

CCMC Support of Active Missions: **STEREO, THEMIS**

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Outline

STEREO Support

- Model – data comparison for quiet solar wind
- Magnetic foot point tracing
- Dynamic solar wind – CMEs

THEMIS Support

- Model – data comparison - substorms

STEREO Support



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Impressions:

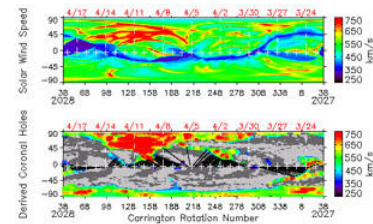
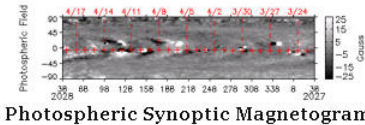
- Dedicated page
- Clean interface

Recommendations:

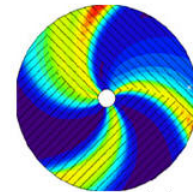
- Clickable images leading to model descriptions.

CCMC STEREO Support

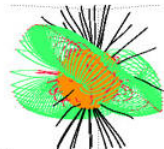
In support of STEREO project, the CCMC is running a series of solar and heliospheric models and saving model input/output on a daily basis.



Wang-Sheeley-Argge
(potential field + current sheet model)



ENLIL model



Luhmann PFSS model

Run Results by Month:

Year 2007:

[October](#)

[September](#)

[August](#)

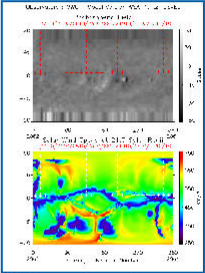
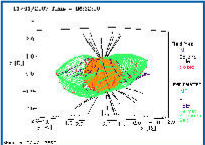
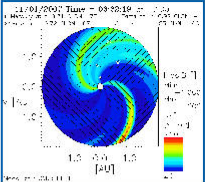
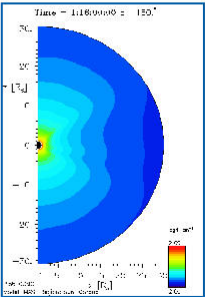
[July](#)

[June](#)

[May](#)

STEREO Support

October 2007

Model	Available options	Latest image
WSA	<p>Browse/download data files</p> <p>Format of the WSA output file</p>	 <p>Click to enlarge image</p>
	<p>View daily magnetograms and run output images</p>	
Luhmann PFSS	<p>Browse/download data files</p>	 <p>Click to enlarge image</p>
	<p>Visualize run results</p>	
ENLIL	<p>Visualize run results</p>	 <p>Click to enlarge image</p>
	<p>To download 3D data files via anonymous FTP please contact CCMC staff.</p>	
MAS Sample Run	<p>Currently, an MAS calculation takes approximately 3 days to produce and we cannot support a daily archive. A sample calculation is shown for Carrington Rotation 1988 and a link to the plotting tool is given. Currently, there is no daily archive. We will in future move to a four-processor computing configuration which can keep up with a daily archive.</p>	 <p>Click to enlarge image</p>

Impressions:

- Clean interface
- Example thumbs

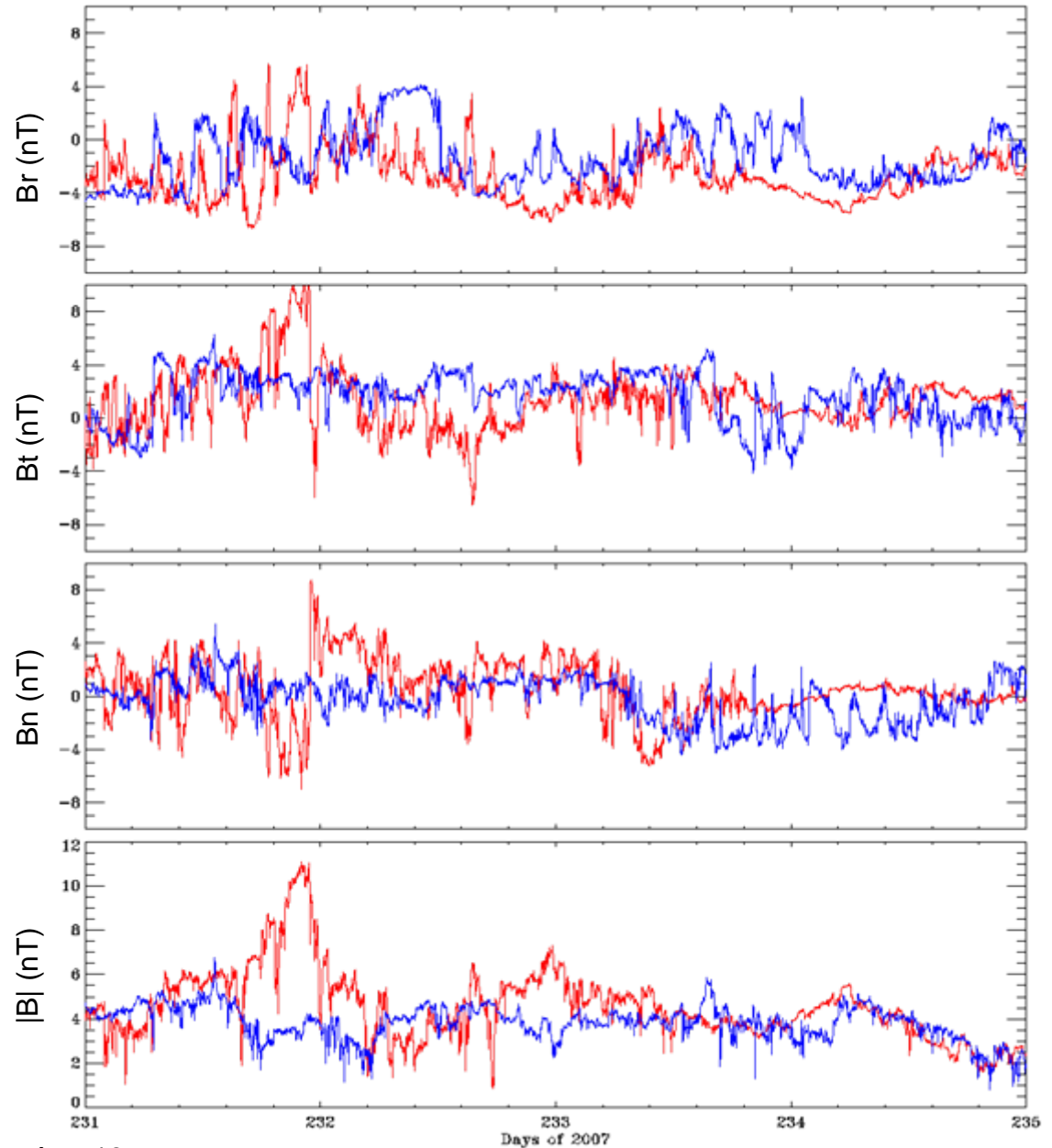
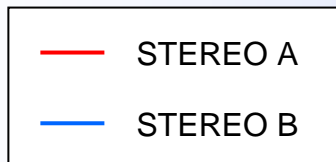
Recommendations:

- Again, definitions would be helpful.



