

# Tomographic Reconstruction of the January 2010 Corona

## Preliminary Results from JOP 225

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## What are plumes ?

Source of the fast wind (Teriaca 2003) ?

Or is it interplumes (Gabriel 2005) ?

Geometry: Tubes ? Curtains ? Both ?

Lifetime: < 1 day ? few days ?

## Can tomography help ?

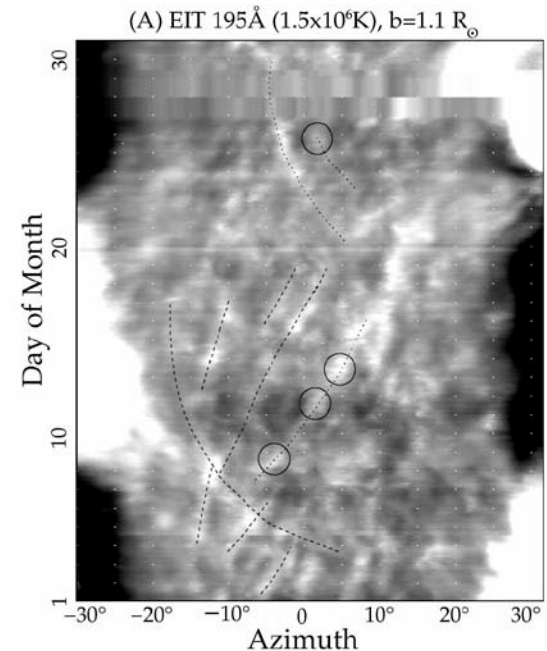
Plumes are dynamic objects

Tomography needs weeks of data

Yes.

## Using three strategies

1. Reduce the acquisition time
2. Time dependent (4D) tomography  
Barbey et al. 2008, Sol. Phys, 248(2), 213
3. All of the above



