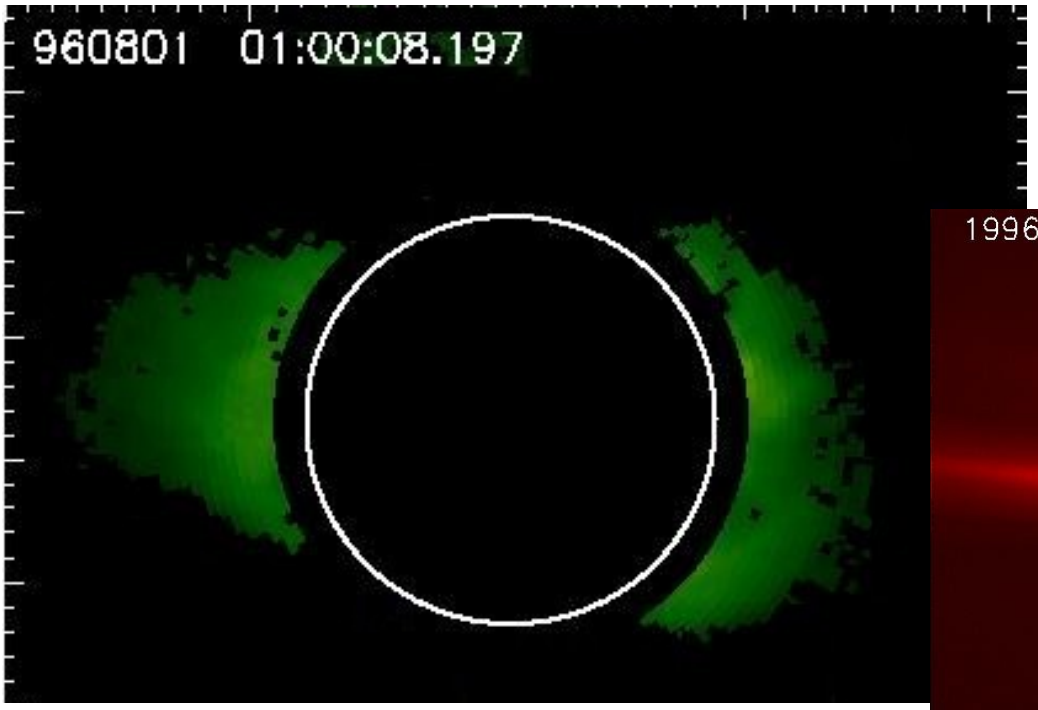
Study of the Minimum Solar Corona on the Period August-October 1996

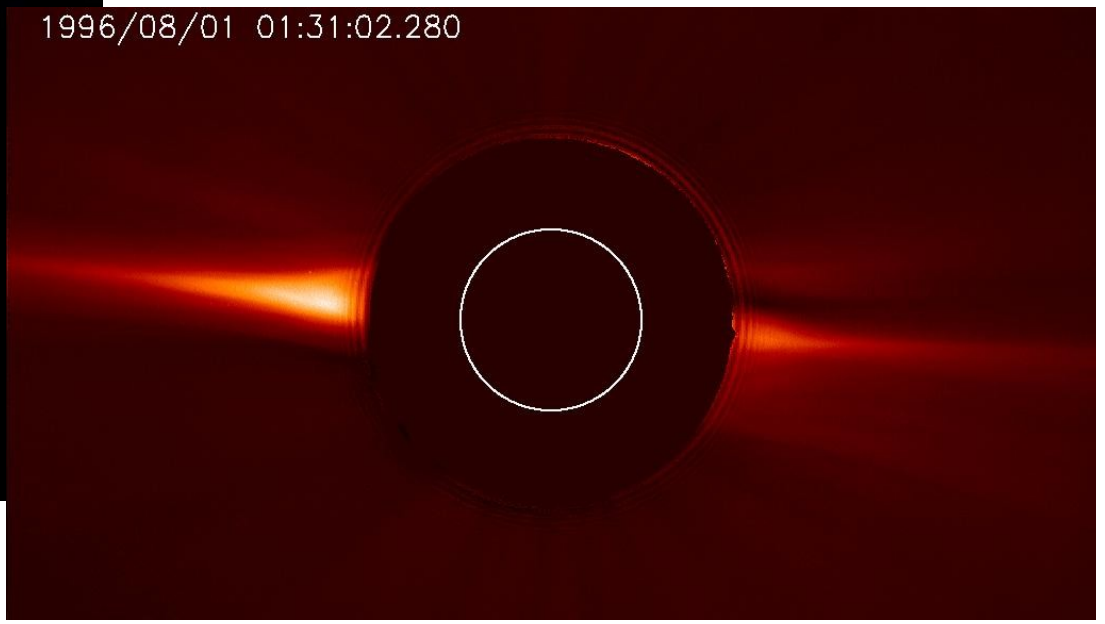
M. Mierla, R. Schwenn, L. Teriaca,
G. Stenborg, B. Podlipnik

Contents

1. Introduction
2. Data Used
3. Data Reduction
4. Solar Corona at Minimum of Activity
5. Conclusions

Introduction

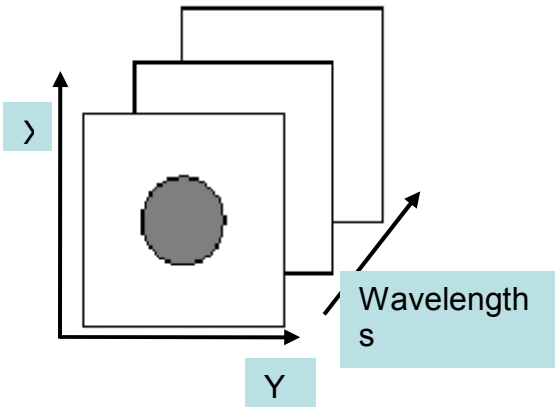




Aim: Study the dynamics of the solar corona at minimum of activity using LASCO-C1 spectral data.