STEREO Data

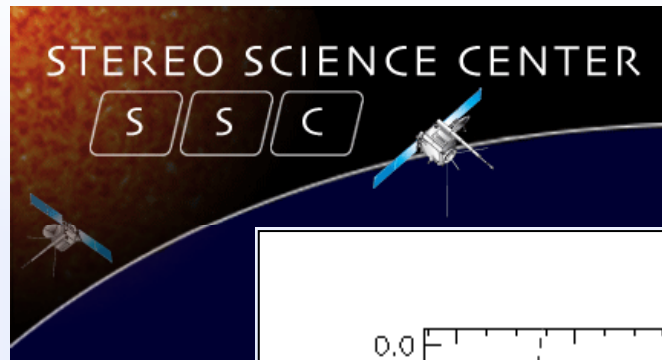
- Relatively quiet solar wind conditions.
- Noticeably different data between STEREO A and B.



Aug 19

Aug 23

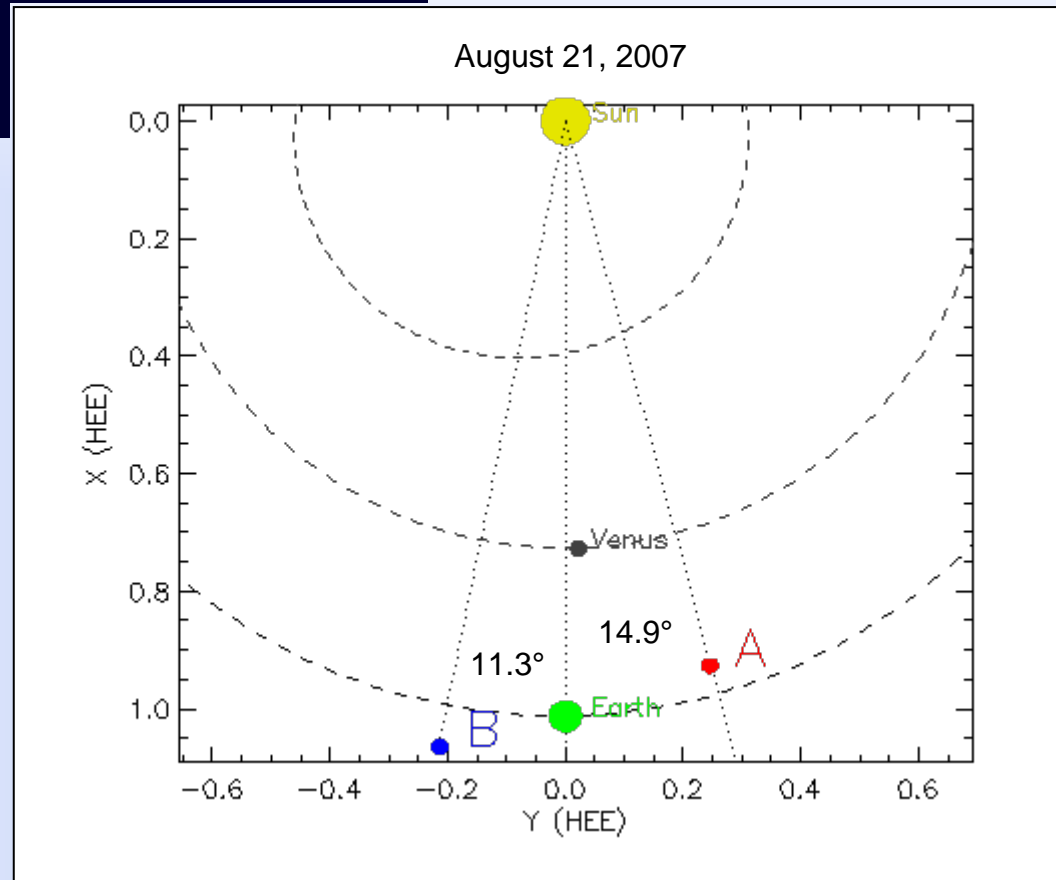
STEREO Spacecraft Location



The longitudinal separation of the STEREO spacecraft is beginning to be significant.

Orbit information from:

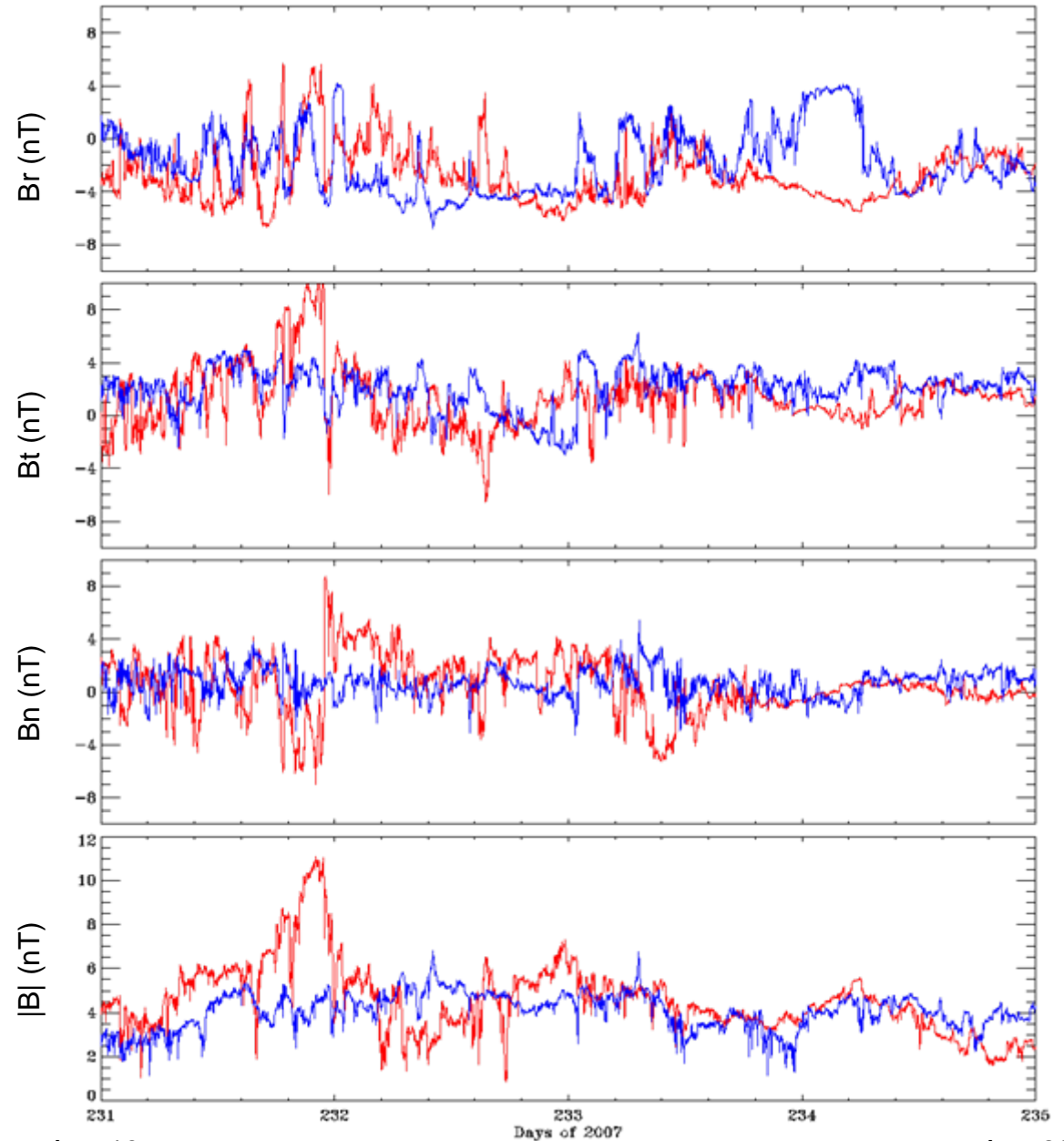
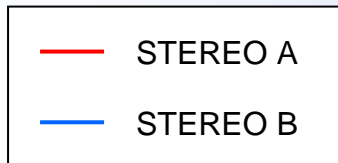
STEREO – Science Center
<http://stereo-ssc.nascom.nasa.gov>



STEREO Data

To compare the data,
STEREO B data is
time shifted by 1.75 days.