DeForest et al. 2001, ApJ, 560, 490

# Reducing the acquisition time



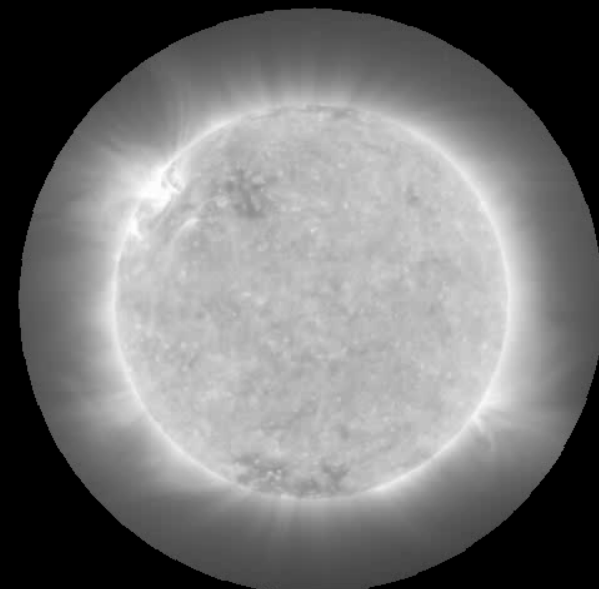
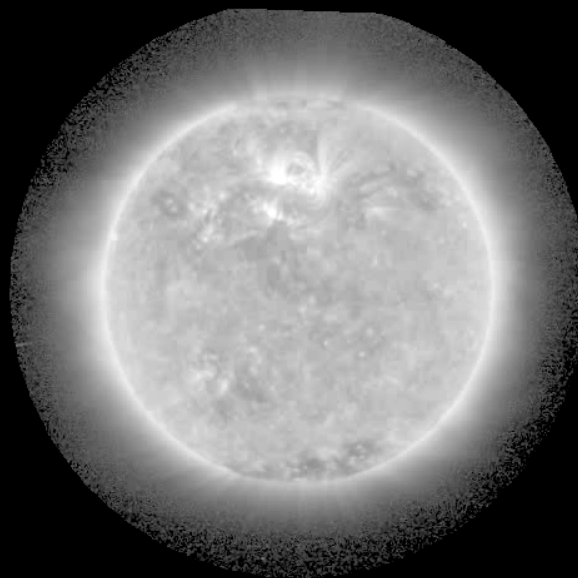
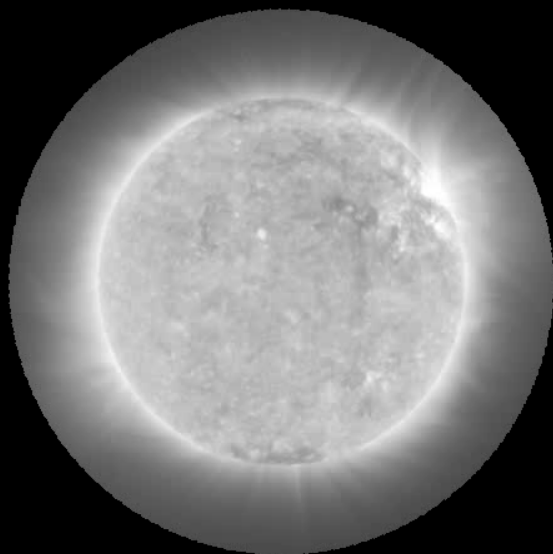
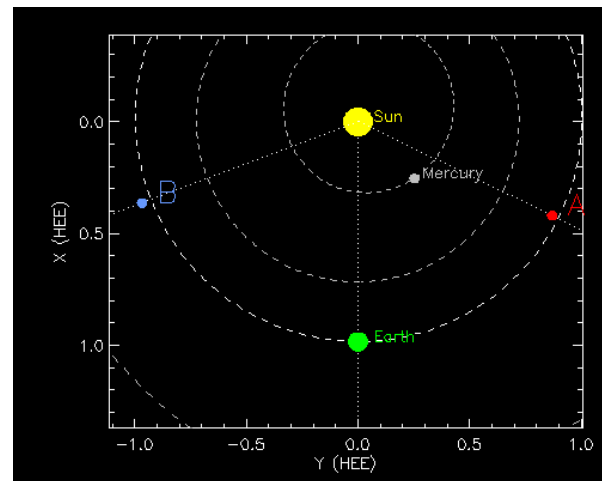
- 1 viewpoint: 28 days (full corona) or 14 days (poles)
- 2 viewpoints @ 90°: 7 days (March 2009)
