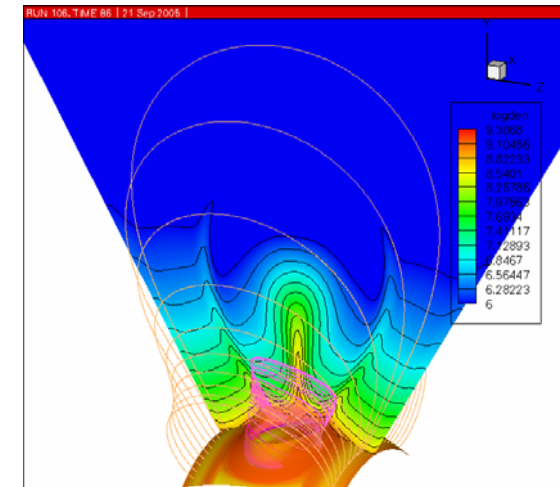


Linker et al., 2003



QuickTime™ and a
TIFF (Uncompressed) decompressor
are needed to see this picture.

Krall et al., 2001

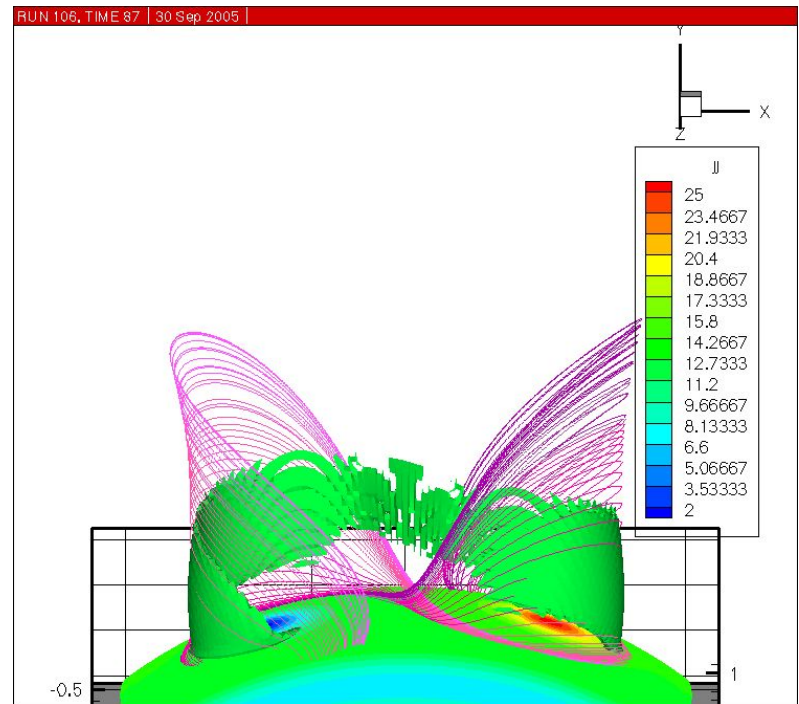


Fan and Gibson, 2005

Gibson and Low, 1998; 2000

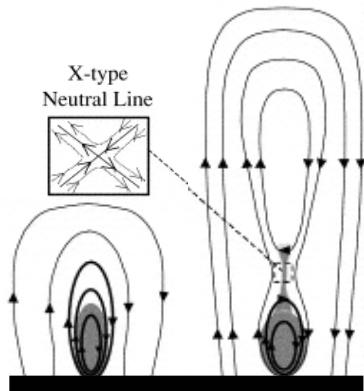
Precursor flux rope: sigmoids

QuickTime™ and a
GIF decompressor
are needed to see this picture.