Significant differences
exist.



Aug 19

Aug 23

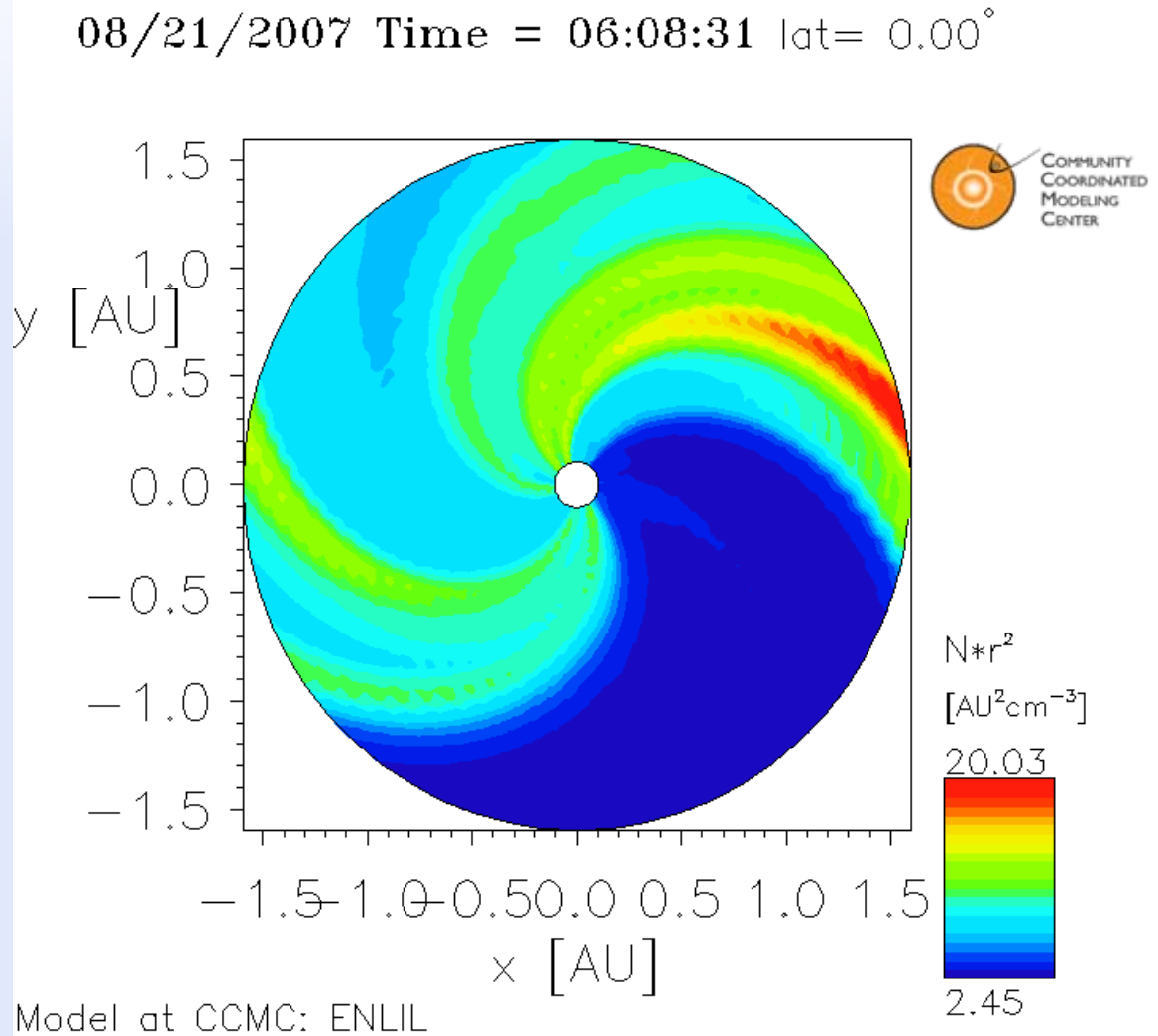
Data – Model Comparison

Impressions:

- Finding daily run was easy
- Default settings good

Recommendations:

- Had to ask about coordinate system used.
- An option to over plot Earth, and STEREO locations would be useful.



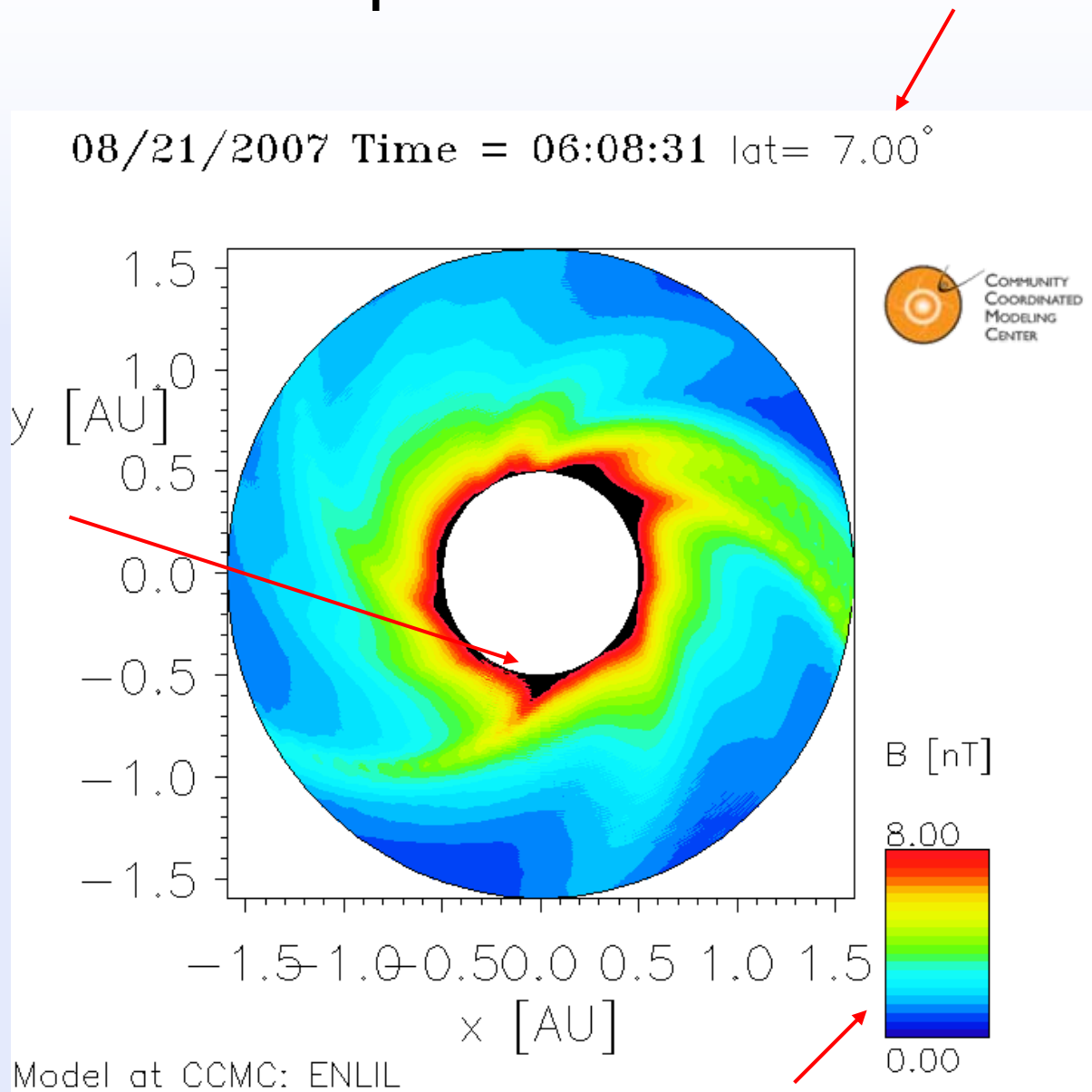
Data – Model Comparison

Impressions:

- Intuitive plot options

Recommendations:

- Options for normalized field parameters (e.g., $B_r * R^2$) would be helpful.