- 3 viewpoints @ 60°: 4.2 days (September 2009)

**Lifetime of (some) plumes !**

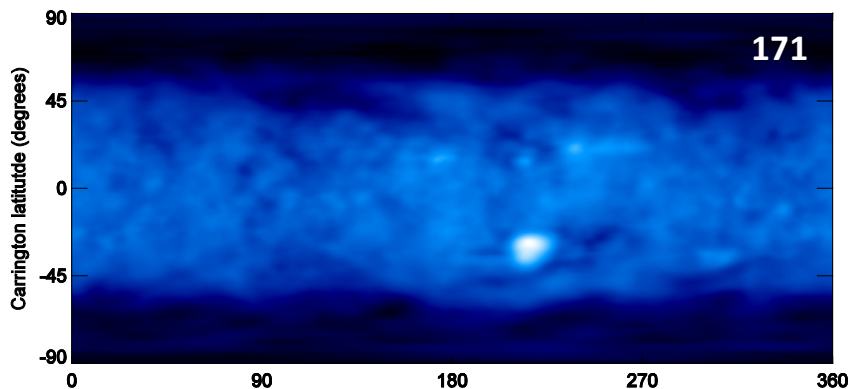
## JOP 225

10-18 January 2010: ~65° / 70°, but  
EUVI: ICER3 binned 2x2, increased exp. times  
EIT: 195, additional 284, increased exp. times  
SWAP: 171, best effort (commissioning)