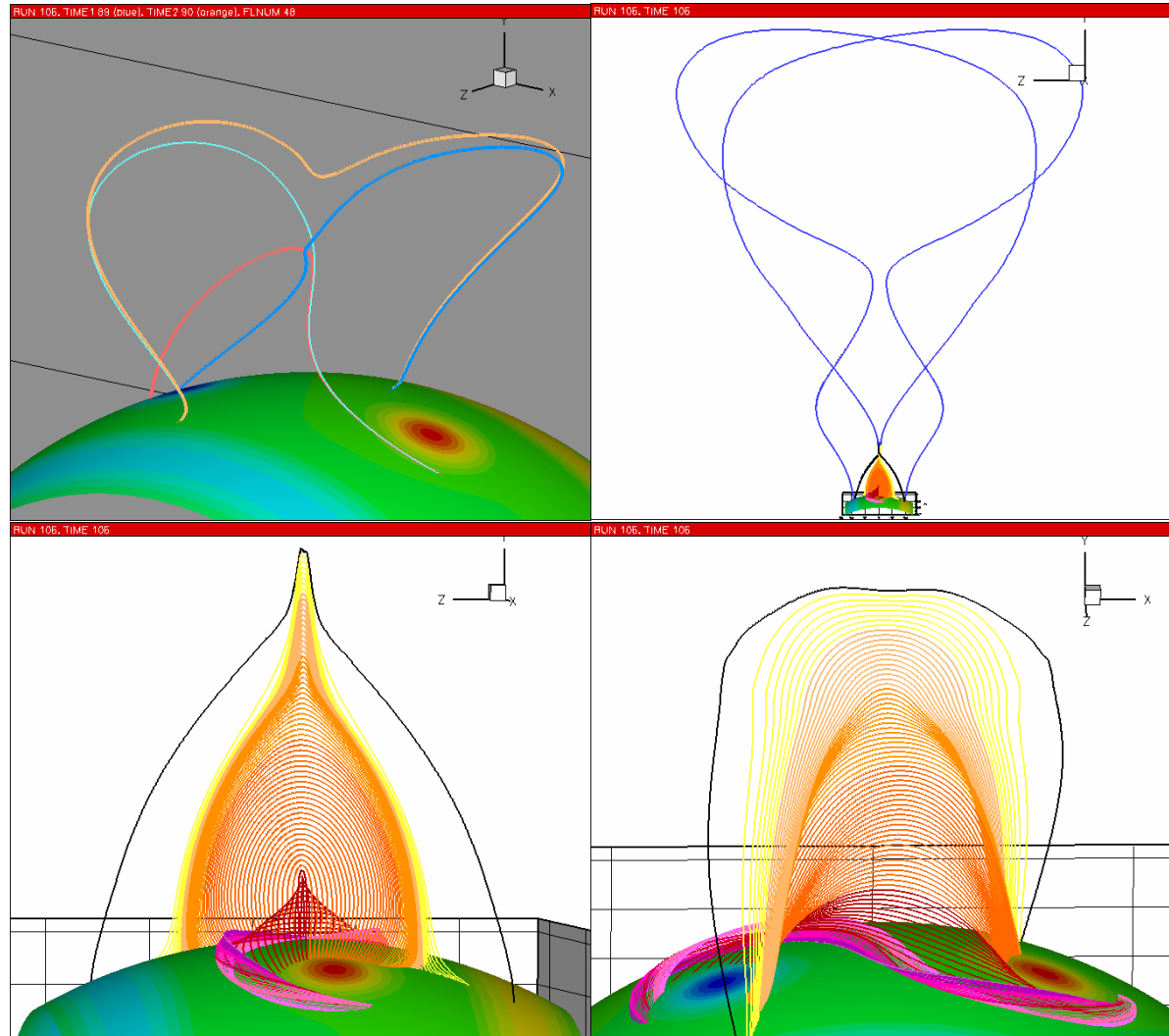
Precursor flux rope: partially erupting filaments

- Forms **two ropes** separated by cusped, sheared arcade
- Sigmoid-separatrix-surface survives
- Some dipped field erupts with upper rope, some shrinks back down with lower rope
- Can break in this manner because
 - **3D**
 - **NO X-line**



