Coronal polarization of pseudostreamers and double helmet streamers

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# Basic idea

✤ FORWARD models coronal polarization together with observations from SWAP

✤ Identification of a new hybrid structure that morphs from a side-by-side double helmet streamer into a pseudostreamer

Coronal polarization recap - L/I

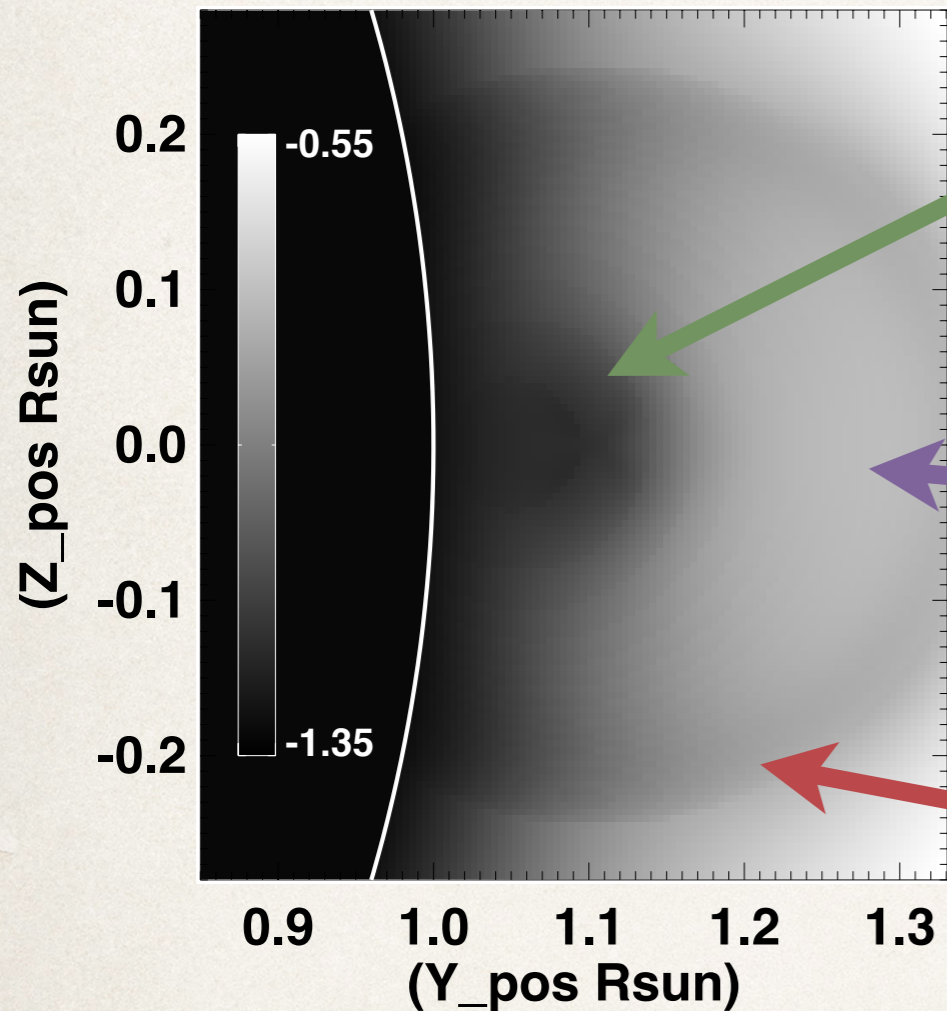$$\frac{L}{I} = \frac{\sqrt{Q^2 + U^2}}{I} \approx 10^{-2} \propto \sin^2 \Theta$$

L=0 provides useful information

1. B is along line of sight (theta=90°) - dark blobs

2. Van Vleck Inversion, B is about 54° from radial - elongated dark structures

3. High symmetry causes false LOS signal - dark blobs
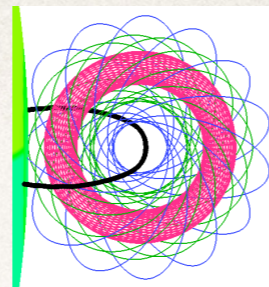
Forward model magnetic field configuration
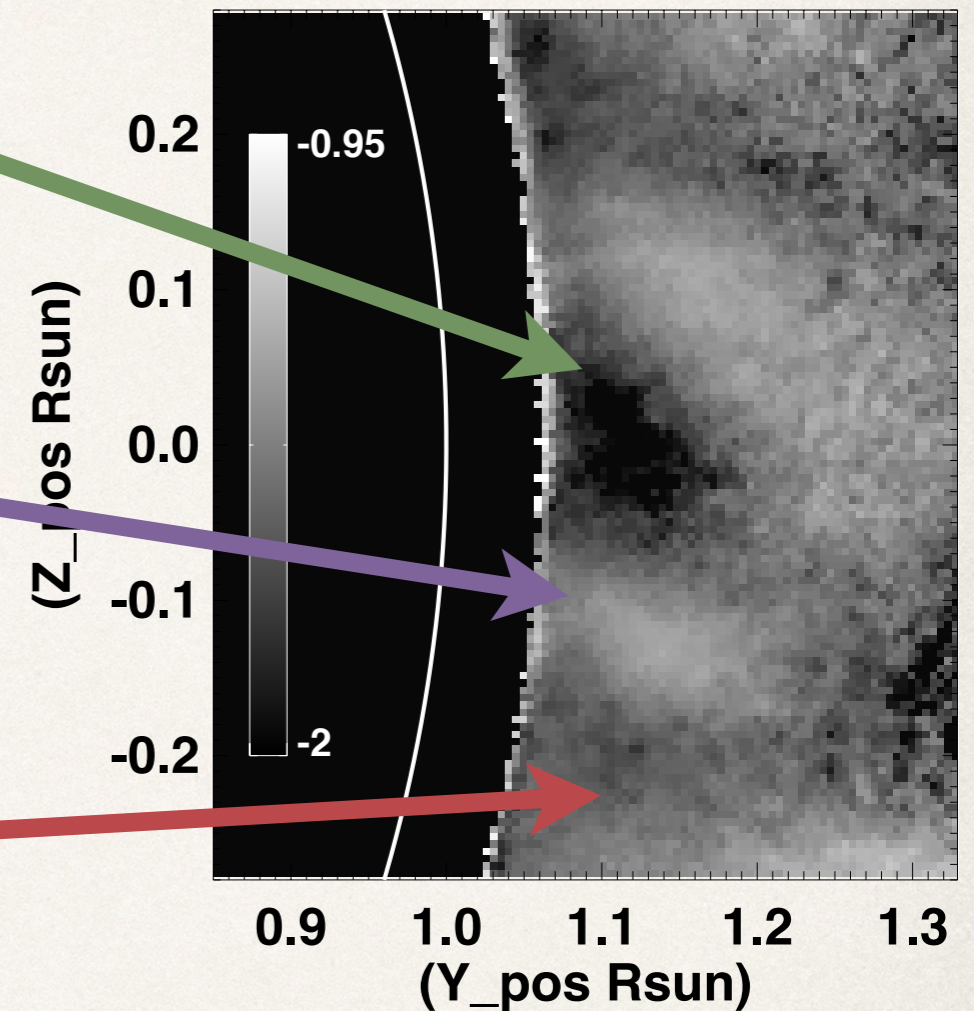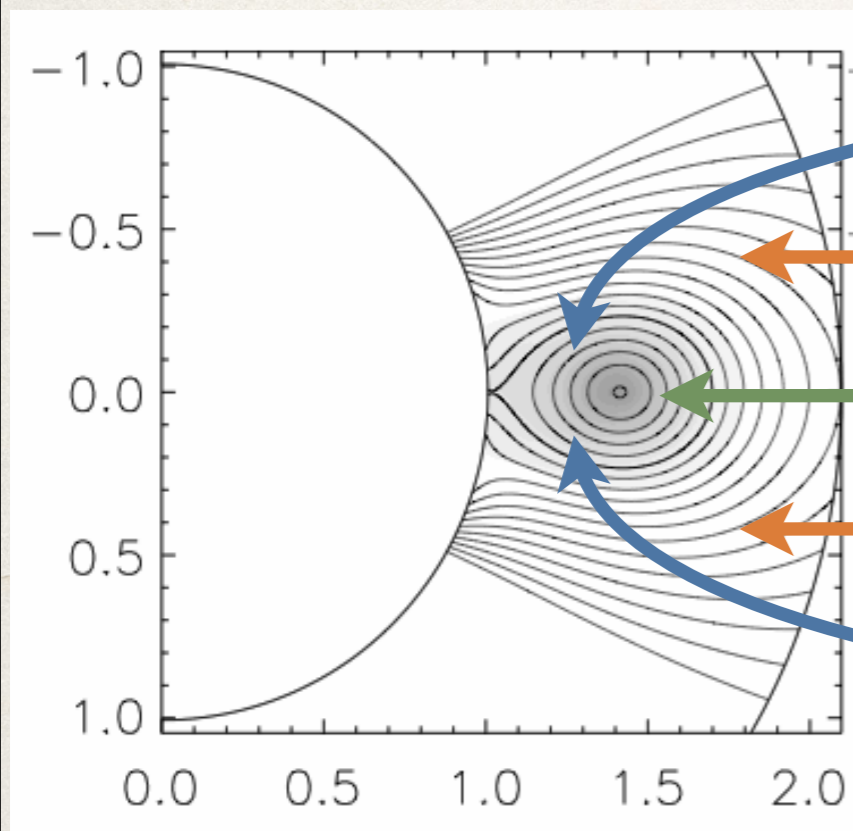
Gibson-Low P/I (log)