**Thanks to the SECCHI and SWAP ops. teams !**

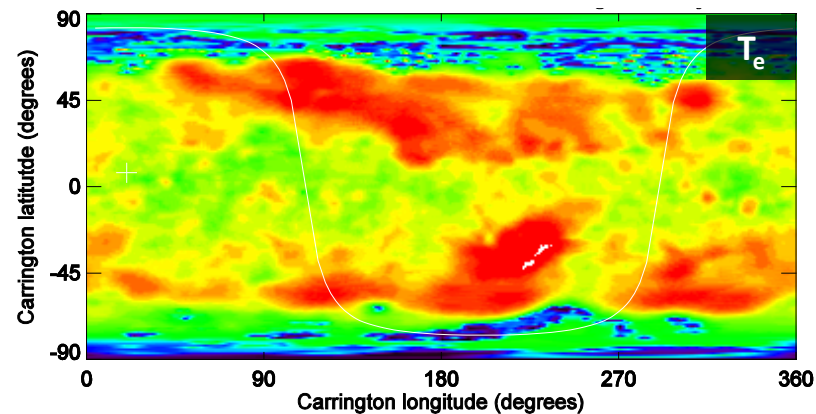
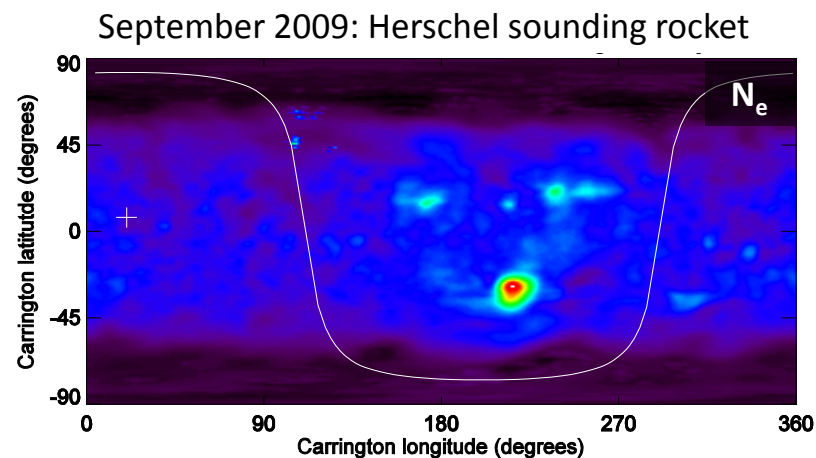
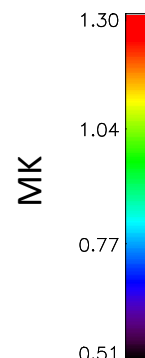
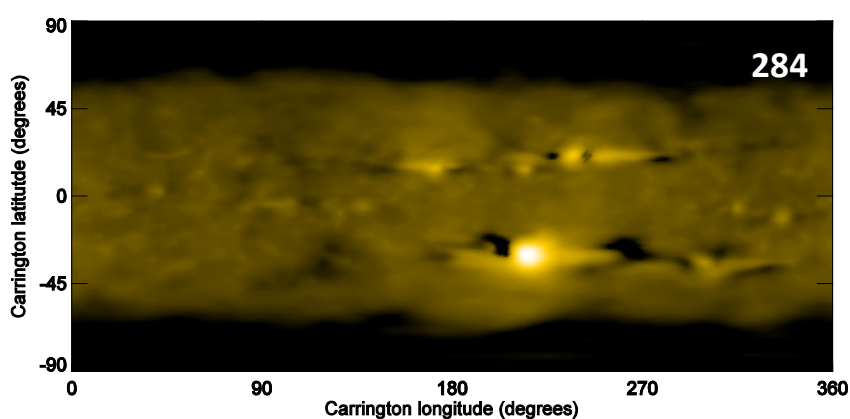
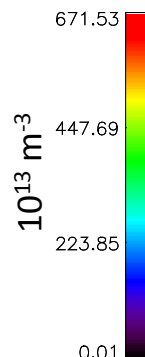
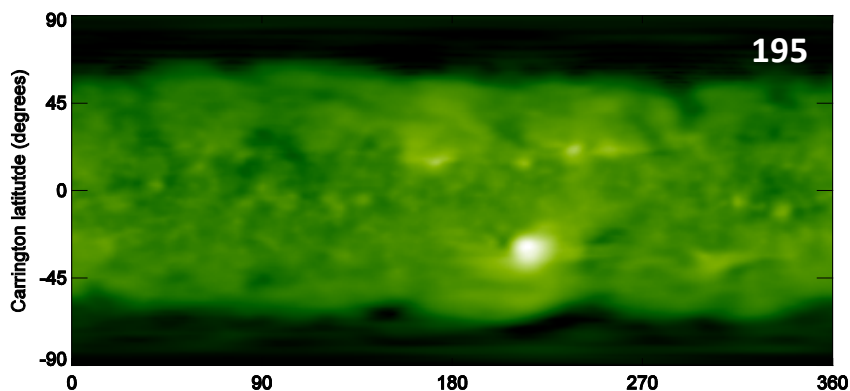