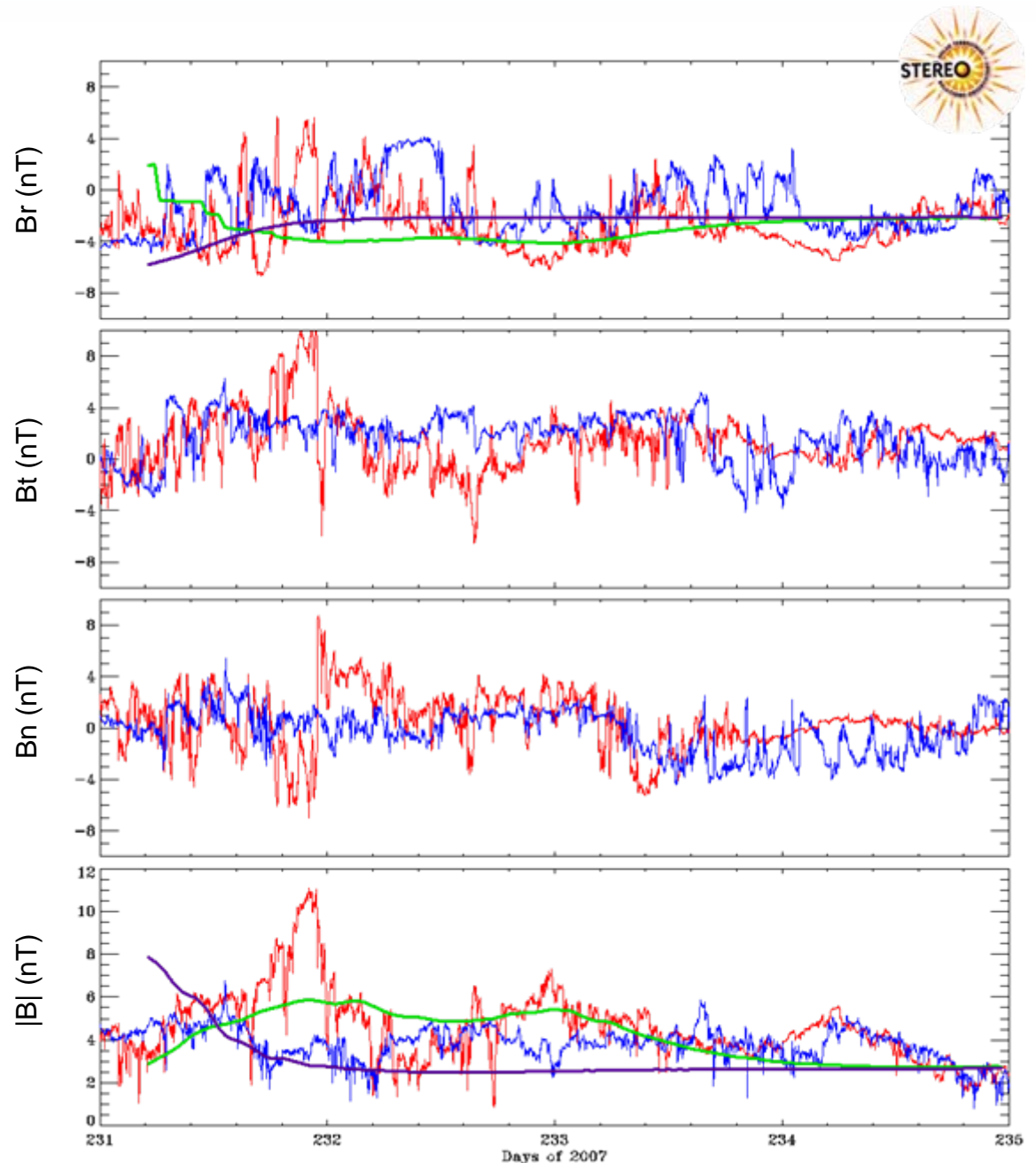
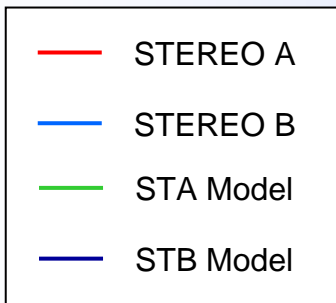


Data – Model Comparison

Model line cuts scaled ($|B|$ with Parker formula, B_r with R^2) and the model V is used to convert space into time.

Reasonable agreement for $|B|$.

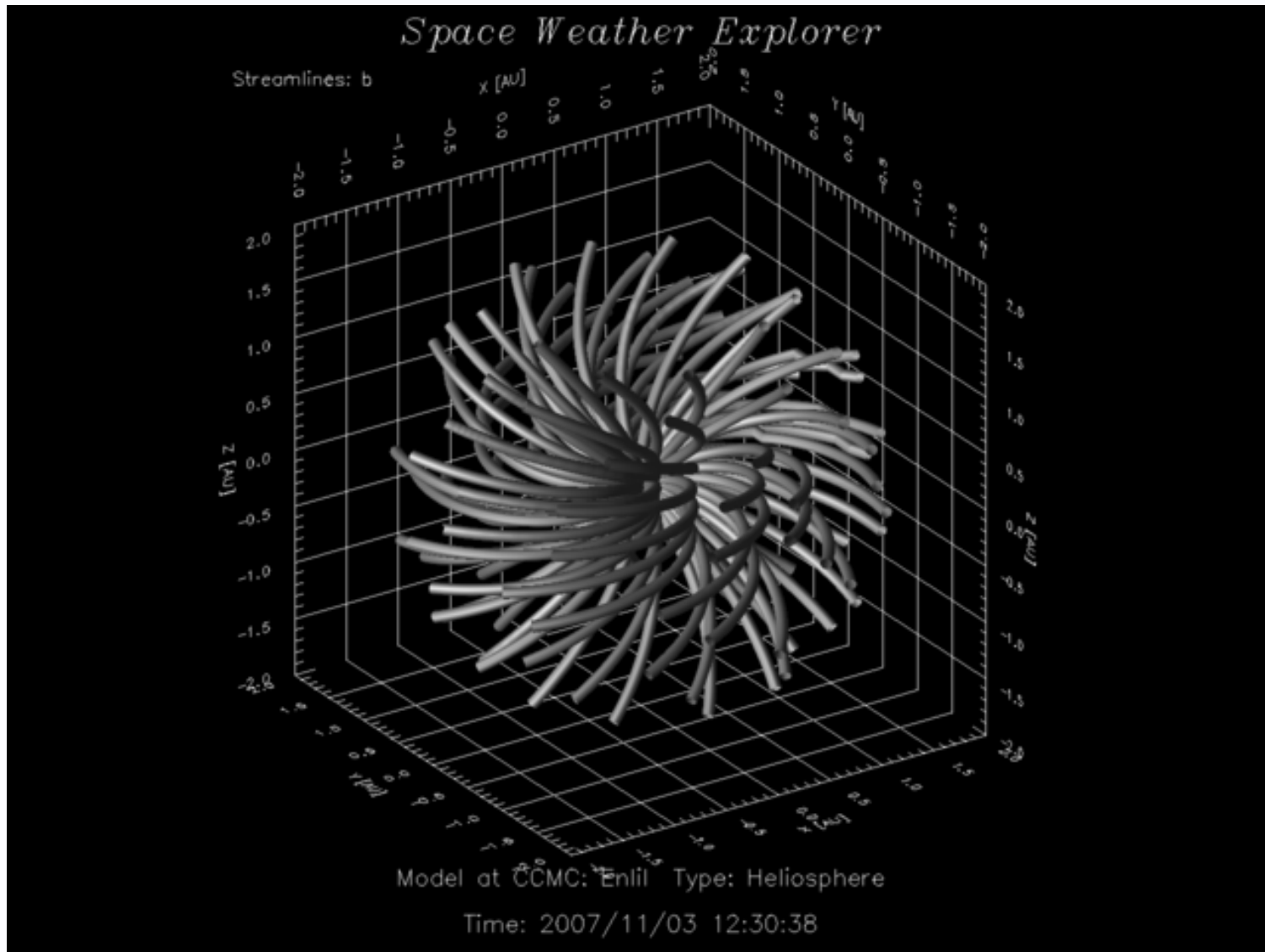
Detailed sector structure missing from B_r model