CoMP 2005 cavity P/I (log)

Dark central core: LOS axis

Bright ring: POS field

Dark ring: LOS outer field

Previous Work

Spheromak flux rope — Dove et. al. 2011

Previous/Ongoing Work

Streamers and Cavities — Gibson et al 2010; Bąk-Stęślika 2013; Forland et al 2013; Rachmeler et al 2013
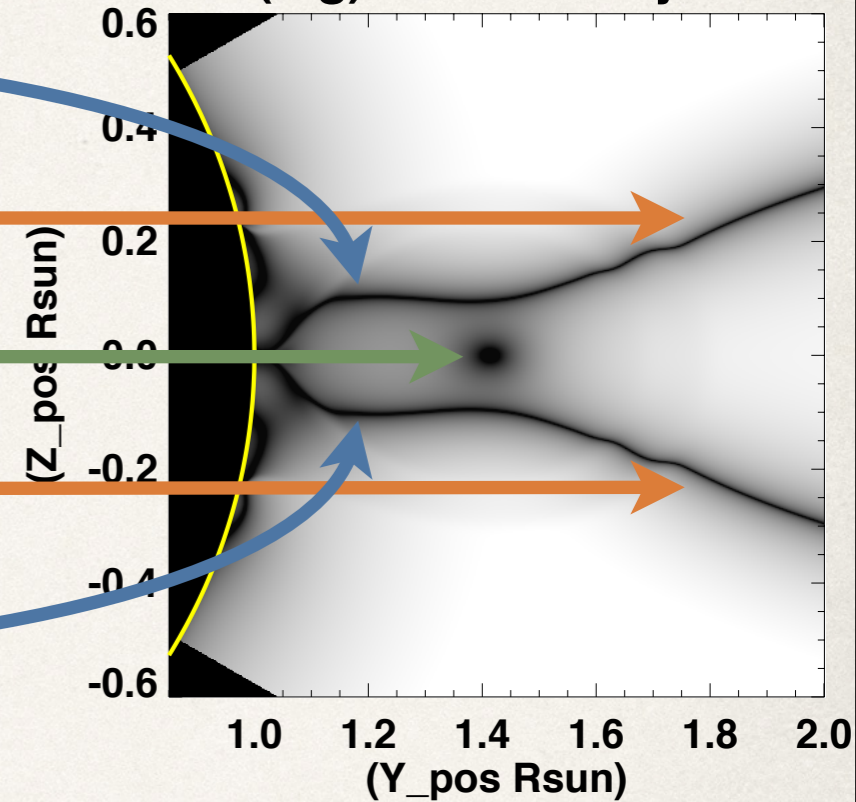
SWAP