# The tomography code



Typically:  $3 R_s$  128 x 128 x 128 reconstruction cube  
6 images per day  
Images binned 512 x 512

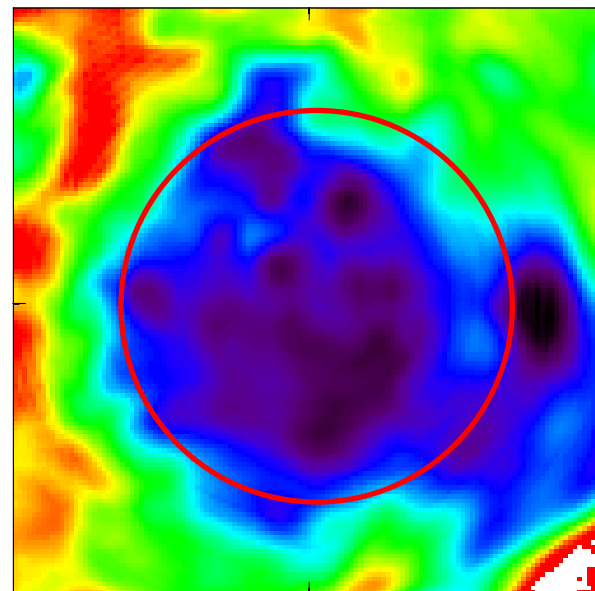
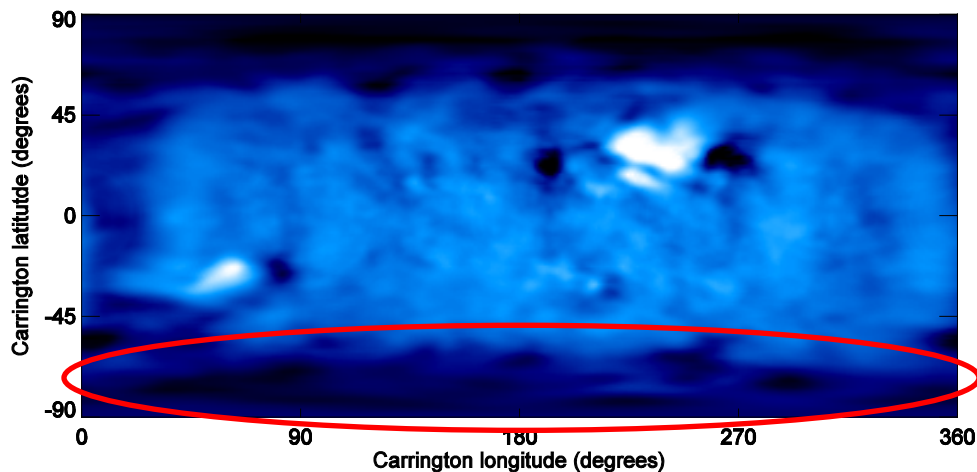
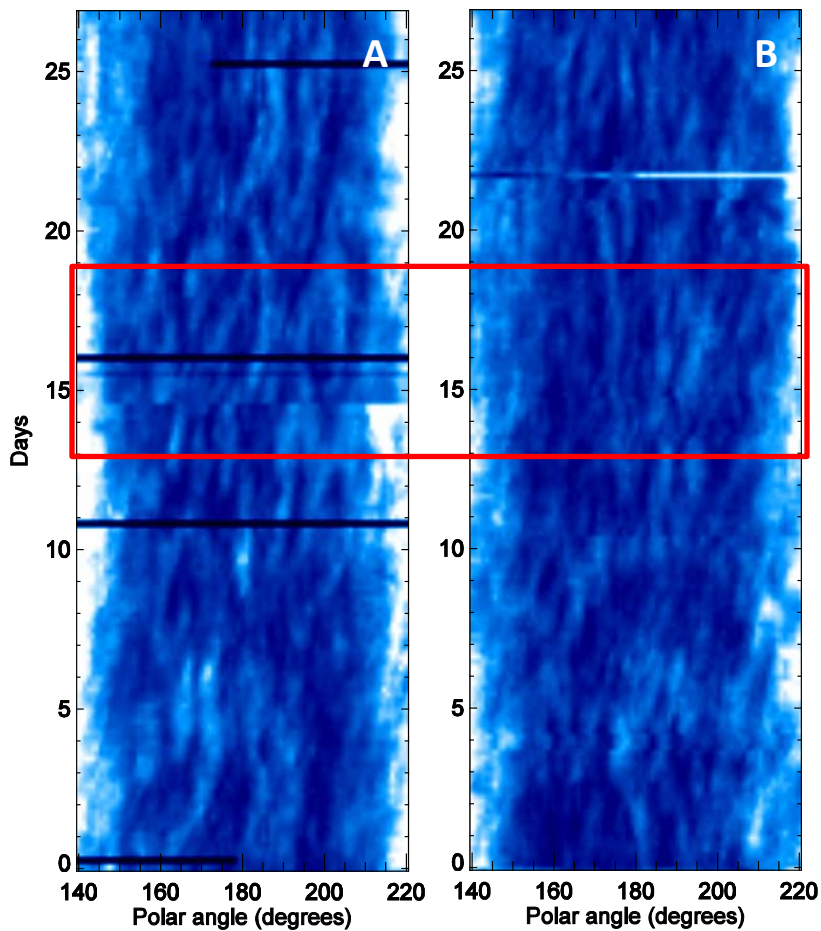
2 or 3 bands + isothermal hypothesis >  $N_e, T_e$