Data Used

Date	*Xsize (pixels)*	*Ysize (pixels)*	*bin*	*Exp. time (s)*	$\lambda_{on\ min}$ (Å)	$\lambda_{on\ max}$ (Å)	λ_{off} (Å)	λ– step (Å)
Aug - Oct 1996	832	672	1	25	5300.90	5303.95	5309.24	0.3
Aug - Oct 1996	832	672	1	16	6374.11	6377.94	6380.95	0.5



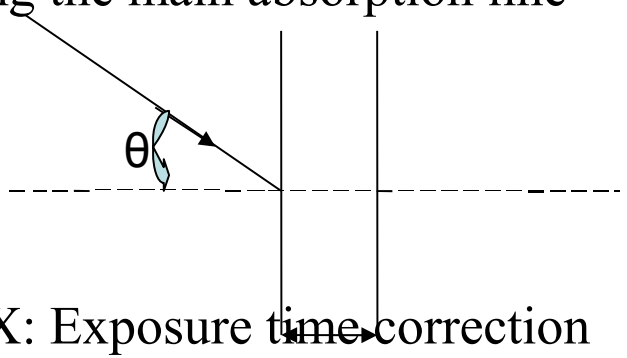
Each on-line image:
emission corona + continuum corona + stray light

Data Reduction

- normalize by exposure time
- bias correction
- cosmic rays removal

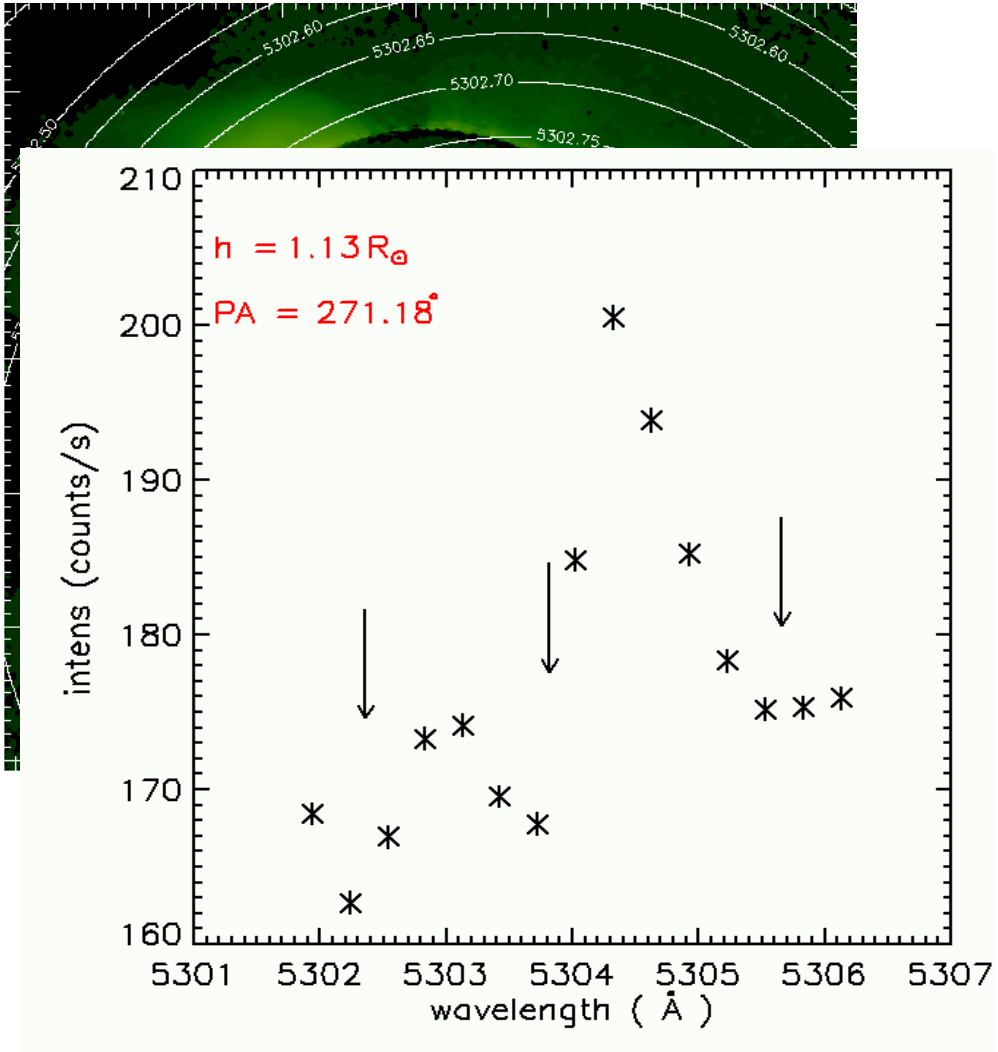
Correction of FP transmittance

Fe XIV: Calibration of wavelengths using the main absorption line



Fe X: Exposure time correction

$$n \cdot d \cdot \cos\theta = m \cdot \lambda / 2$$



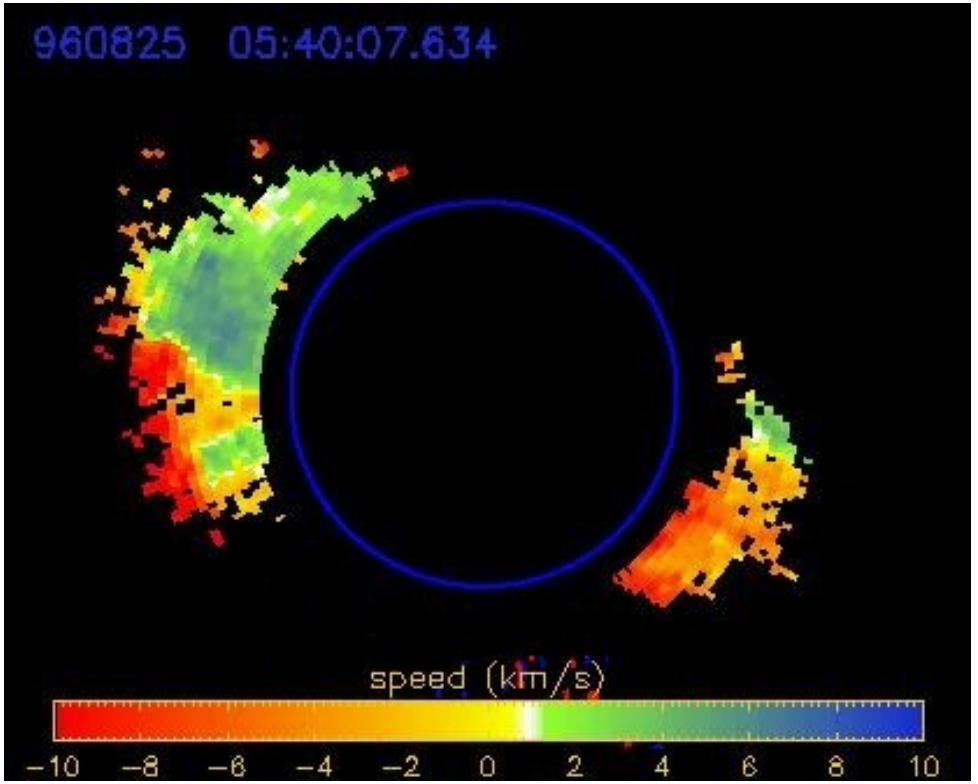
Determination of LOS Velocities

from the position of the emission line peak with respect to the reference line peak (average over the whole corona)

=> LOS velocities

(0.1 Å ~ 5.6 km/s)

(0.1 Å ~ 4.7 km/s)