March 3 to

June 10

2013

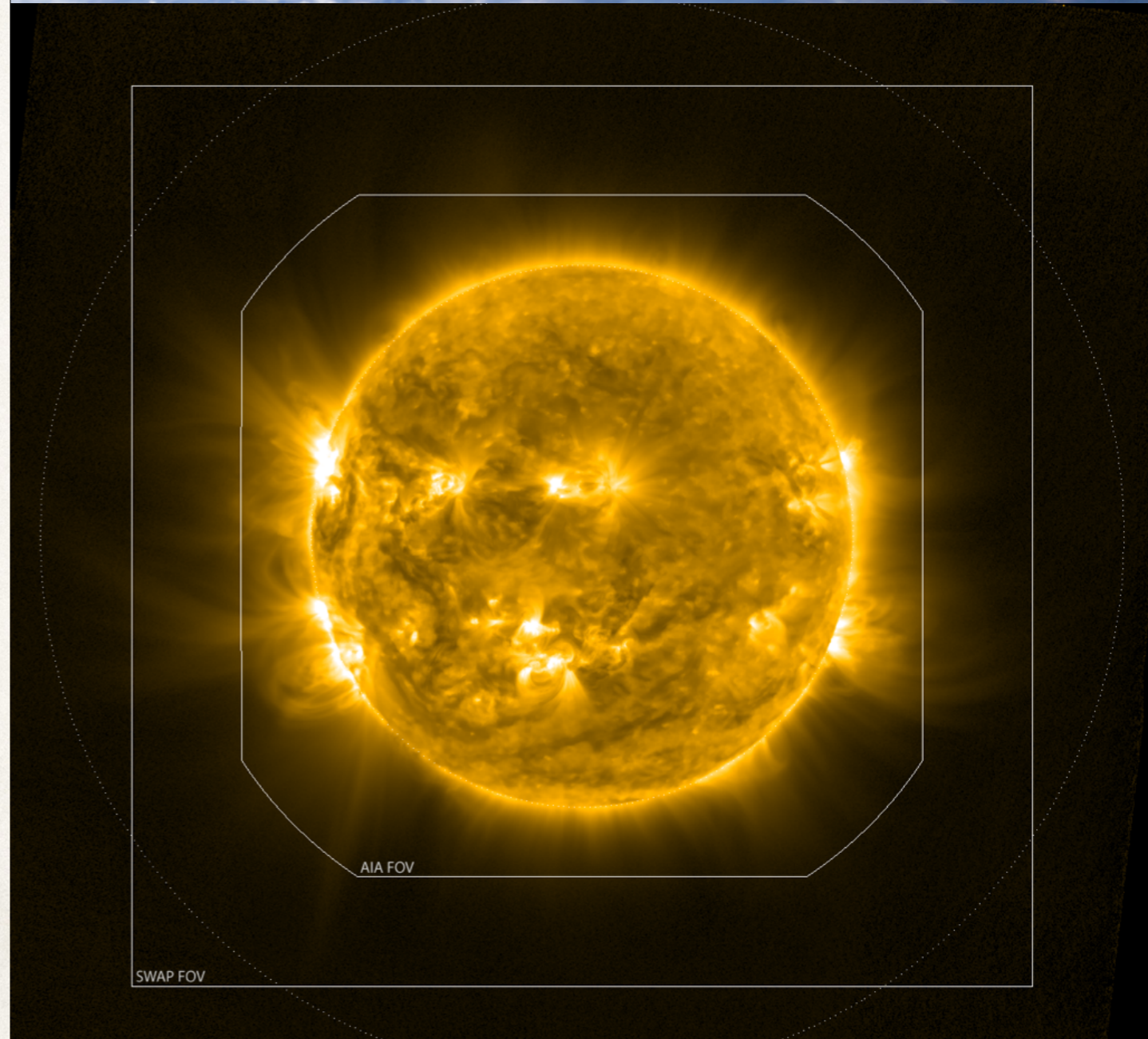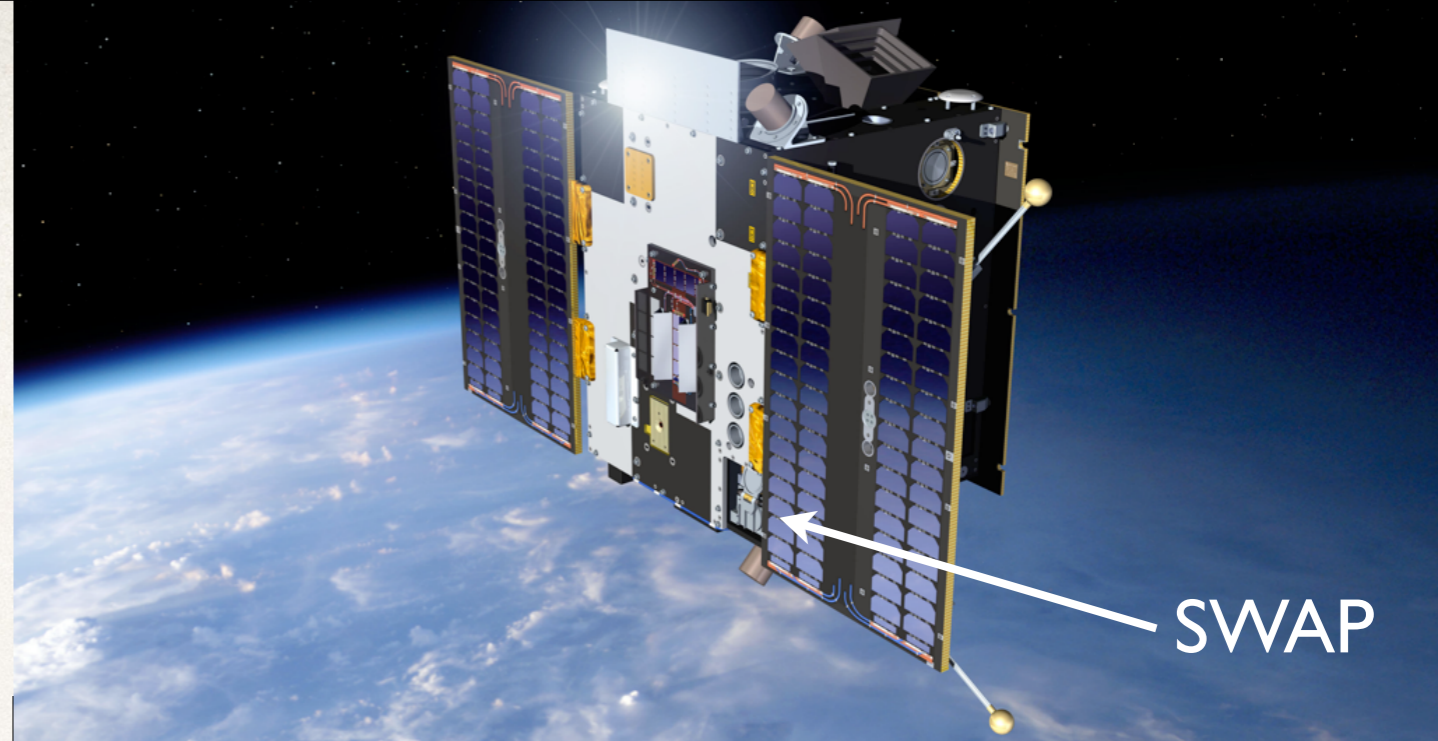East longitude = 276   PROBA2/SWAP   2013-03-21   00:24:52   West longitude = 96
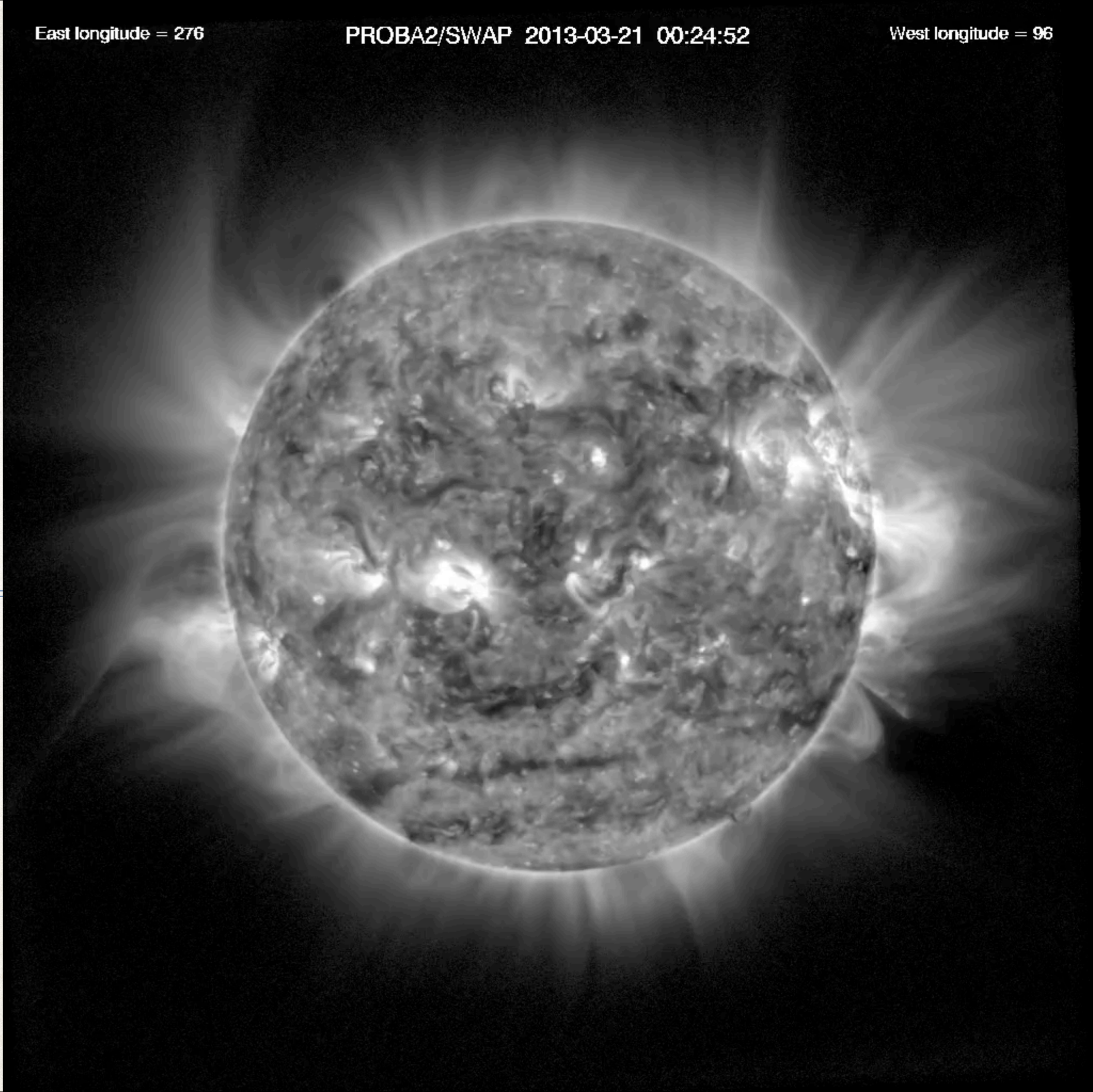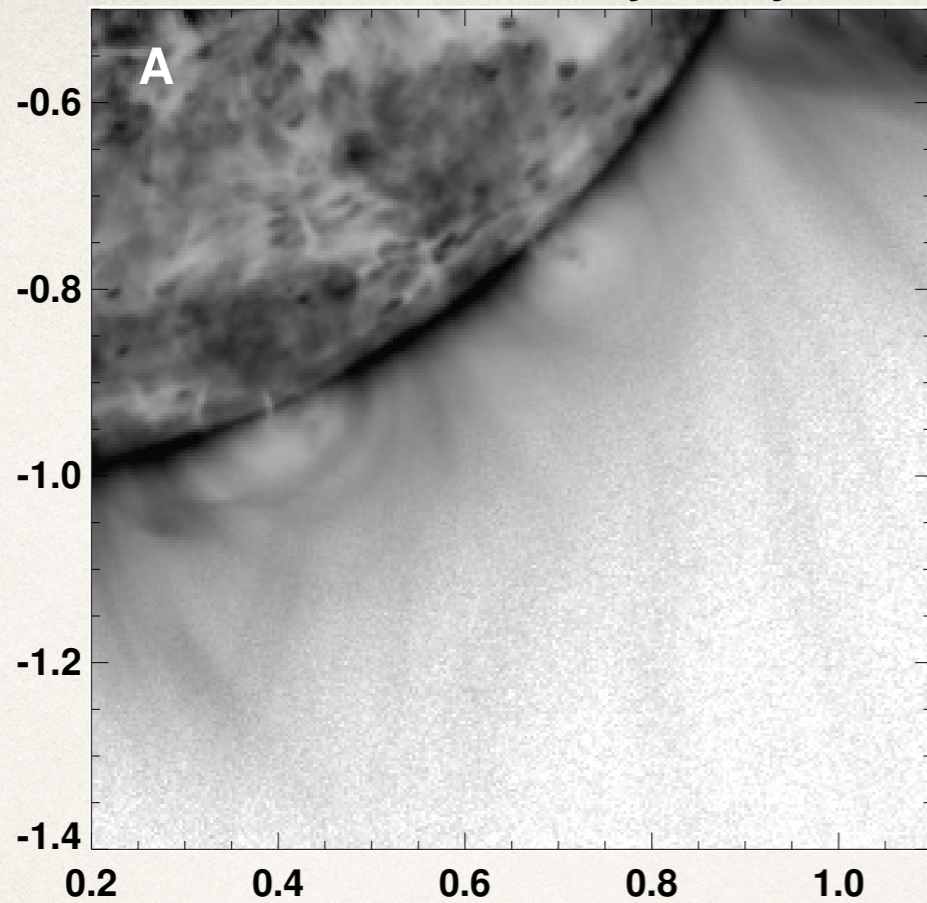
The SWAP telescope