Aug 19

Aug 23

Tracing Foot Points



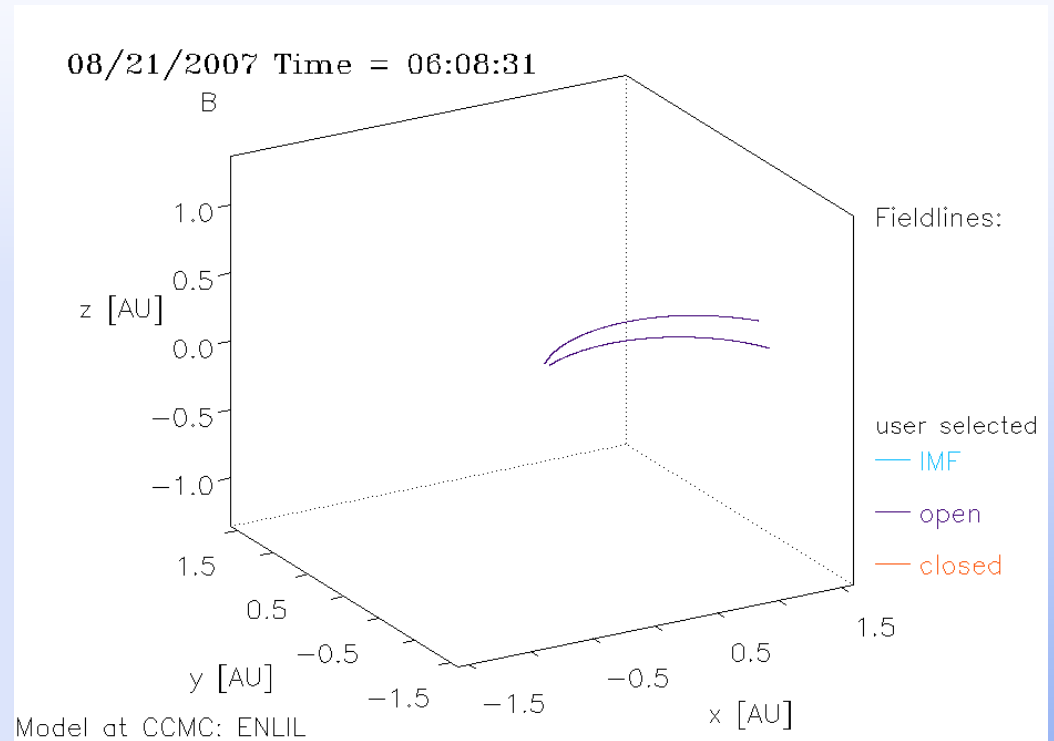
Tracing Foot Points

Starting Point:

R = 0.96 1.09 AU
Lon = 15 349 deg
Lat = 7.3 6.0 deg

Traced to:

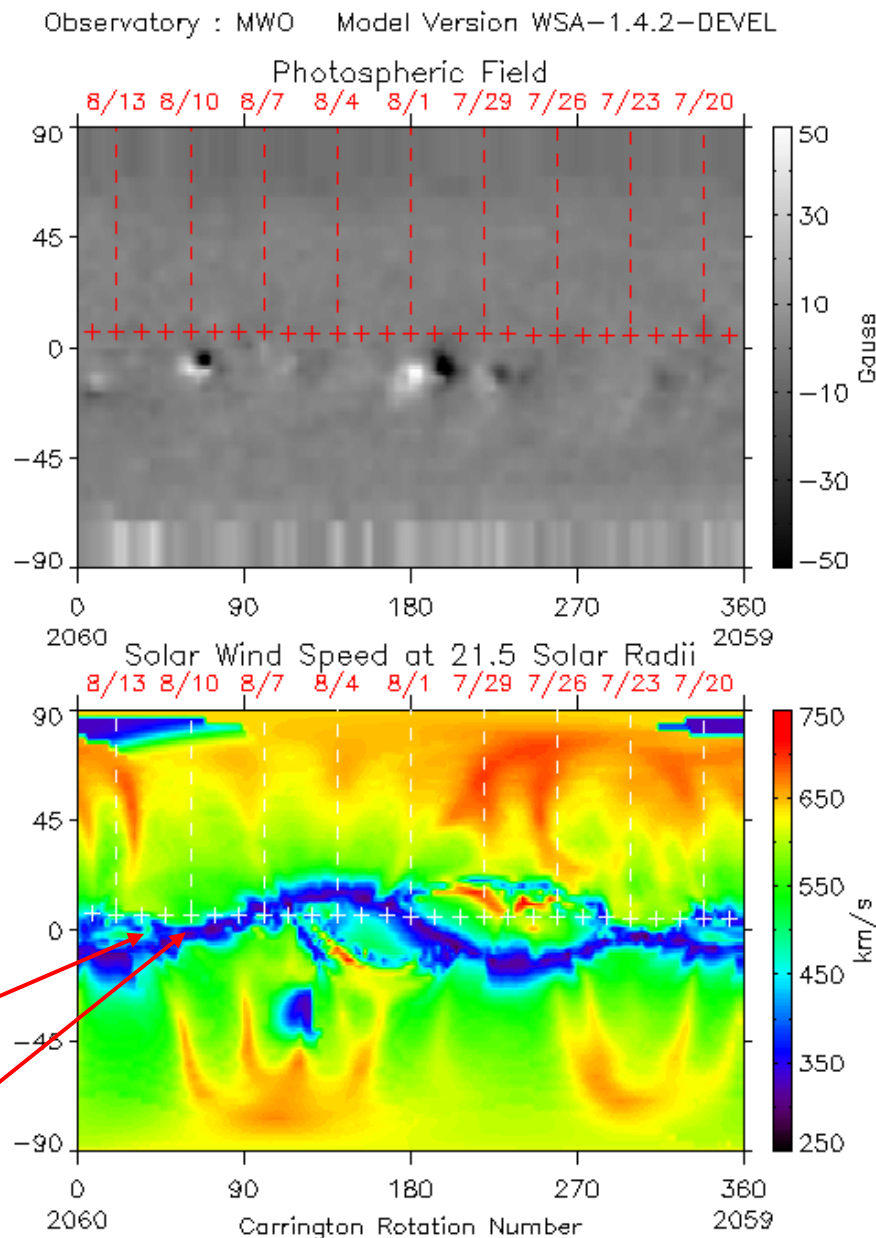
R = 0.102 0.102 AU
Lon = 49 28 deg
Lat = 6.4 4.5 deg