4

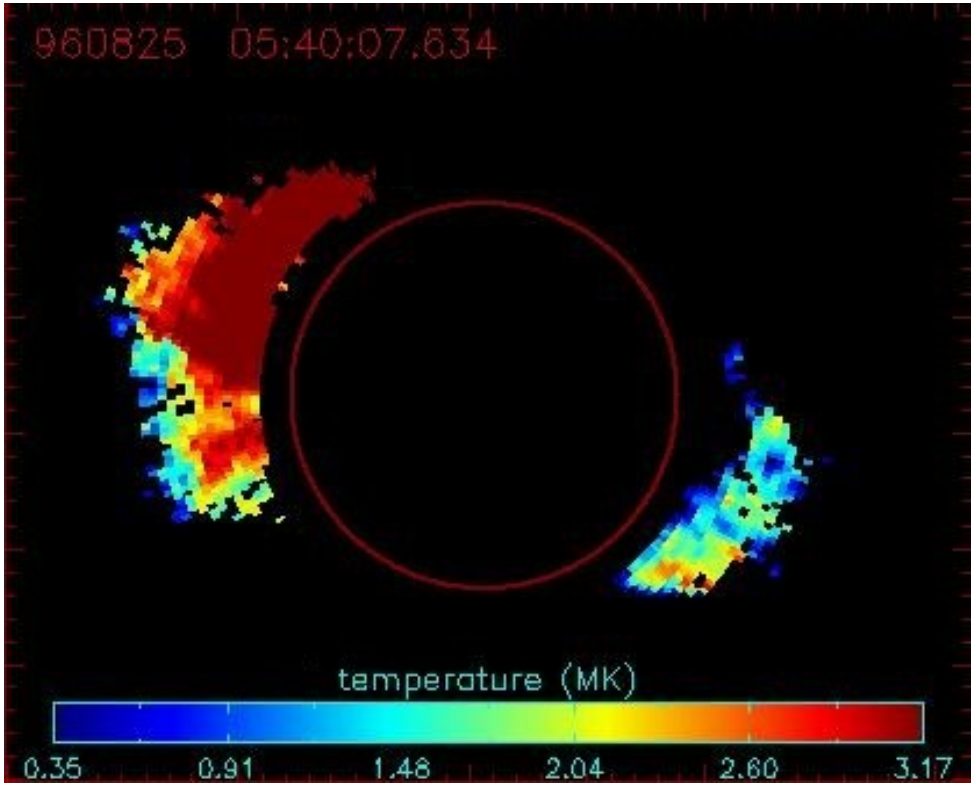
Determination of Effective Temperatures

from the line width value, after correcting for the instrumental profile

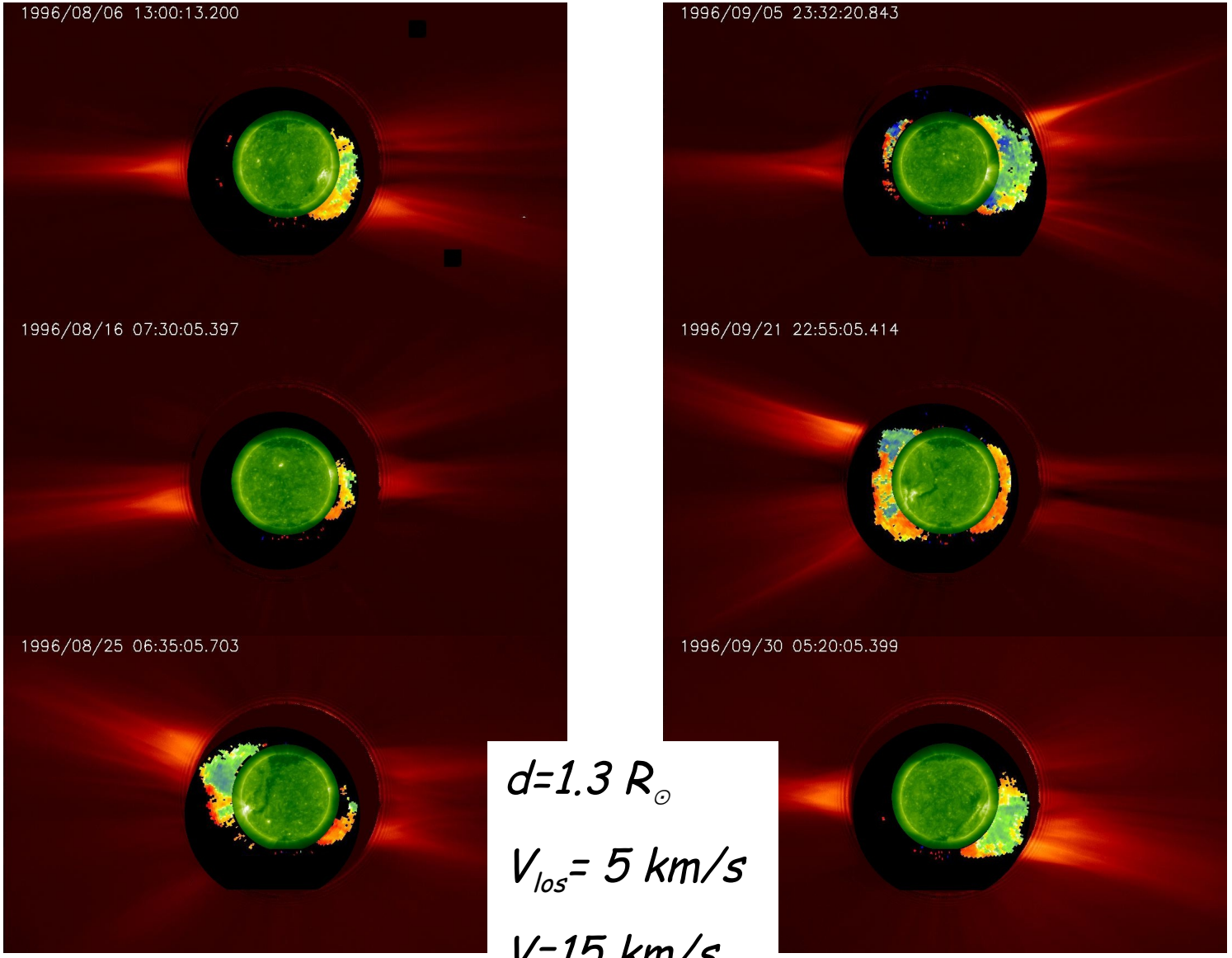
=> effective temperatures

(0.7 Å ~ 2MK)

(0.6 Å ~ 1MK)