SWAP

* PROBA2: Small ESA satellite in polar orbit, launched Nov 2009

* SWAP: Sun Watcher with Active Pixel System & Image Processing

* 174 Å bandpass, ~1MK

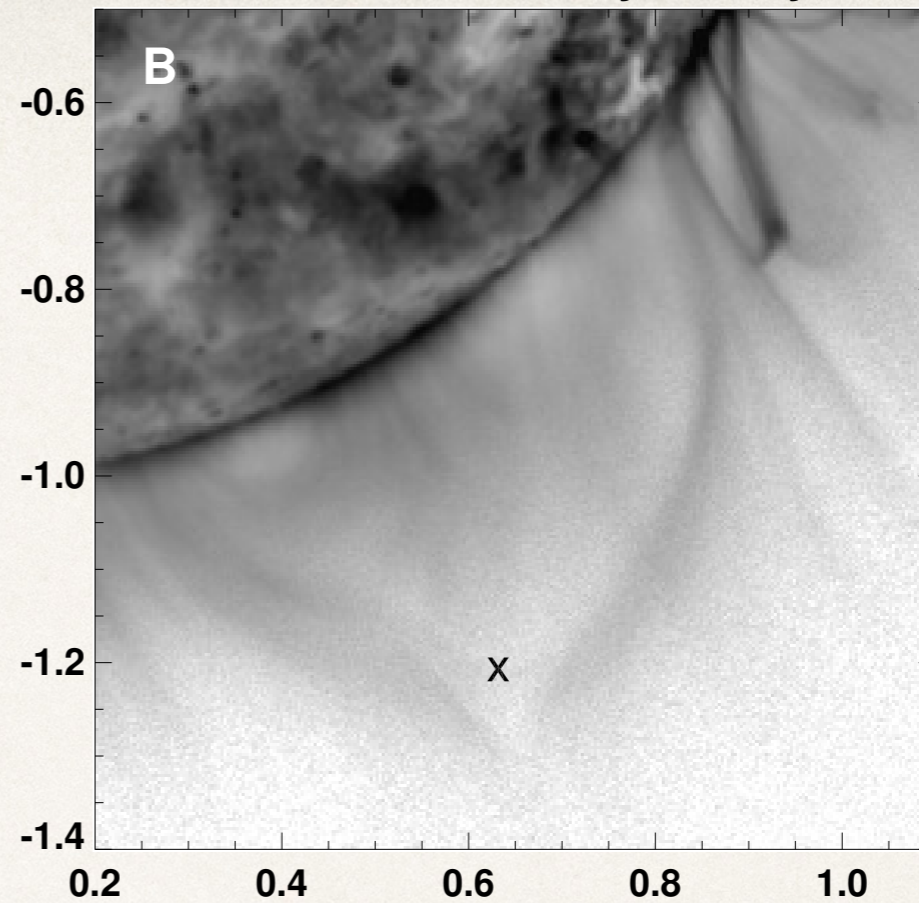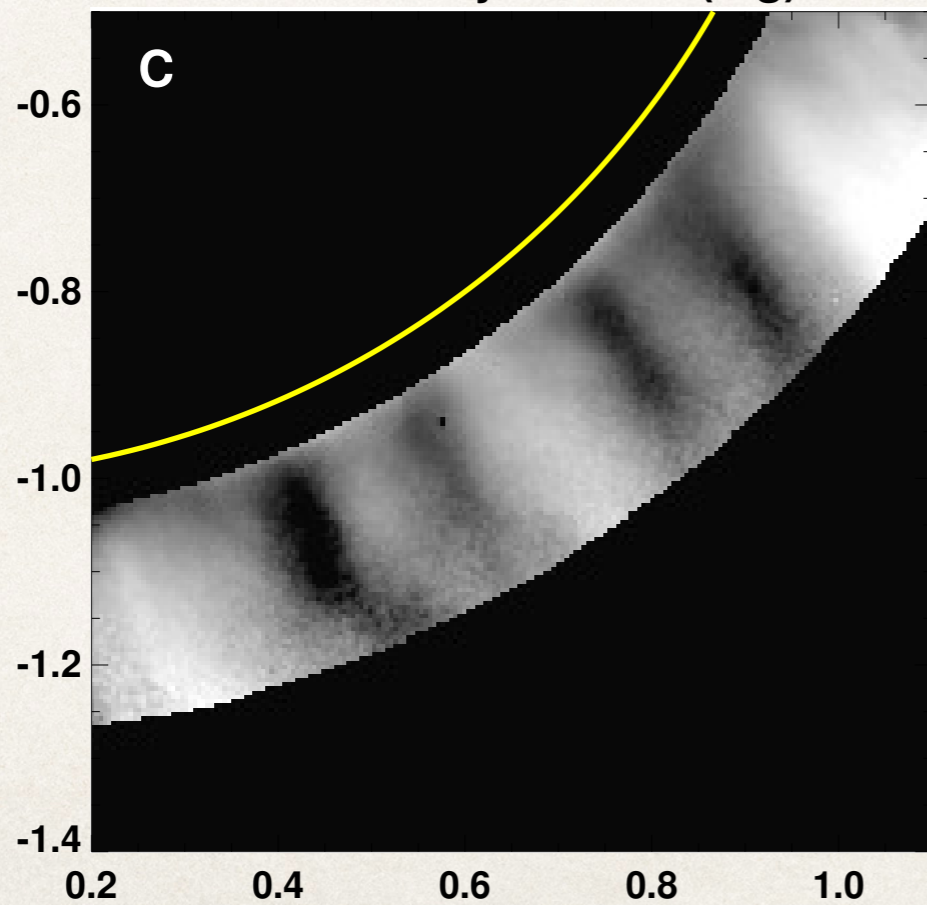* Large FOV, 54 arcmin, 3.2 arcsec resolution
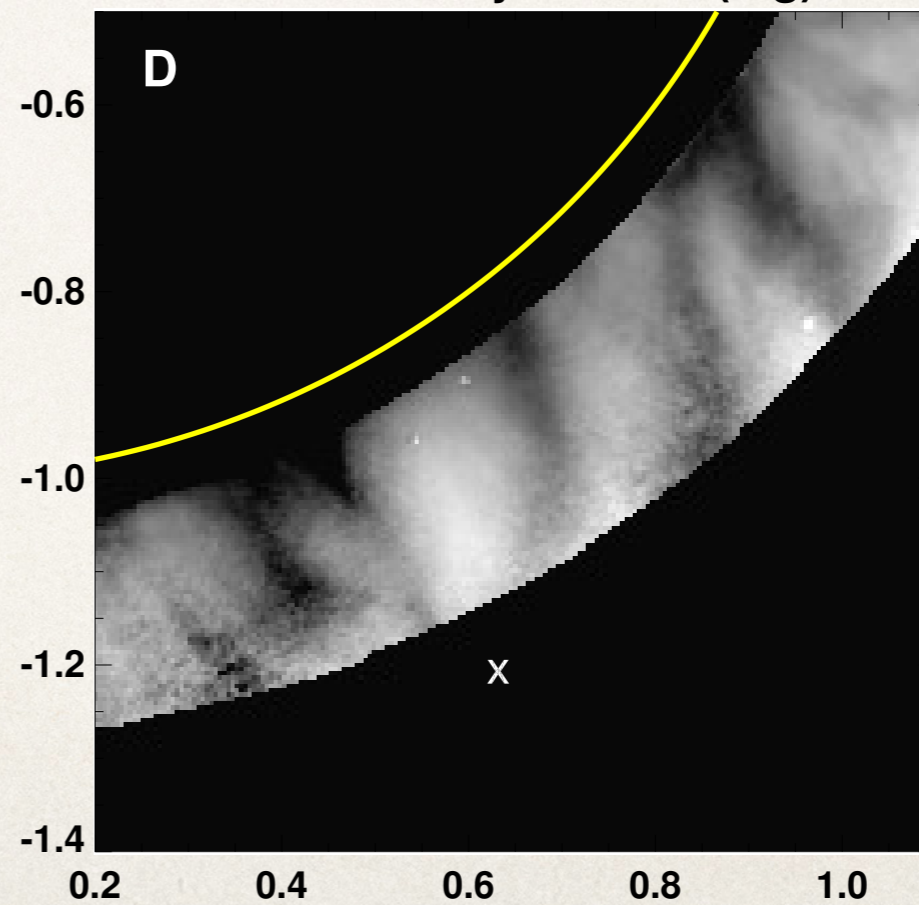
* 3 min cadence images