Adapted from *Gilbert et al. 2001*

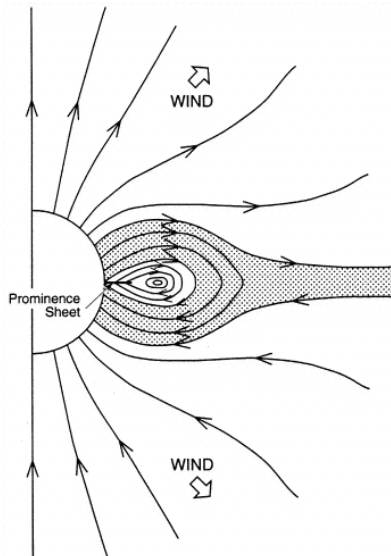
Gibson and Fan, 2005



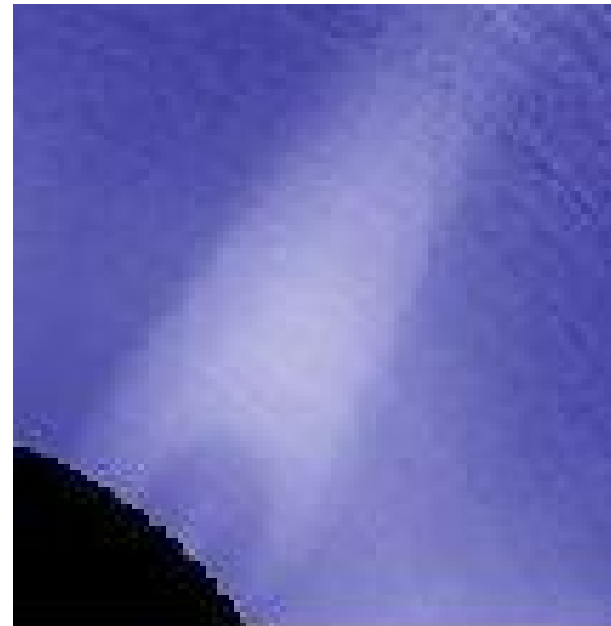
Precursor flux rope: Cavities

Pre-CME flux rope models predict a cavity also:

- Enhanced magnetic field in rope compensates for low gas pressure of cavity
- Requires thermal isolation from photosphere for longevity
- Circular cross-section, sharp boundary (magnetic flux surface/tangential field discontinuities)