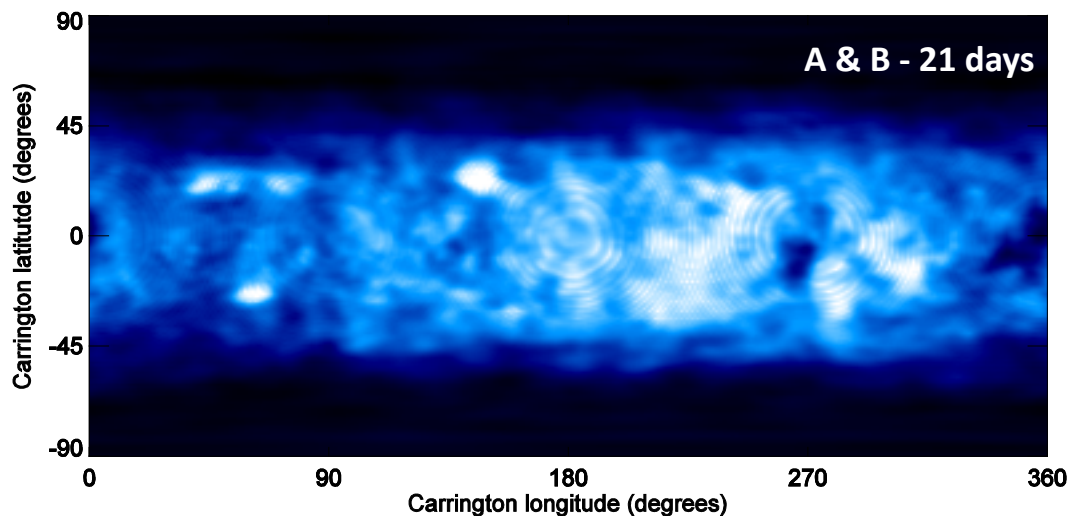
# JOP 225 preliminary results



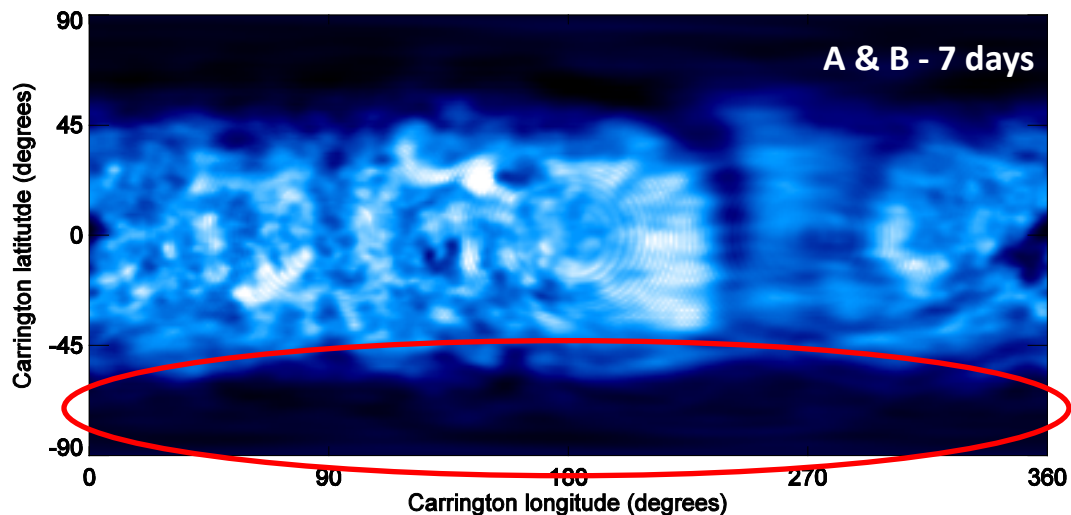
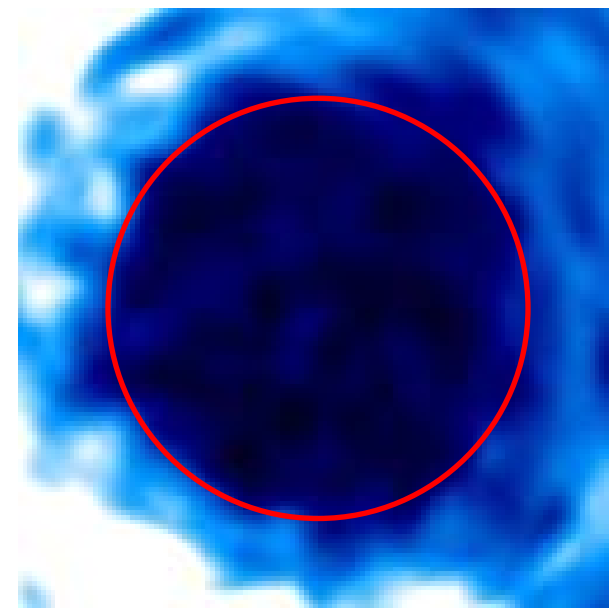
6 days of data: 13 – 18 January 2010  
B0 < 0 on A and SWAP: south pole  
Some structures last several days



# A + B reconstructions @ 90°



March 2009: spacecraft separation = 90°  
B0 ~ -5°: good coverage of the south pole  
Only 7 days needed



7 days running over 4 weeks

Average of  $N$  reconstructions over  $p$  days  
= Reconstruction over  $p \times N$  days

A 3D reconstruction is an average over  
the acquisition time



## **3 point tomography !**

Helps

Reduced acquisition time: 6 days

Disparity of viewpoints: that's good

Disparity of data: that's bad

SWAP: still learning (pointing, noise, response, etc.)

## **Shortest snapshot of polar plumes !**

Interpretation still challenging

Average quantities

Quantification of artefacts

## **Work in progress**

Process 195 and 284

Temperature, density

Putting it all together: 3 viewpoints time dependent tomography

**THANKS to the SECCHI and SWAP operations teams !**