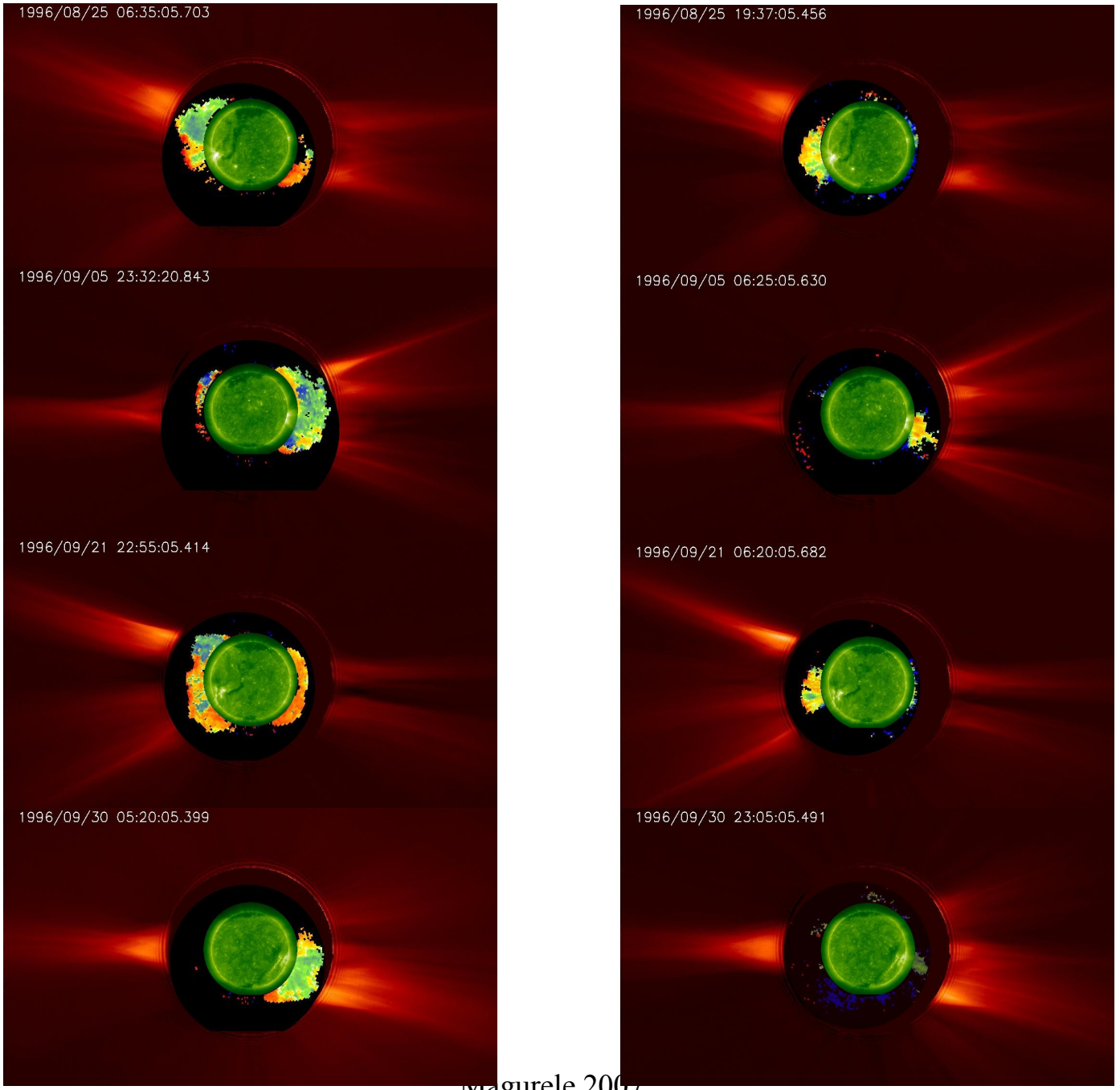
Slow Solar Wind



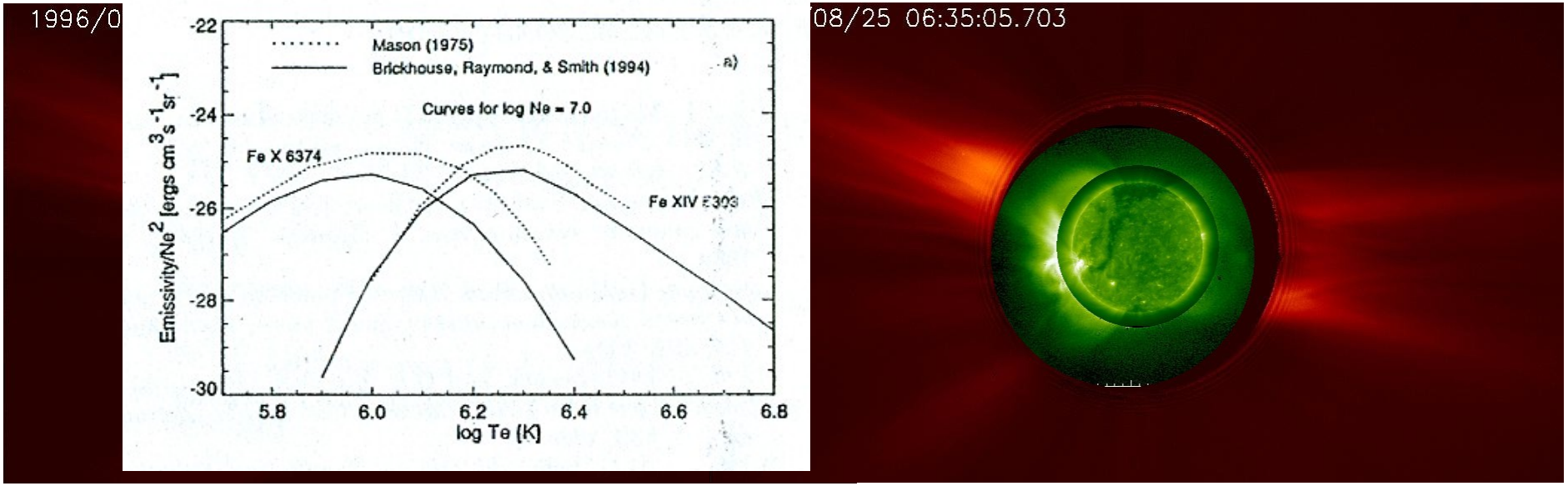
$d=1.3\ R_{\odot}$

$V_{los}= 5$ km/s

$V=15$ km/s


1996/08/25 06:35:05.703
1996/08/25 19:37:05.456
1996/09/05 23:32:20.843
1996/09/05 06:25:05.630
1996/09/21 22:55:05.414
1996/09/21 06:20:05.682
1996/09/30 05:20:05.399
1996/09/30 23:05:05.491