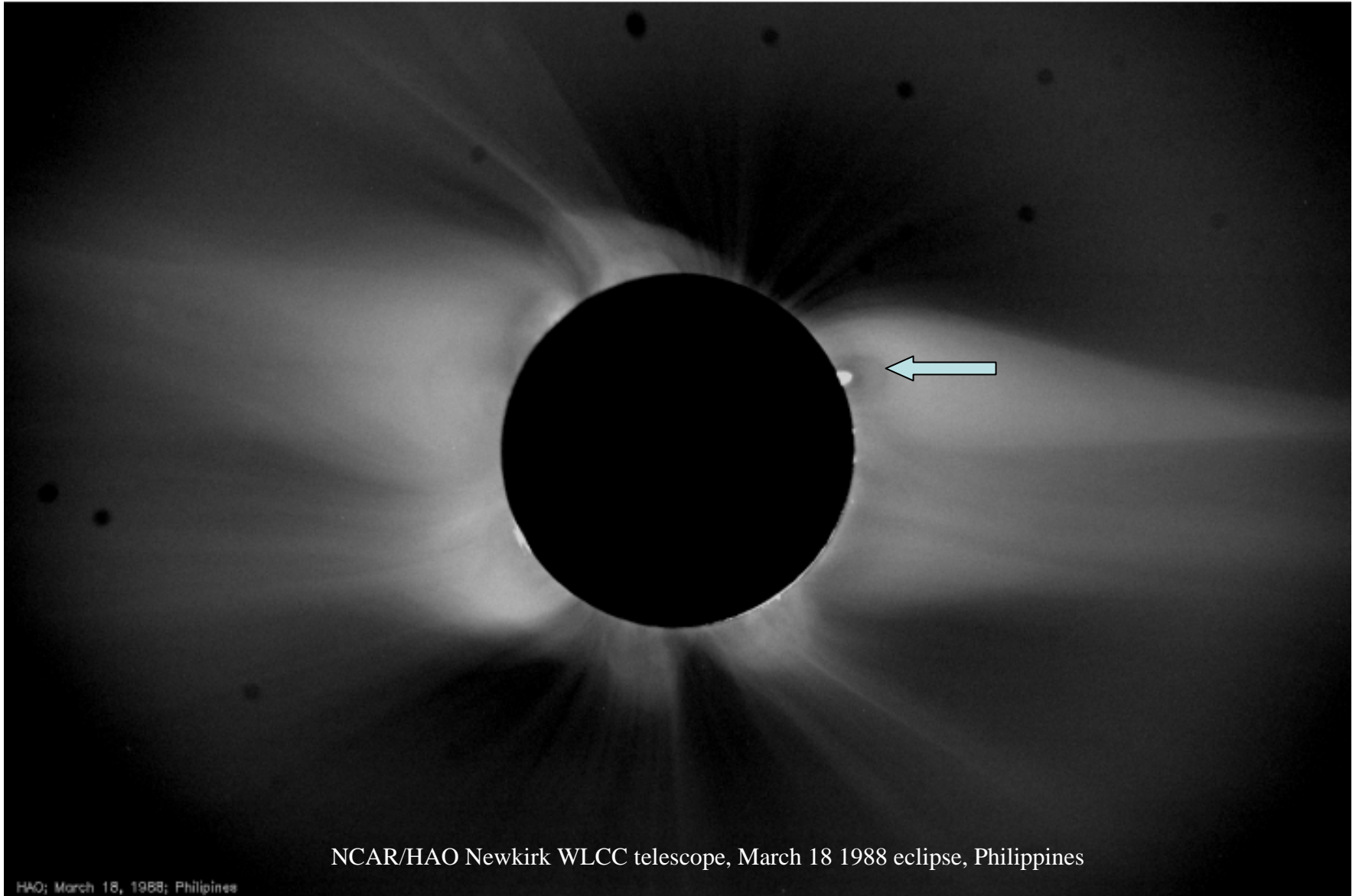


Low and Hundhausen, 1995

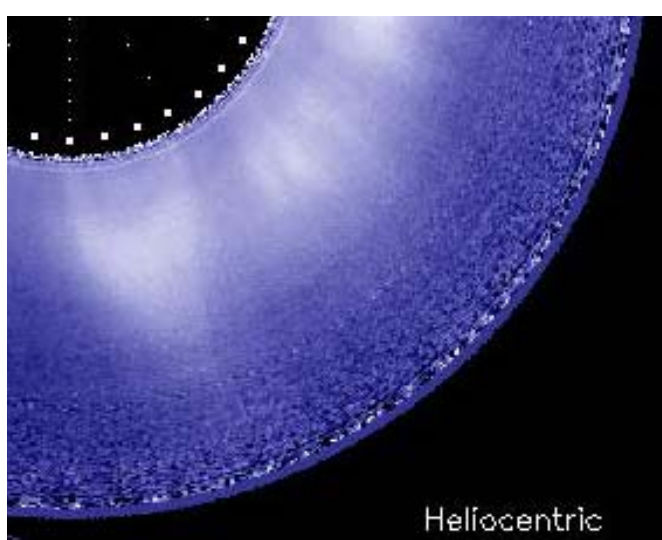


Gibson et al., 2005

Quiescent cavity-3 part structure

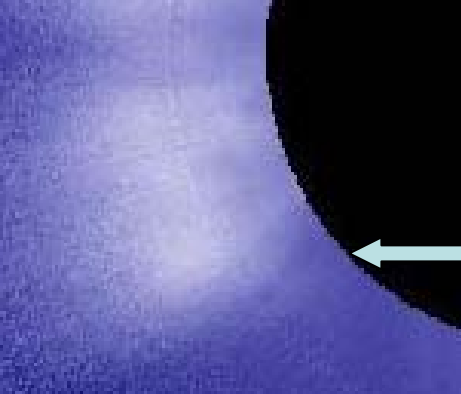


System 4: November 19, 1999



November 18, 1999

QuickTime™ and a
Cinepak decompressor
are needed to see this picture.