Tracing Foot Points

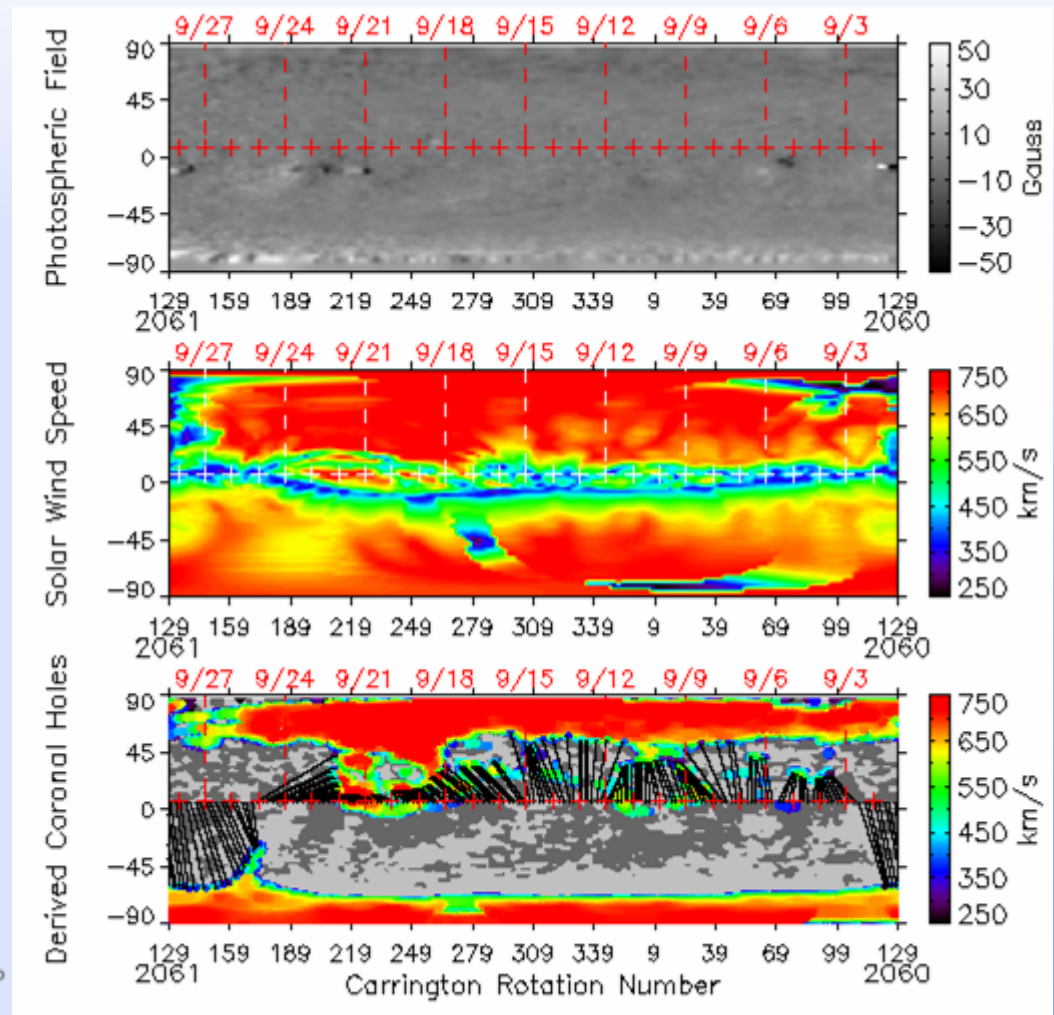
- Could locate foot points of field lines on a 21.5 Rs source surface.
- But could not connect field lines to photospheric map. PFSS does not come out to 0.1 AU and MAS is not yet available.
- Description of picture notations and how the synoptic map is generated would be helpful.

STEREO B
STEREO A



Tracing Foot Points

- Mapping points from the 21.5 Rs source surface to the photosphere can be done and will be available shortly.
- Precise foot point mapping is difficult. Regularly computing it for the STEREO locations might be a solution.