Inverted SWAP Intensity 5 May 2013

Inverted SWAP Intensity 10 May 2013

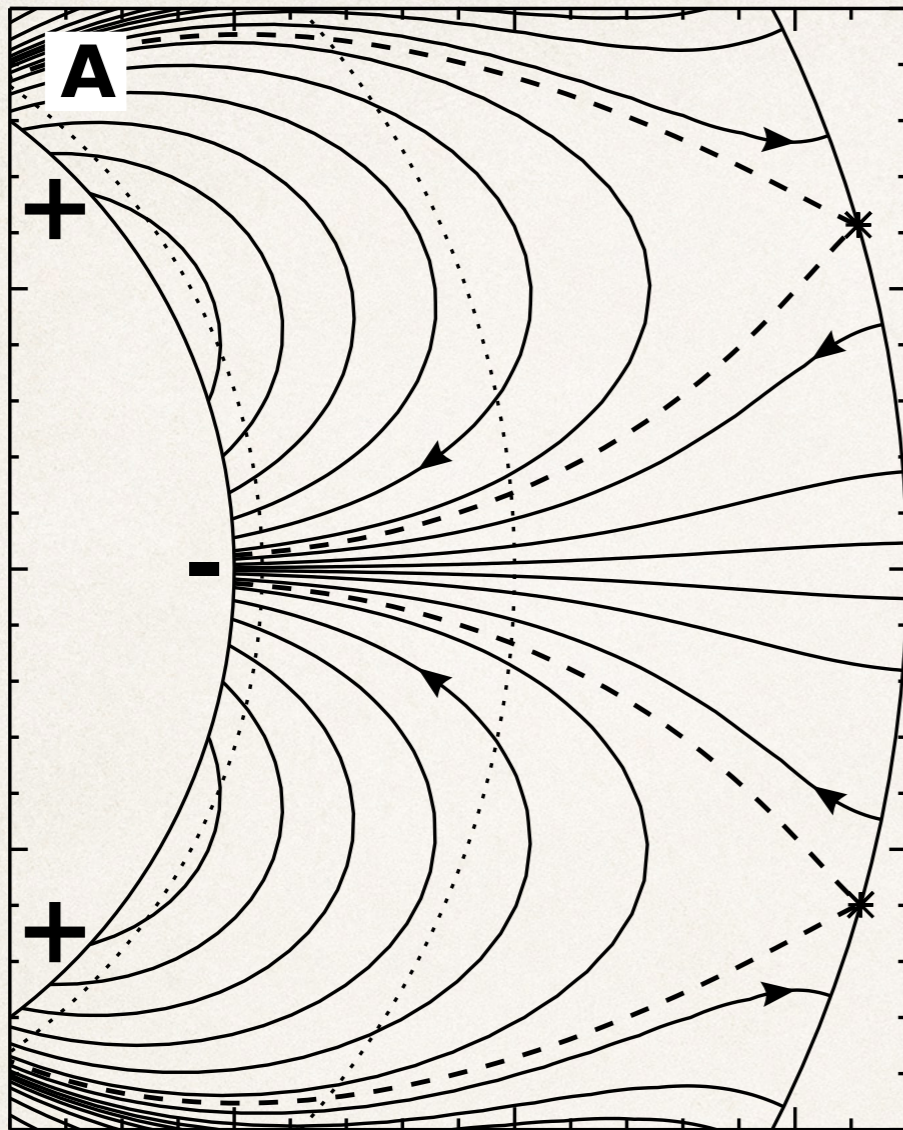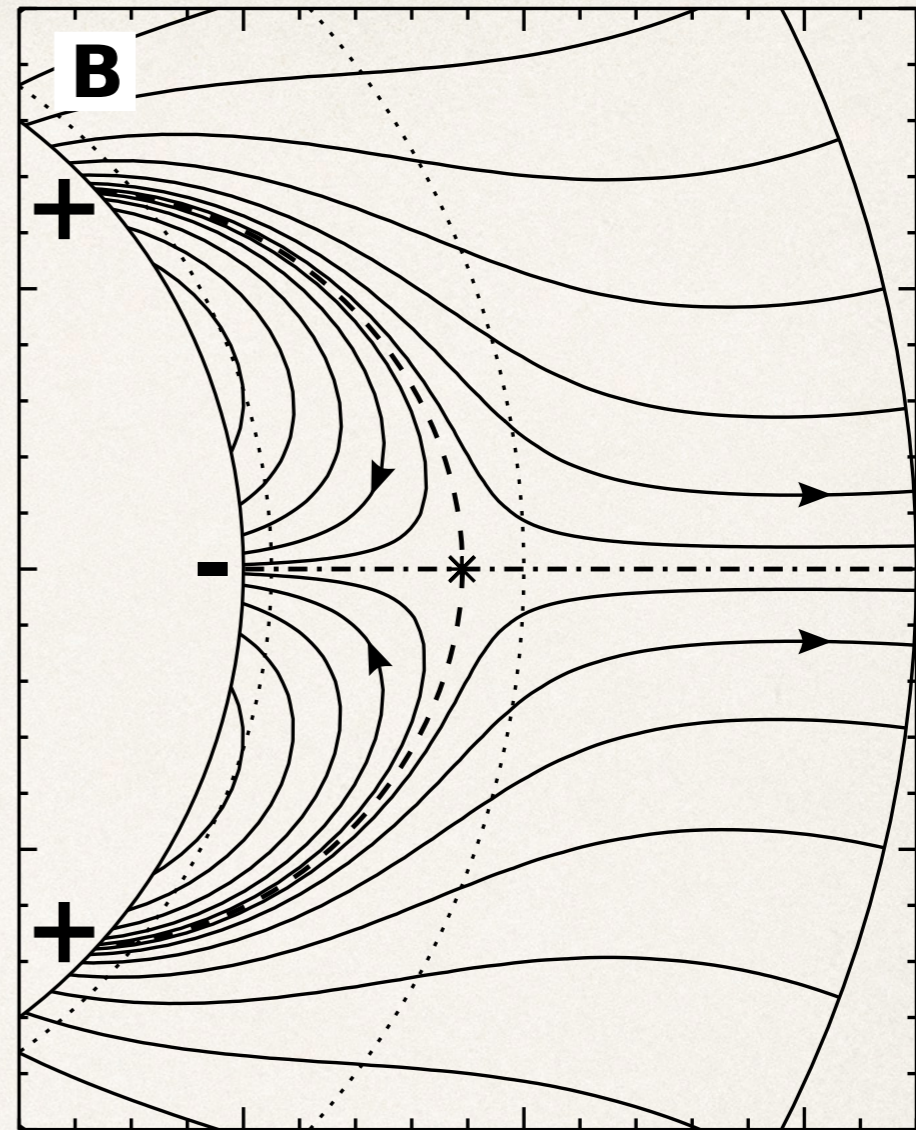CoMP 5 May 2013 L/I (log)

CoMP 10 May 2013 L/I (log)