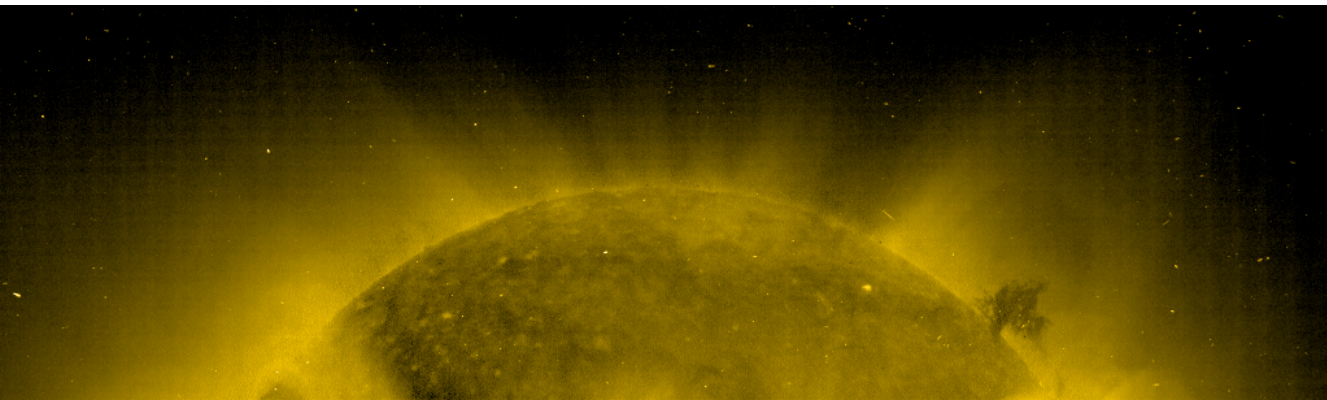
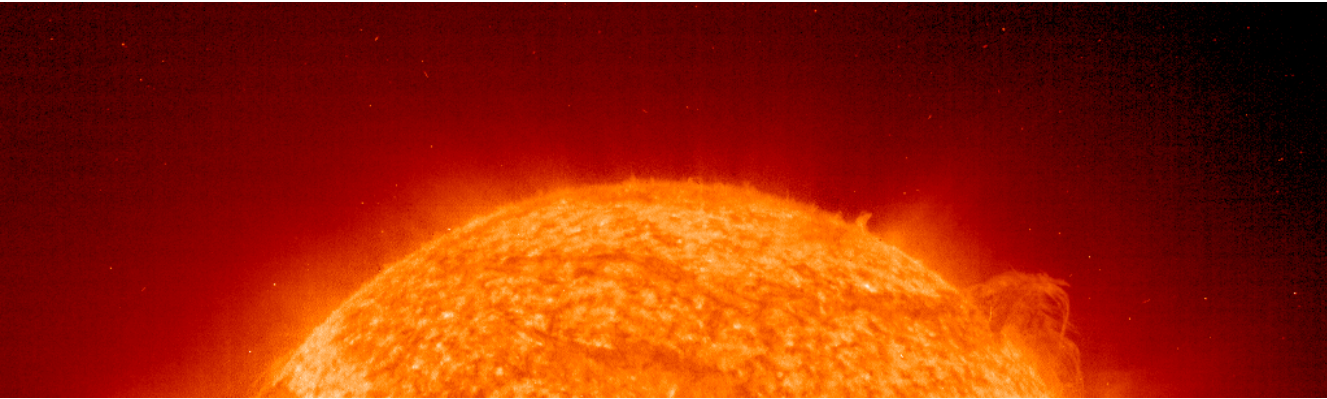
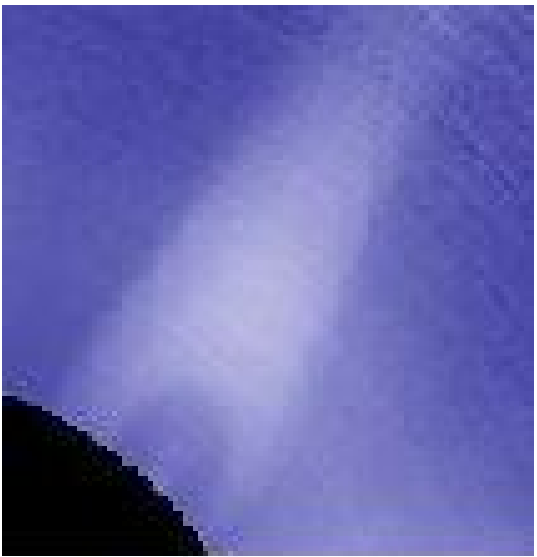
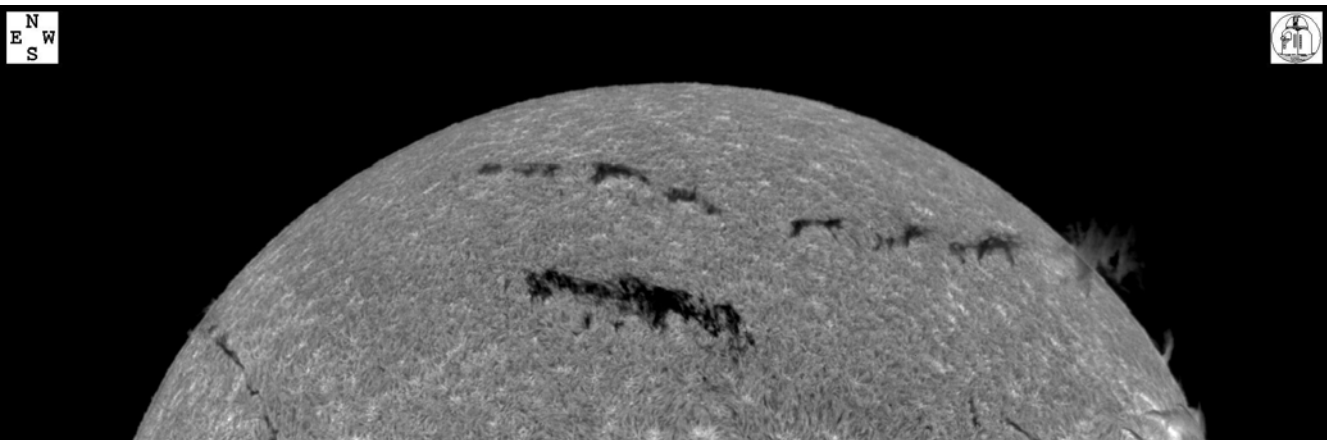
August 8, 2001