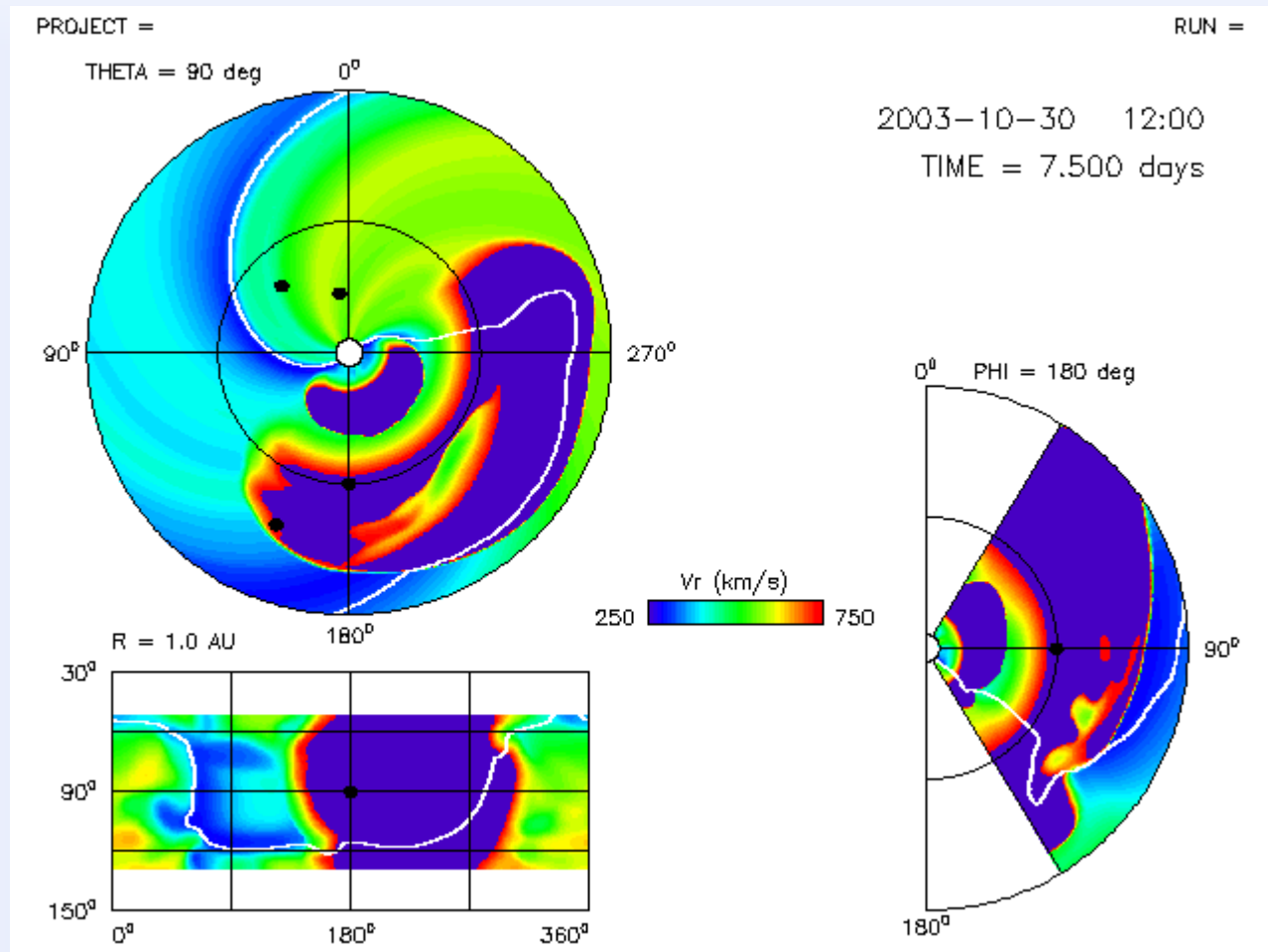


Dynamic Heliosphere

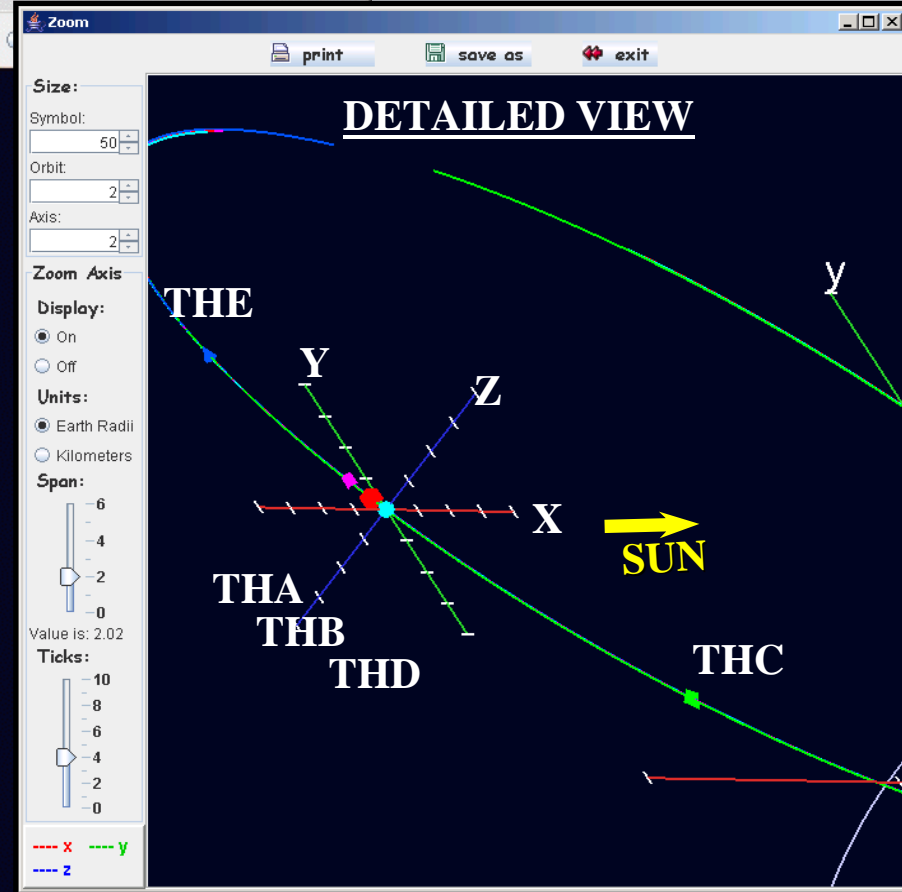
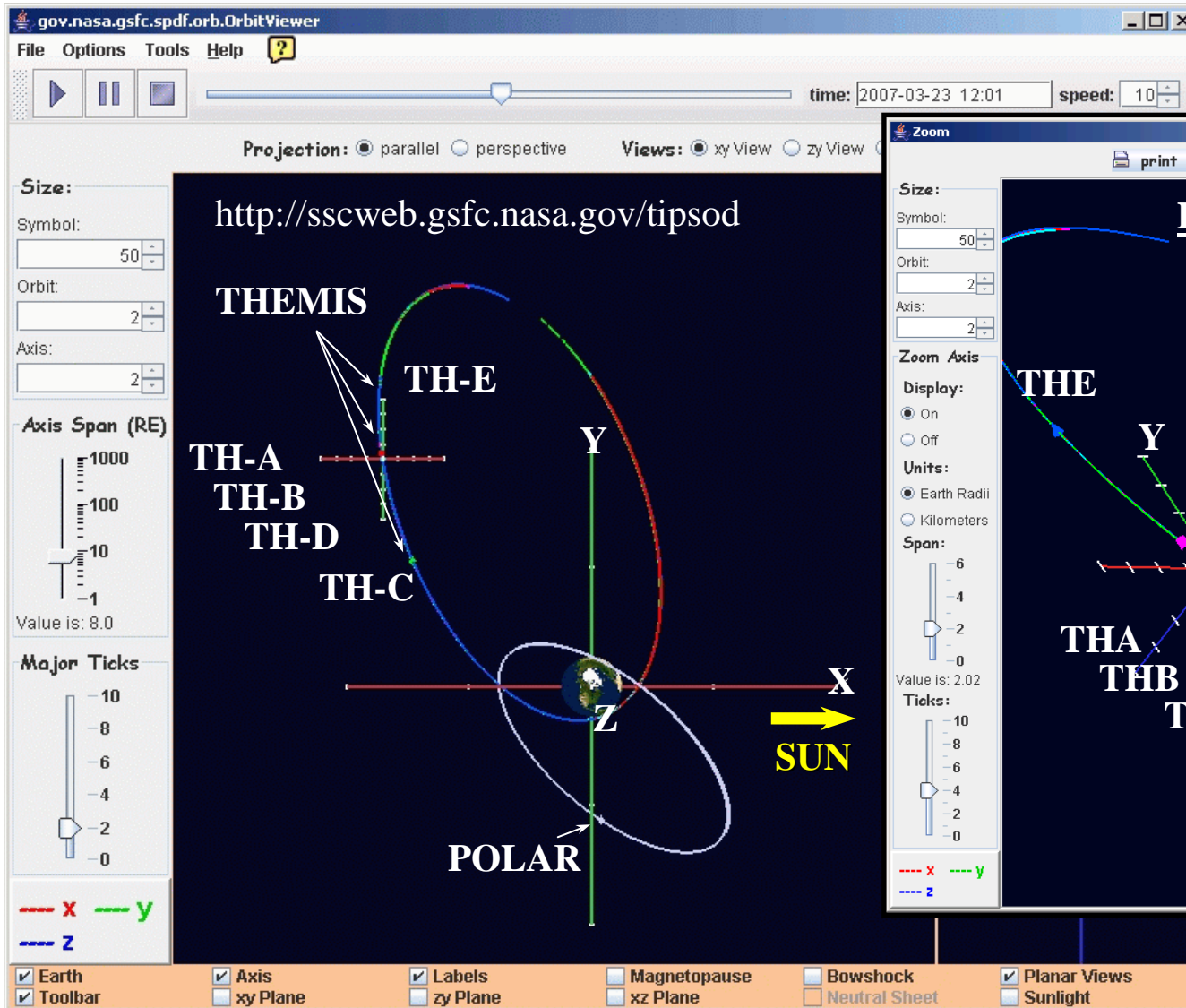
Cone model of CMEs available
On request.

Also planned to be
executed automatically
for large events.

Need the Sun's
cooperation to
compare to
STEREO data.