Double Streamer

Pseudostreamer
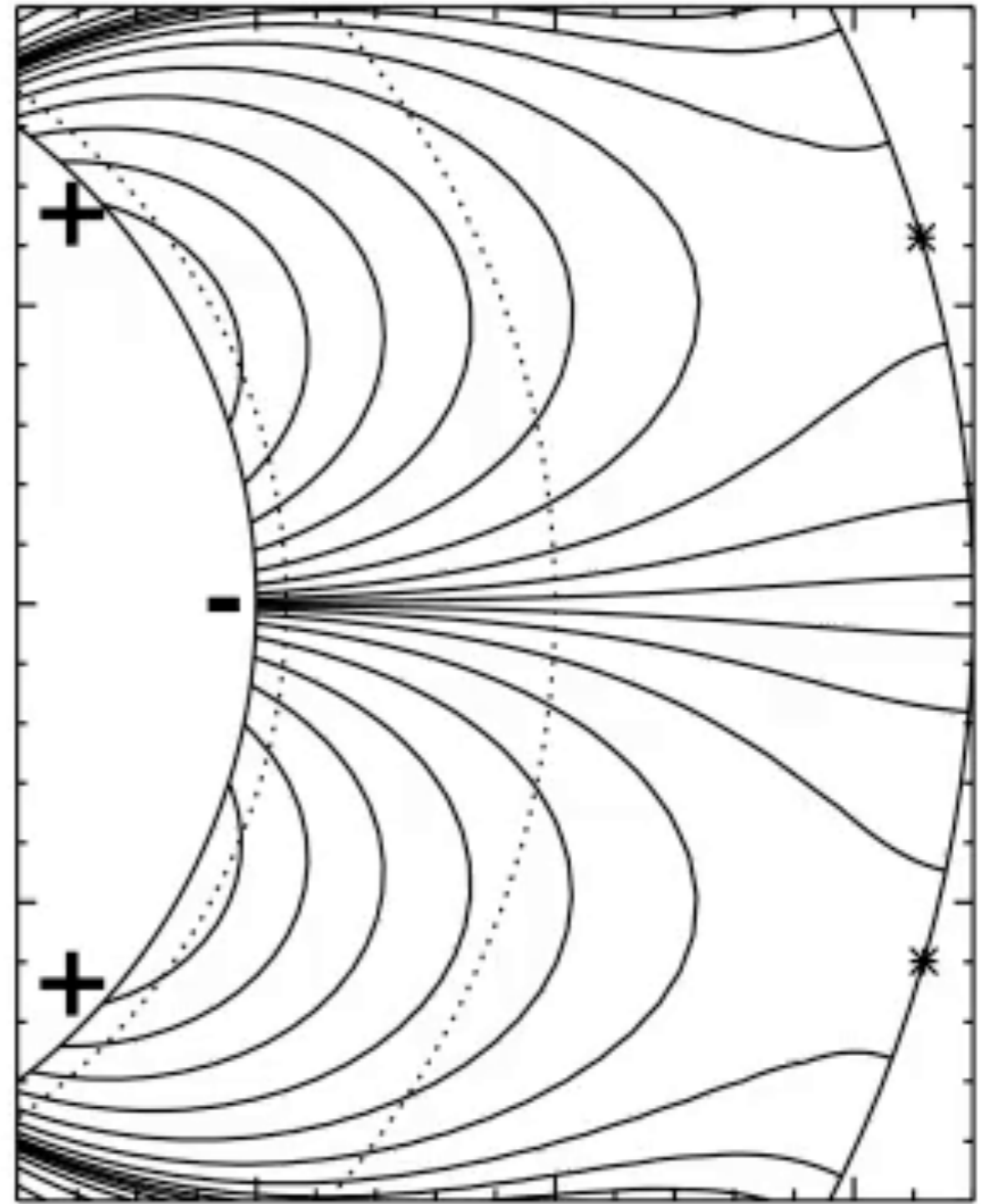
Double Streamer

Pseudostreamer

Magnetic Models

*Simple, 2D axisymmetric, hydrostatic plasma background*

Hybrid model
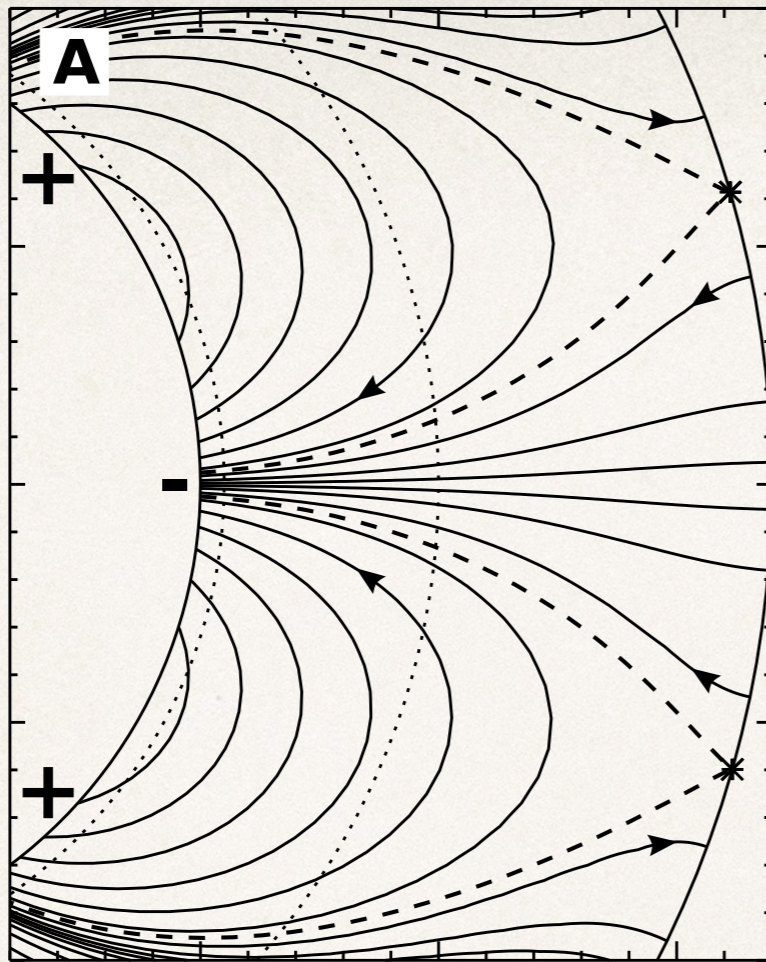
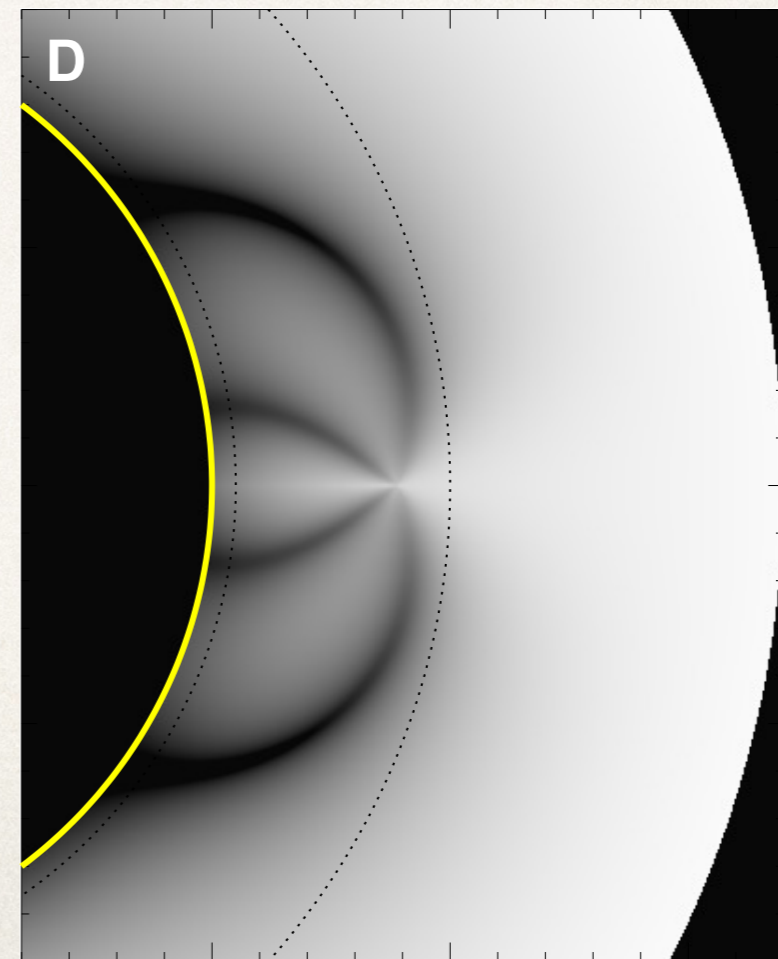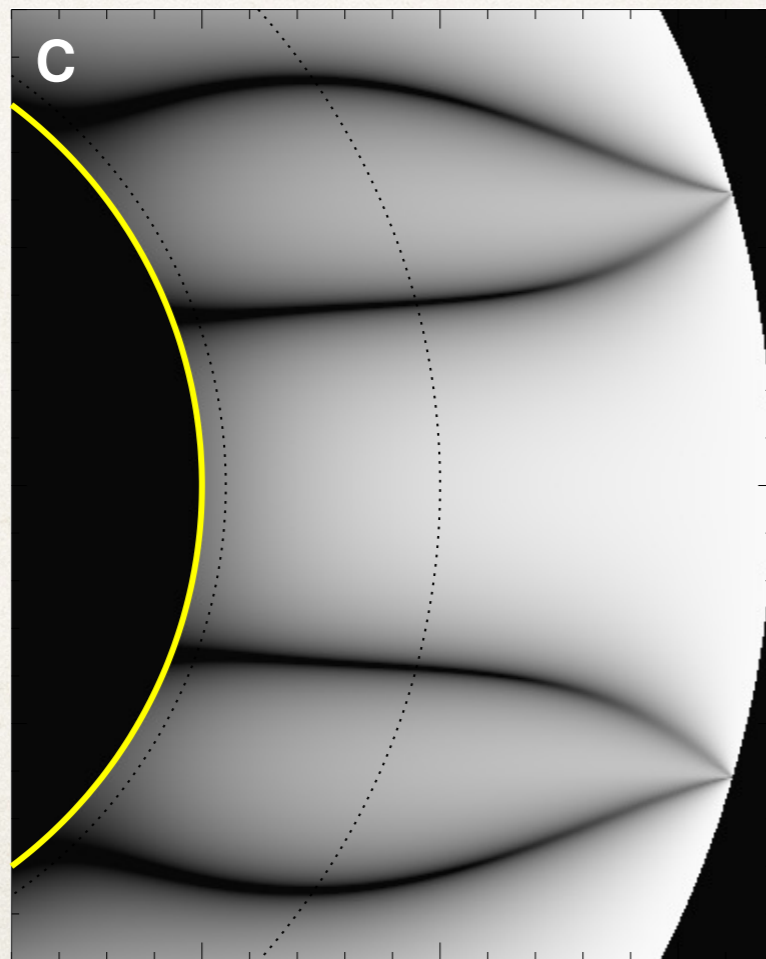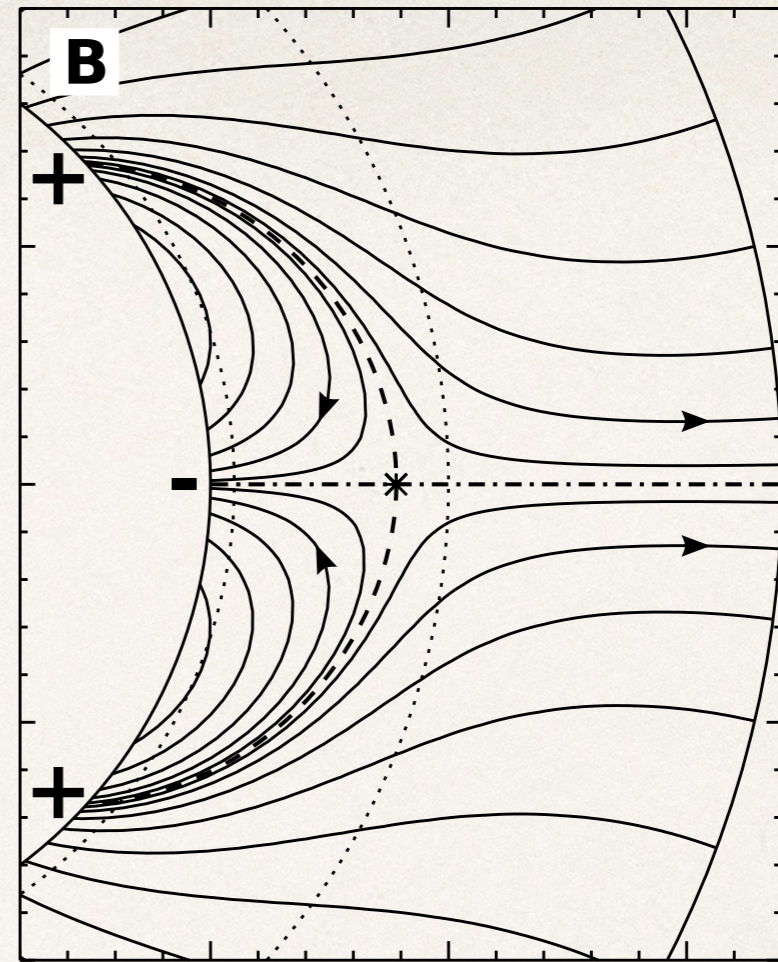- ✤ 3D structure
- ✤ Progressive longitudinal slices
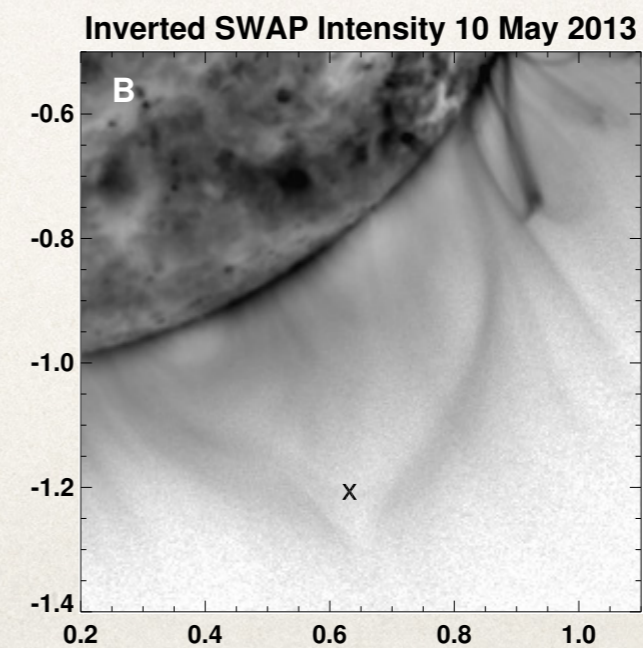- ✤ Cartoon model