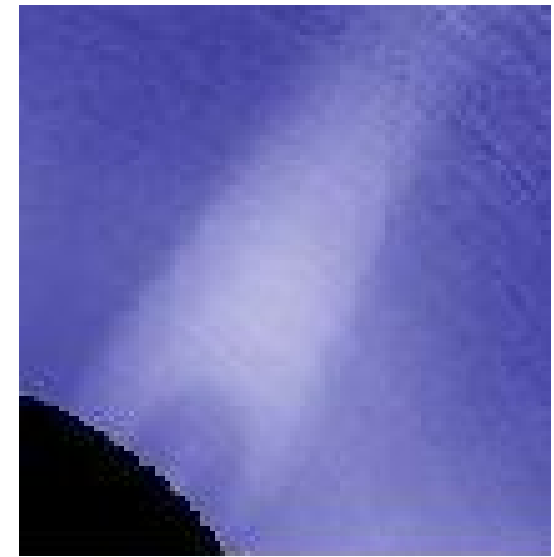
August 9, 2001

QuickTime™ and a
Photo - JPEG decompressor
are needed to see this picture.

QuickTime™ and a
YUV420 codec decompressor
are needed to see this picture.

N
E S W





1. (early in mission) Cavity/filament rising prior to CME -- disentangle rotation of structure vs. actual rising motion
2. (late in mission) 3D magnetic structure: Cavity/prominence at limb, filament/filament channel + magnetic field on disk