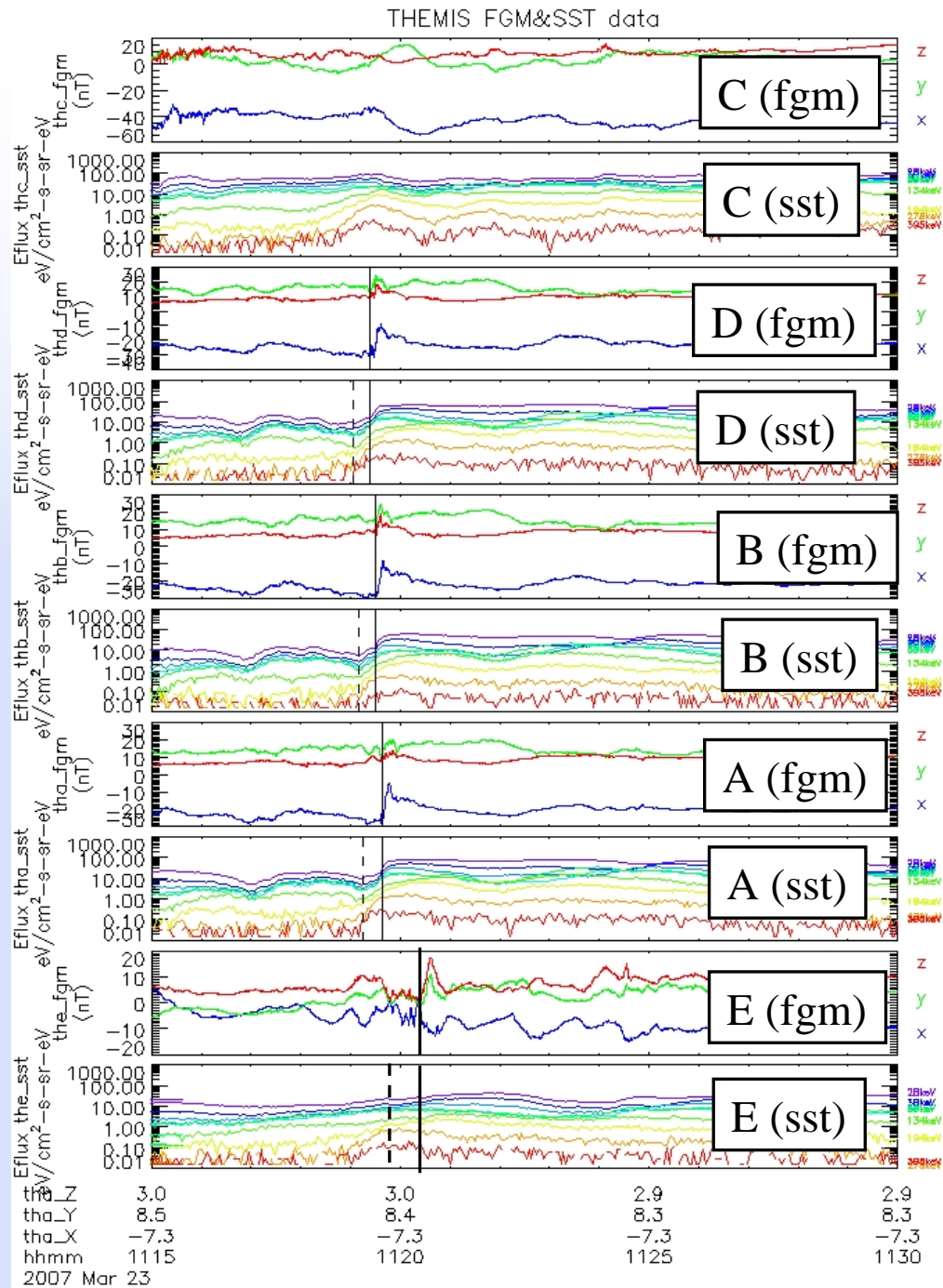
First light: Nature's welcome.
Two substorms seen on March 23

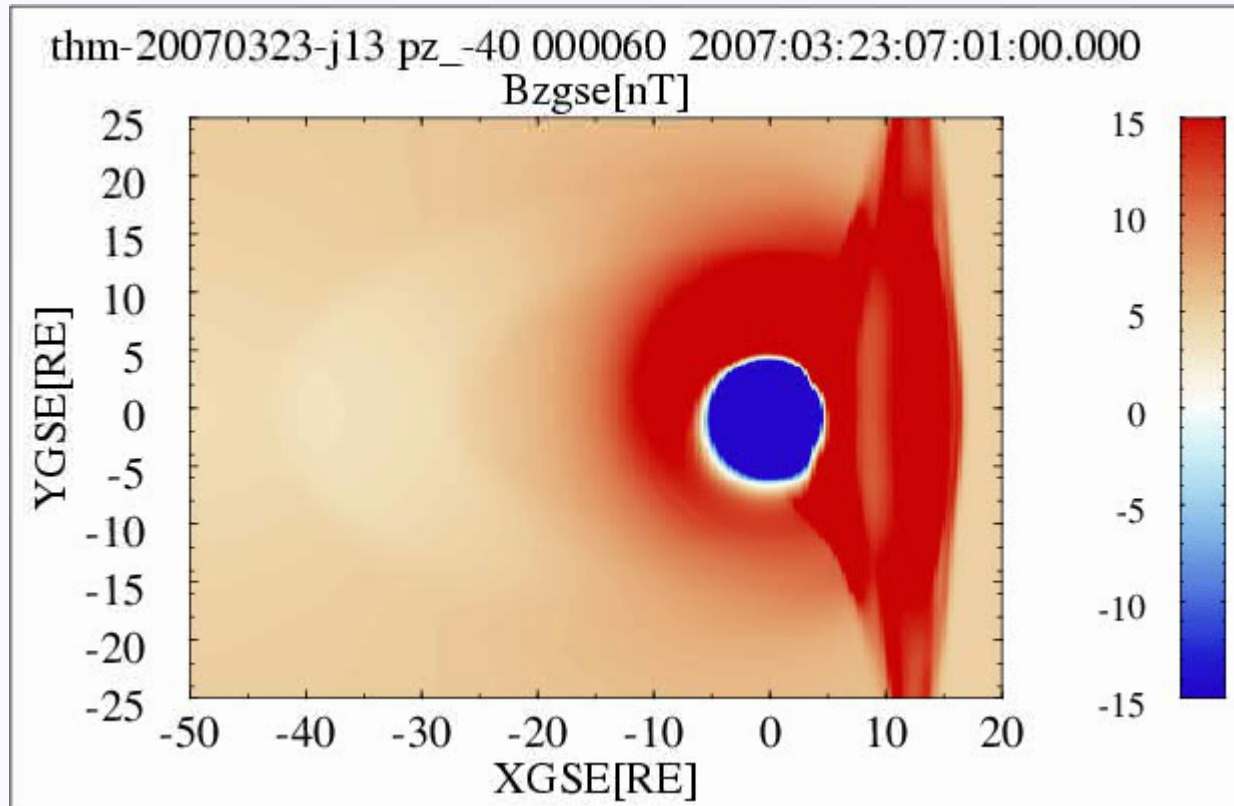


Data

Clear dipolarization with a propagation or expanding speed of 200~300 km/s along GSM y direction.

Injection occurs ~10-30s earlier than dipolarization





Open GGCM Model - J. Raeder

CONCLUSIONS

STEREO Support:

- Well developed dedicated CCMC support with daily runs for the heliosphere.
- Was able to compare model predictions to spacecraft observations and trace magnetic field lines back to 0.1 AU.
- Need more work to trace field lines to the photosphere / coronal holes and to model realistic ICMEs.

THEMIS Support:

- No dedicated page, but model runs on request should be able to satisfy most requirements.
- It appears that the THEMIS community is not yet availing themselves to the capabilities of CCMC.