Zoom in movie

Indications of the hybrid structure

SWAP 02-May-2013 00:57:11 UT
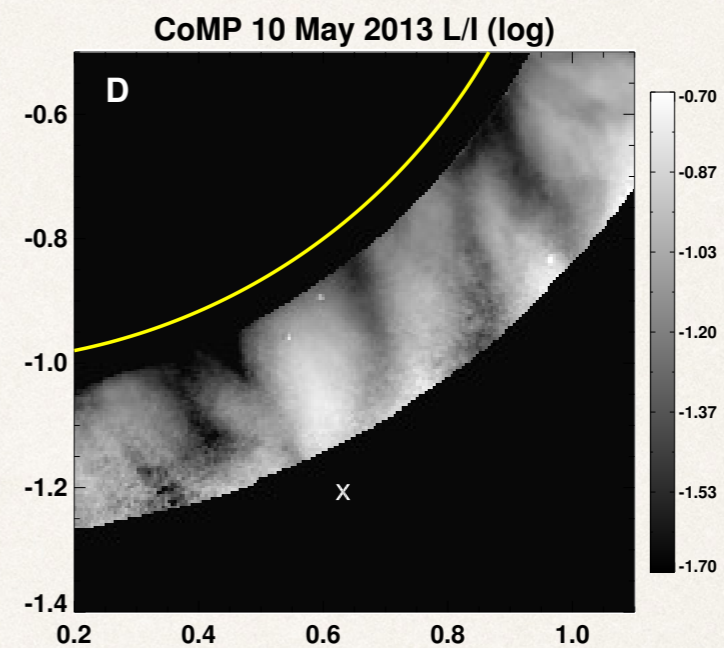
Double Streamer

A

Pseudostreamer

B

C

D

Double Streamer

A

C

Models

D

B

Pseudostreamer

CoMP 5 May 2013 L/I (log)

C

CoMP

CoMP 10 May 2013 L/I (log)