Streamers



Streamers: T_e ~ 1.35 MK at 1.03 $R_\odot$ (Feldman et al. 1998 - SUMER)

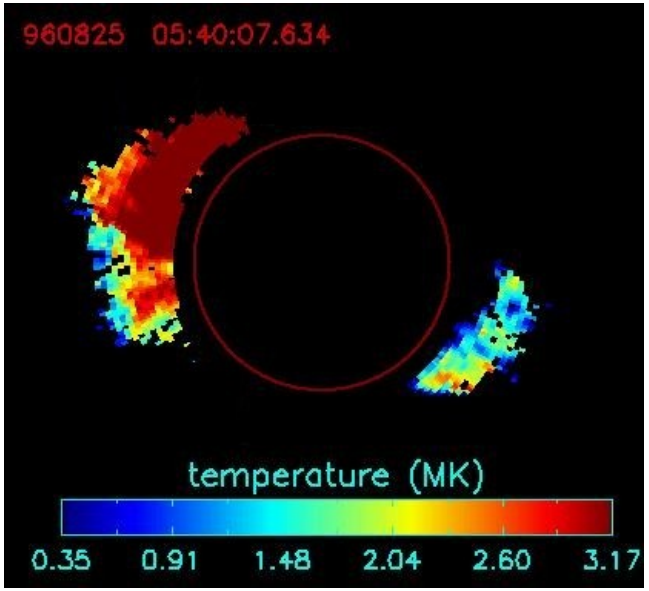
T_e ~ 1.8 MK at 1.15 $R_\odot$ (Li et al. 1998 - Yohkoh SXT)

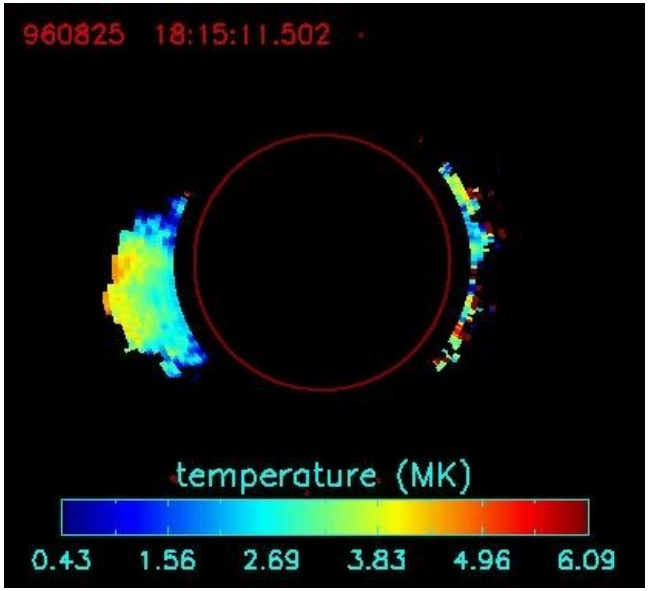
T_e ~ 1.4 MK at 1.4 $R_\odot$ (Gibson et al. 1999, Parenti et al. 2000 - CDS)

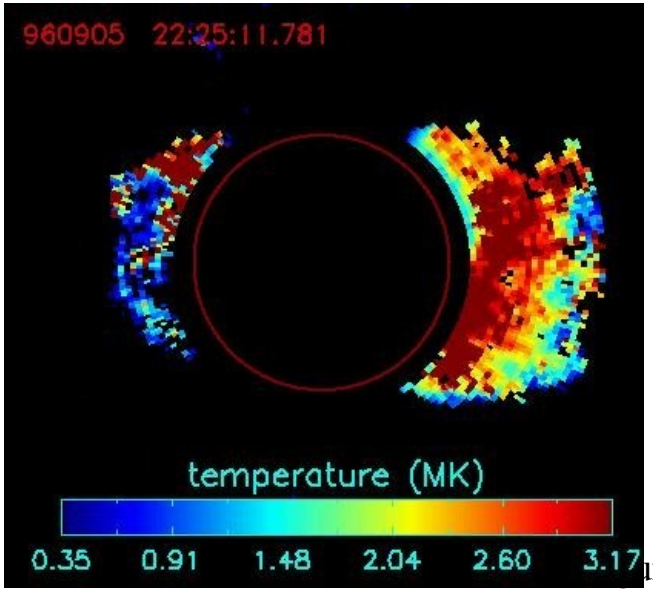
T_e ~ 1.6 MK at 1.5 $R_\odot$ (Raymond et al. 1997 – UVCS)