D

Inverted SWAP Intensity 5 May 2013

A

SWAP

Inverted SWAP Intensity 10 May 2013
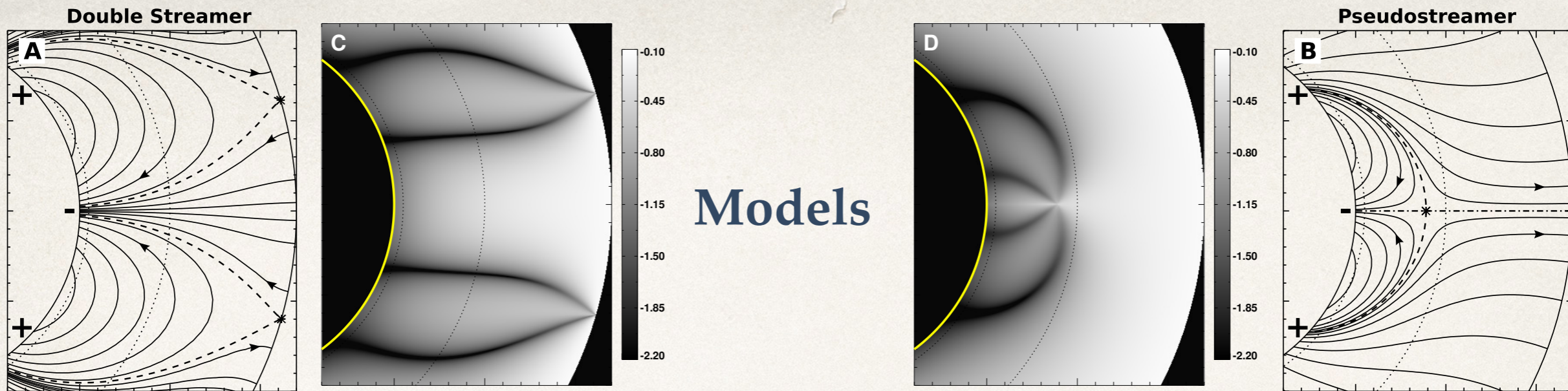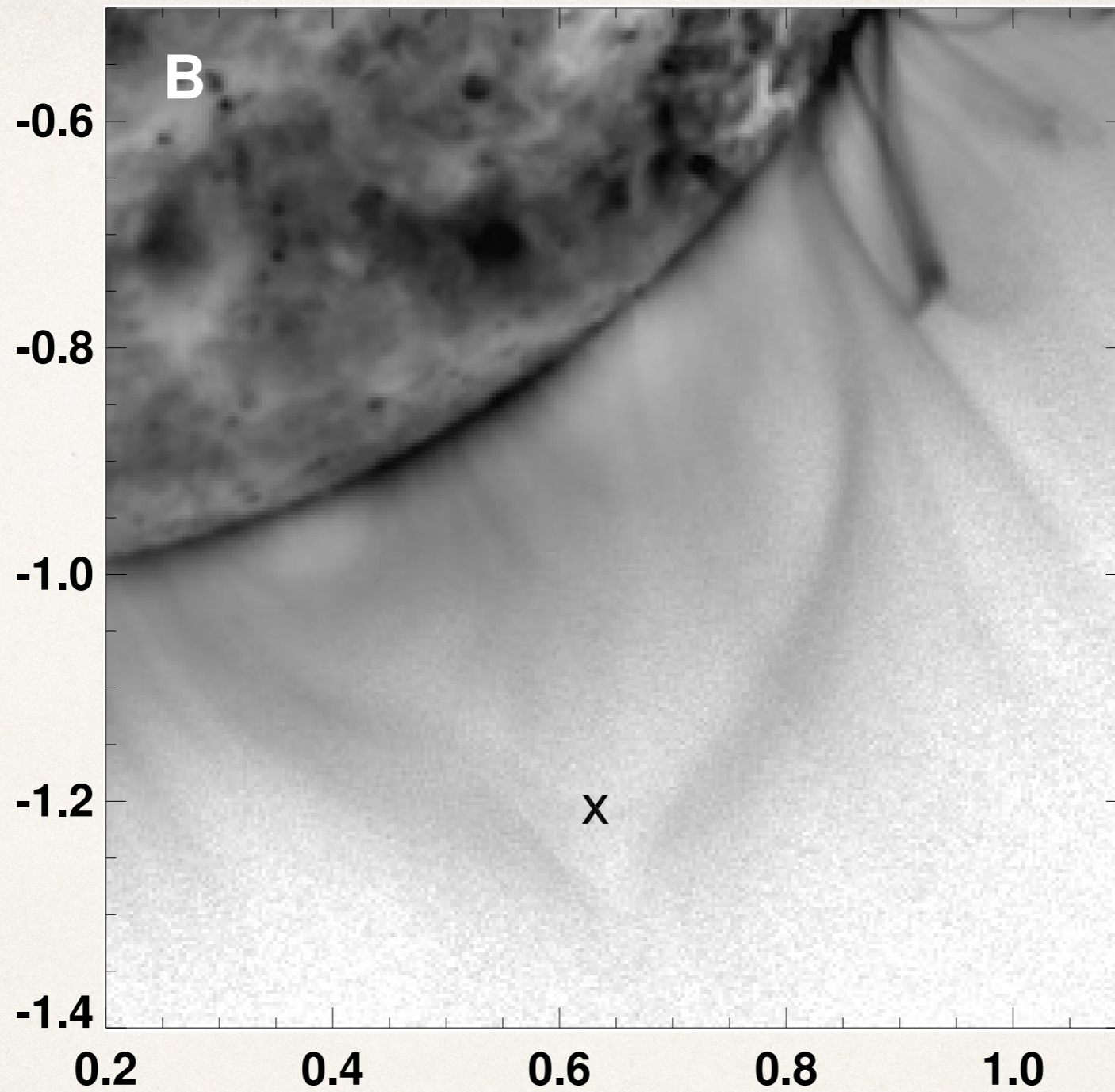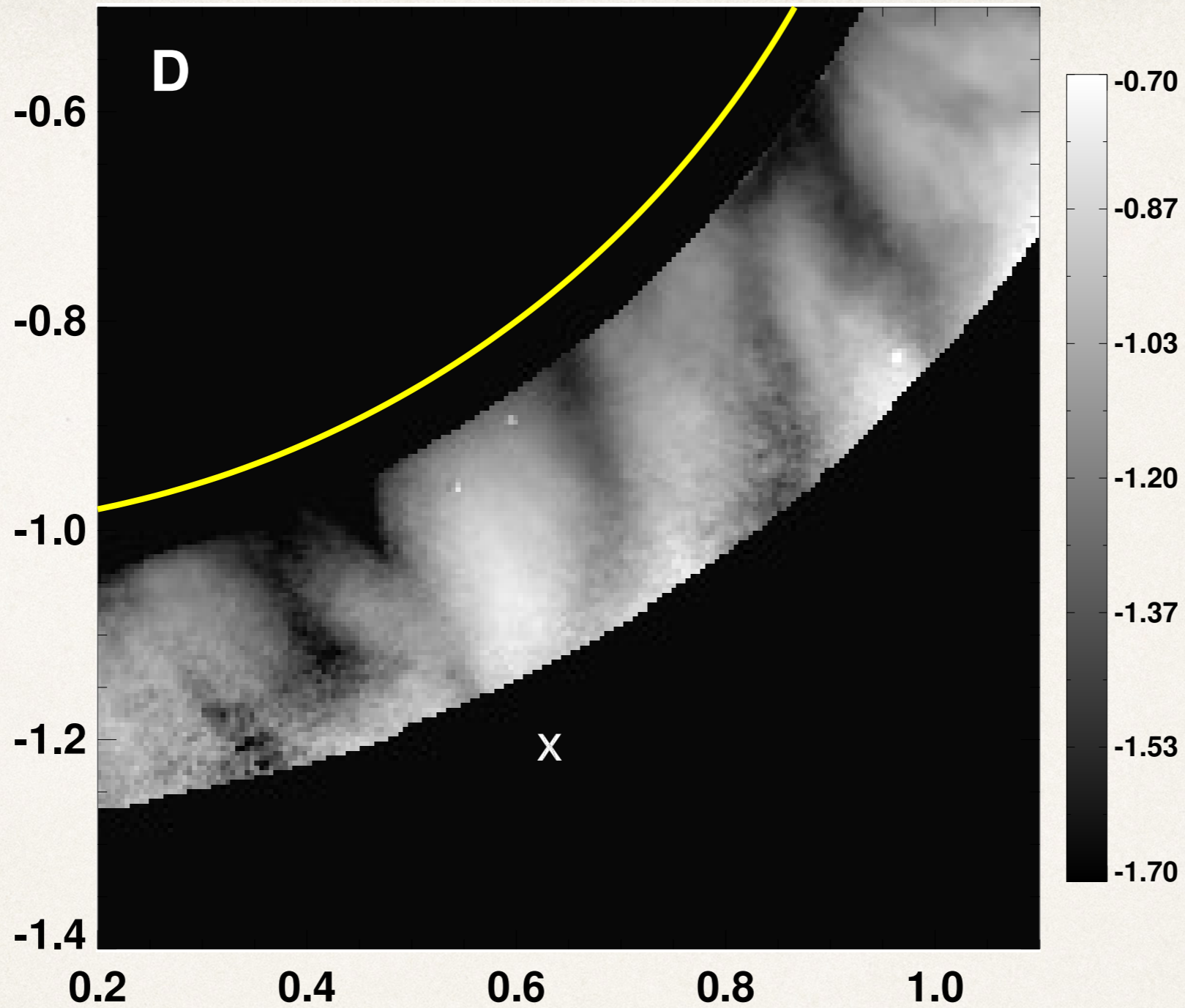
B
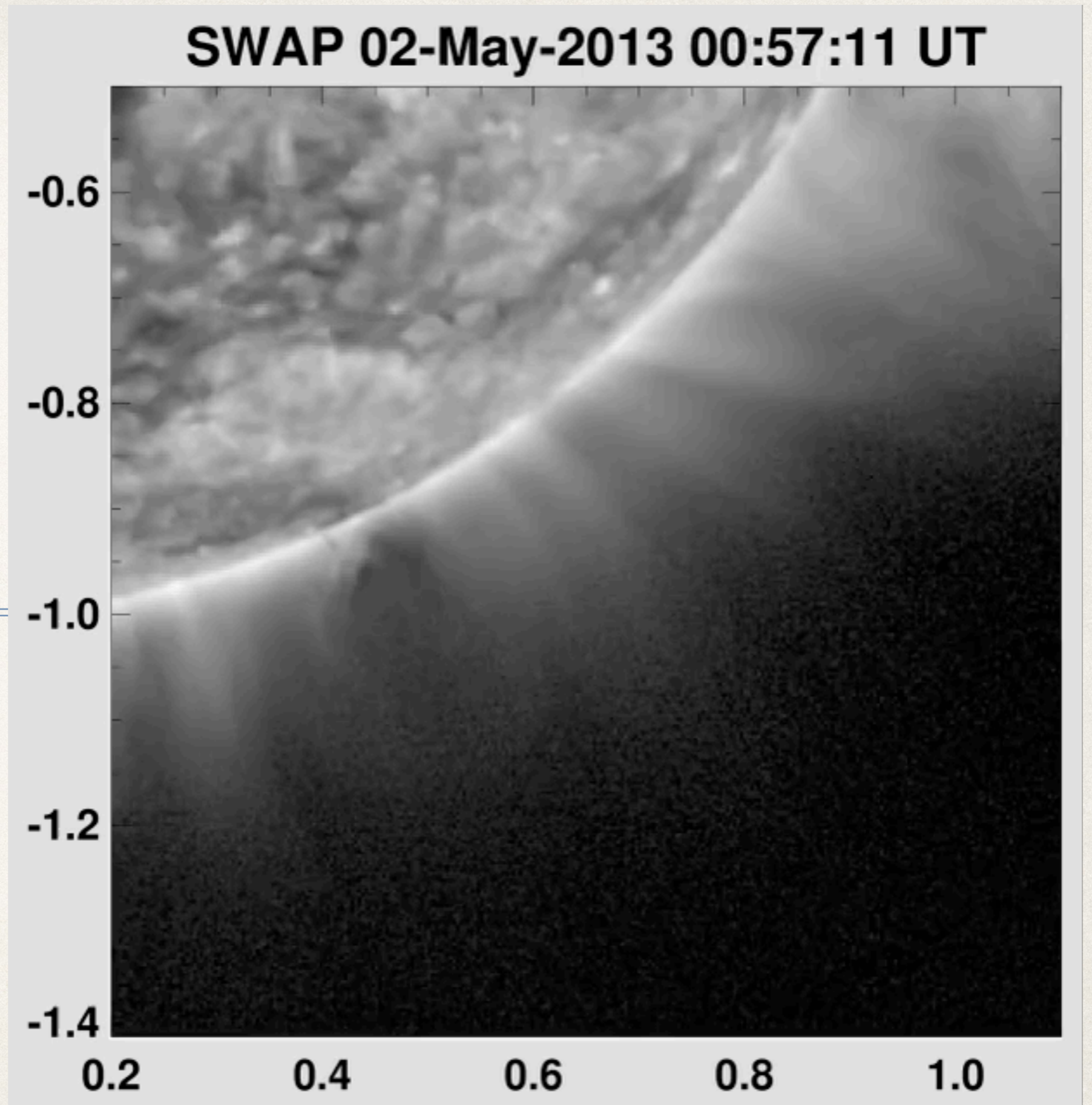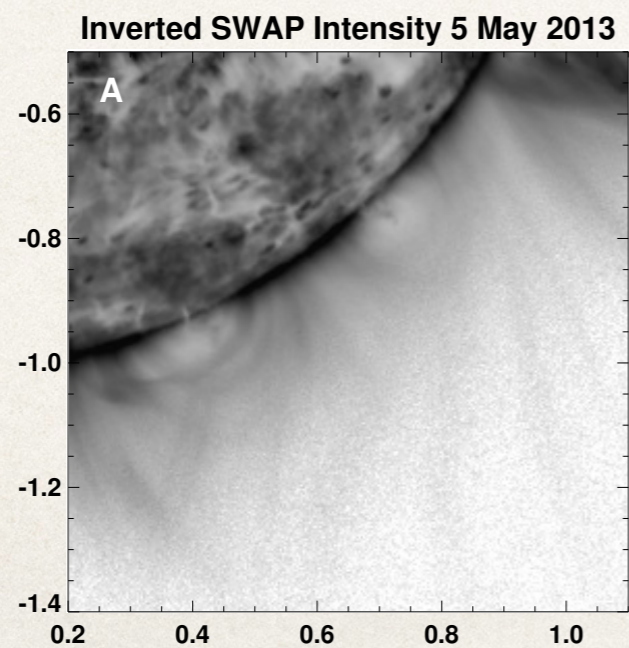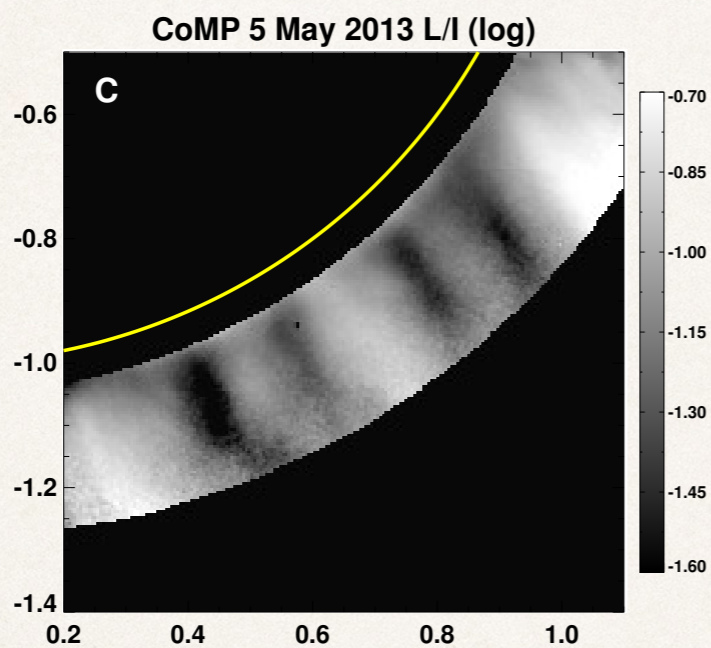
Inverted SWAP Intensity 10 May 2013

Unresolved issue

Extra dark features in L/I

CoMP 10 May 2013 L/I (log)

Unresolved issue

Extra dark features in L/I