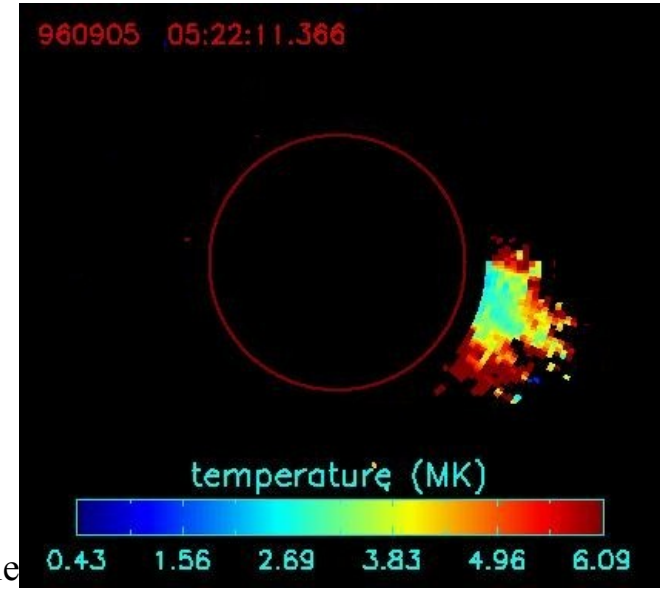
T_e ~ 1.6 – 2.0 MK at 1.1 – 2.0 $R_\odot$ (Ichimoto et al. 1996 - model)

Effective Temperatures

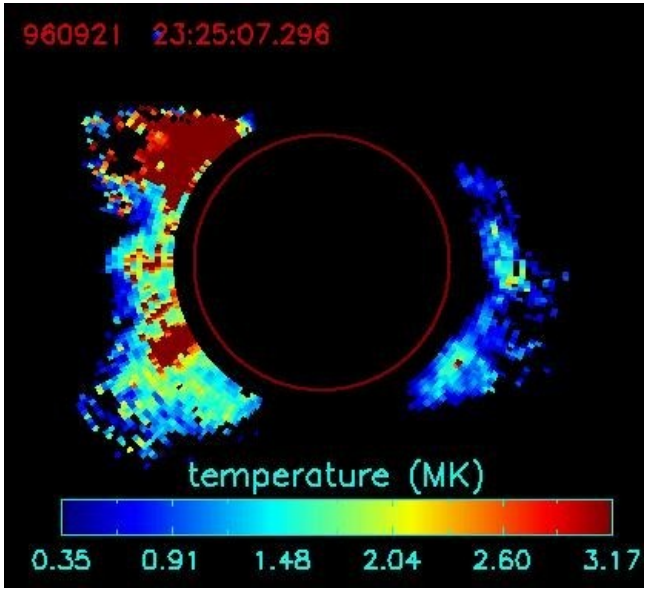


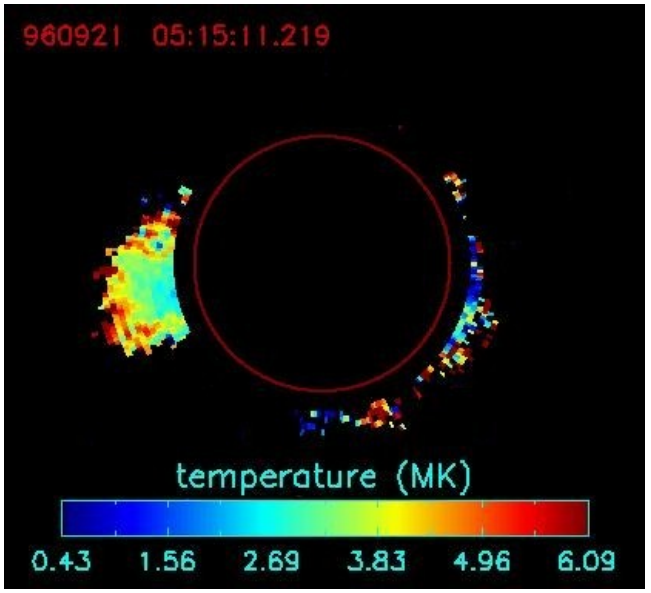


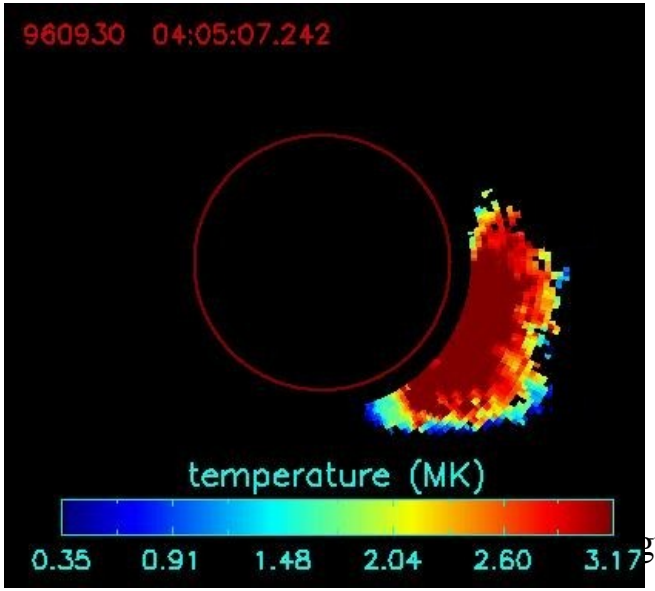


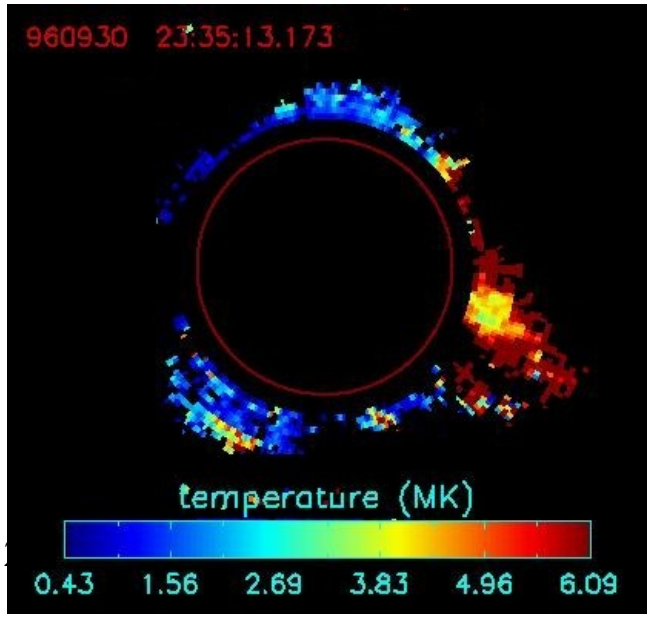


Effective Temperatures

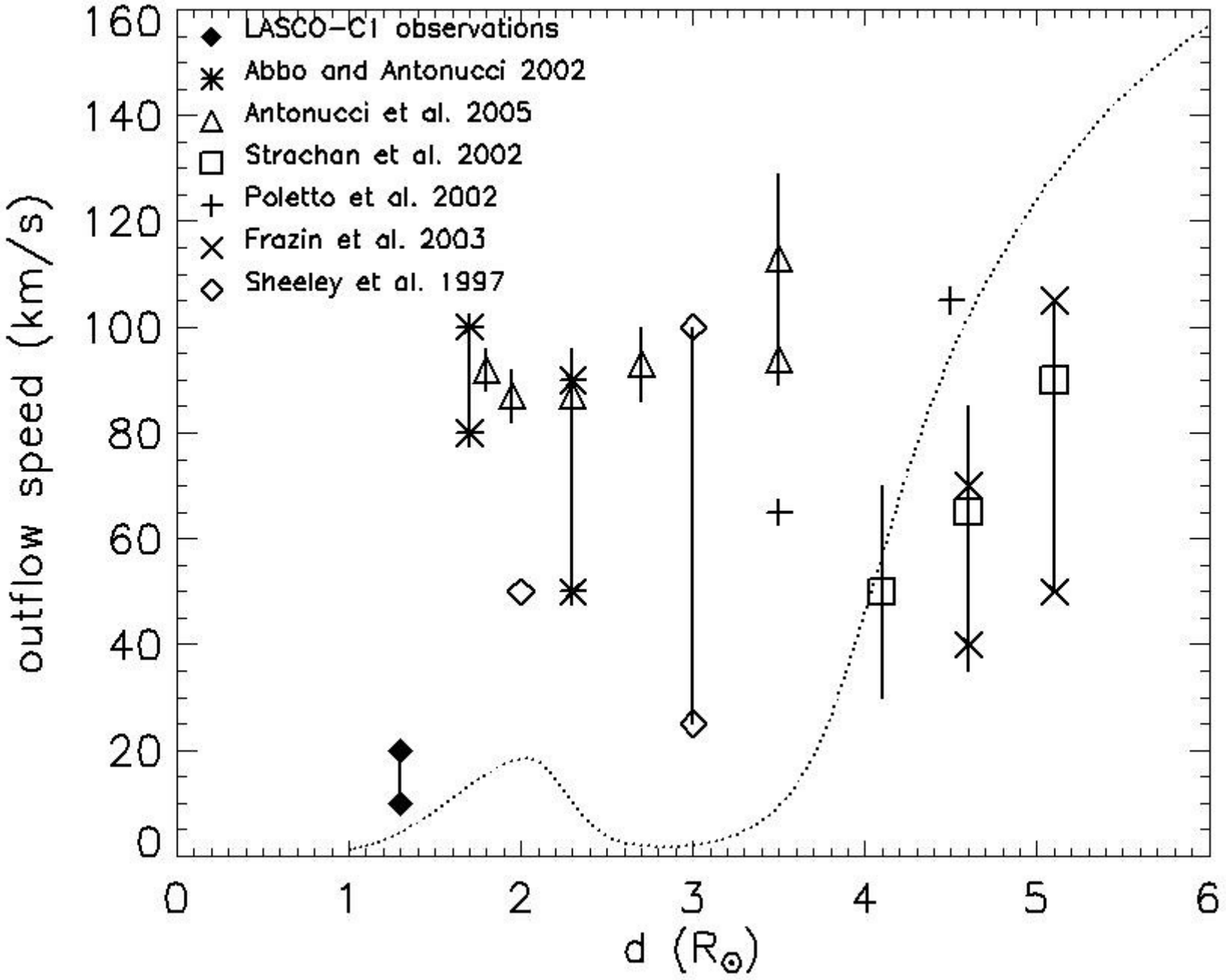








gurele 1


LASCO-C1 observations
Abbo and Antonucci 2002
Antonucci et al. 2005
Strachan et al. 2002
Poletto et al. 2002
Frazin et al. 2003
Sheeley et al. 1997
outflow speed (km/s)
d (R⊙)
0
20
40
60
80
100
120
140
160
0
1
2
3
4
5
6

Conclusions (2)

Fe X emission is associated with cooler closed loops

Fe XIV emission is associated with the hotter plasma at the base of the streamers