



University of Michigan
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Plasma Simulations in Support of the Stereo Mission

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<http://csem.engin.umich.edu>



Outline



M SWMF

M Synoptic solar wind

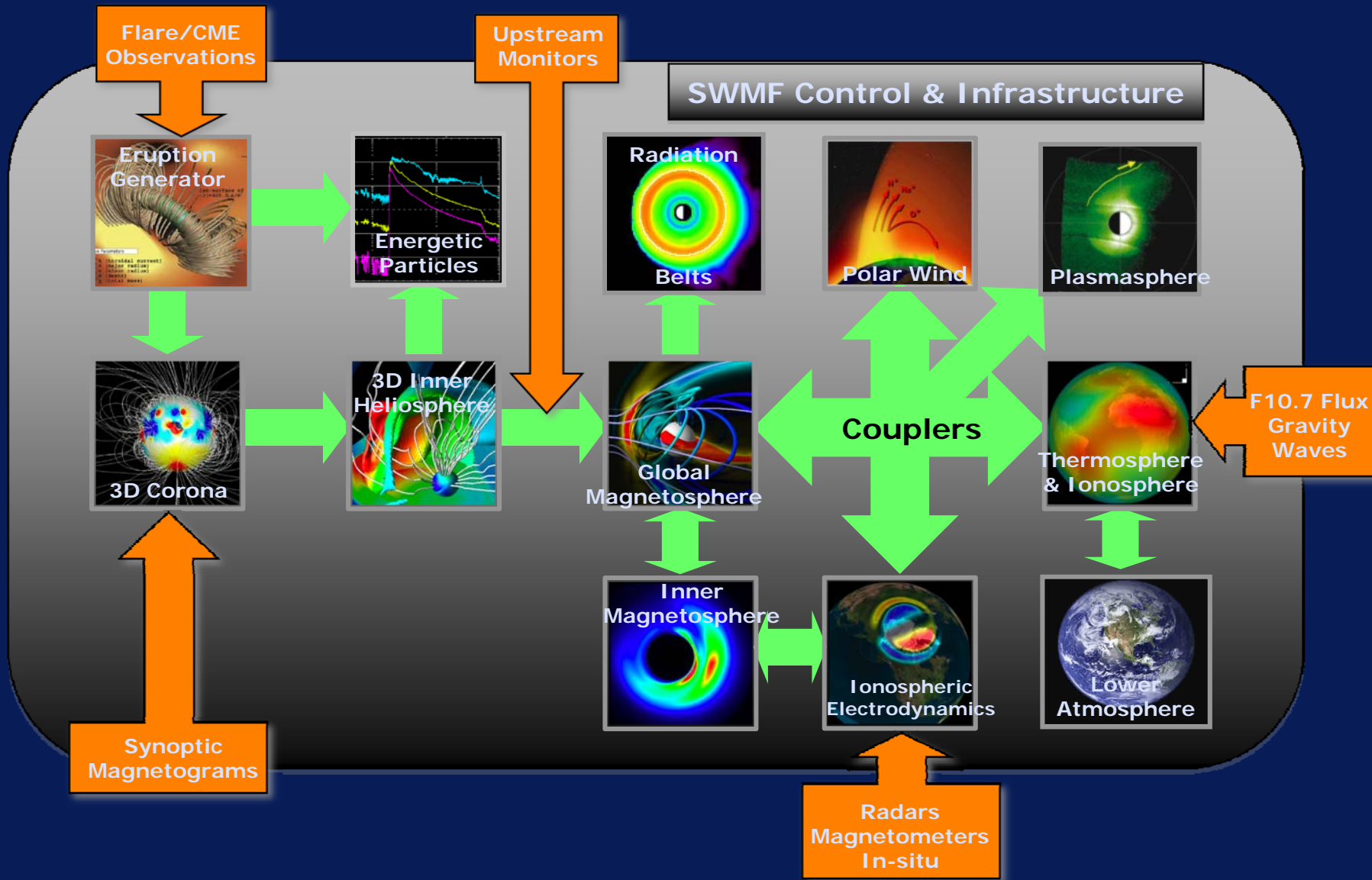
M April 20, 2007 pre-event solar wind

M Coronal tomography

M CME breakout simulation

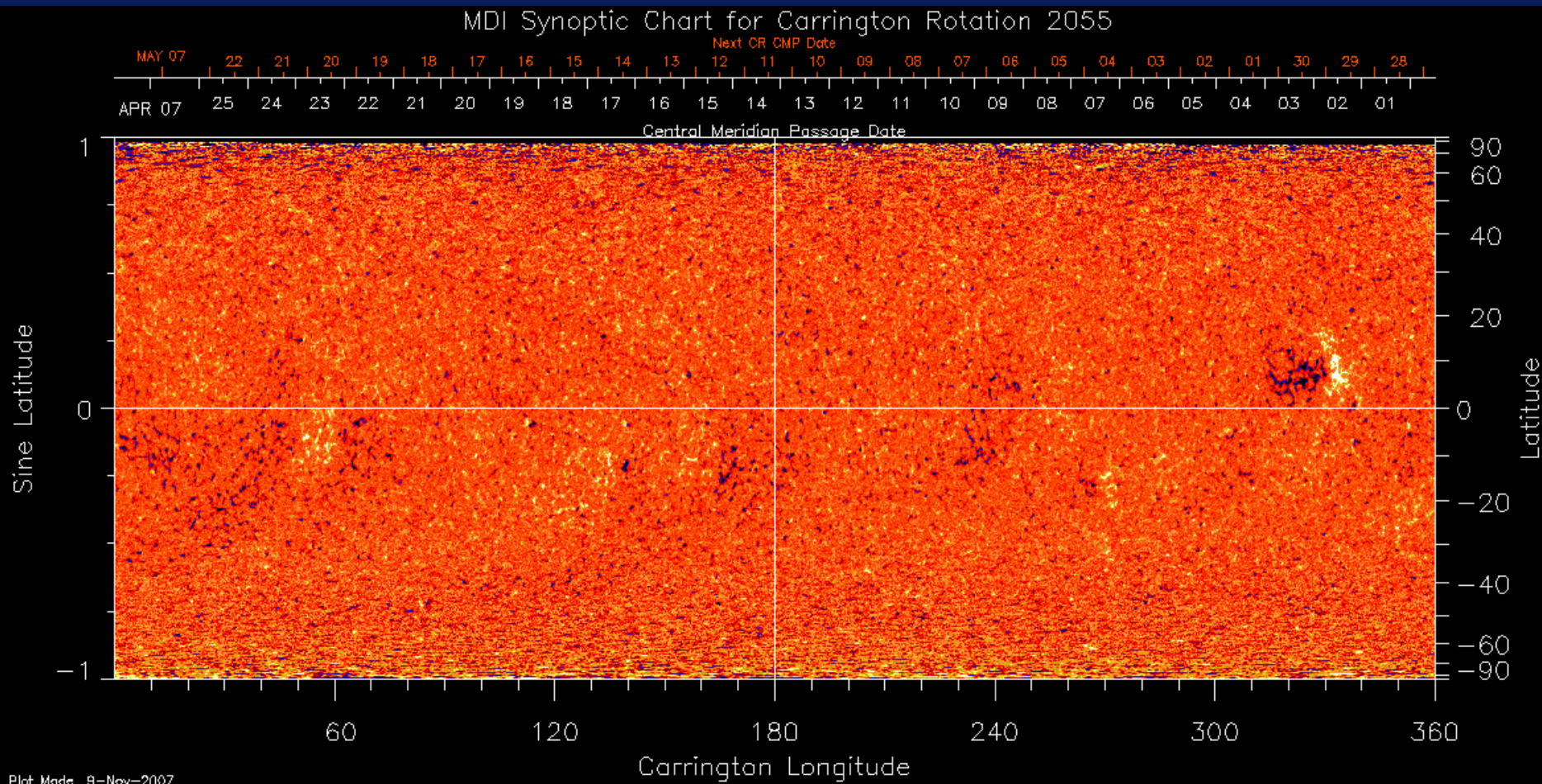


Space Weather Modeling Framework (SWMF)





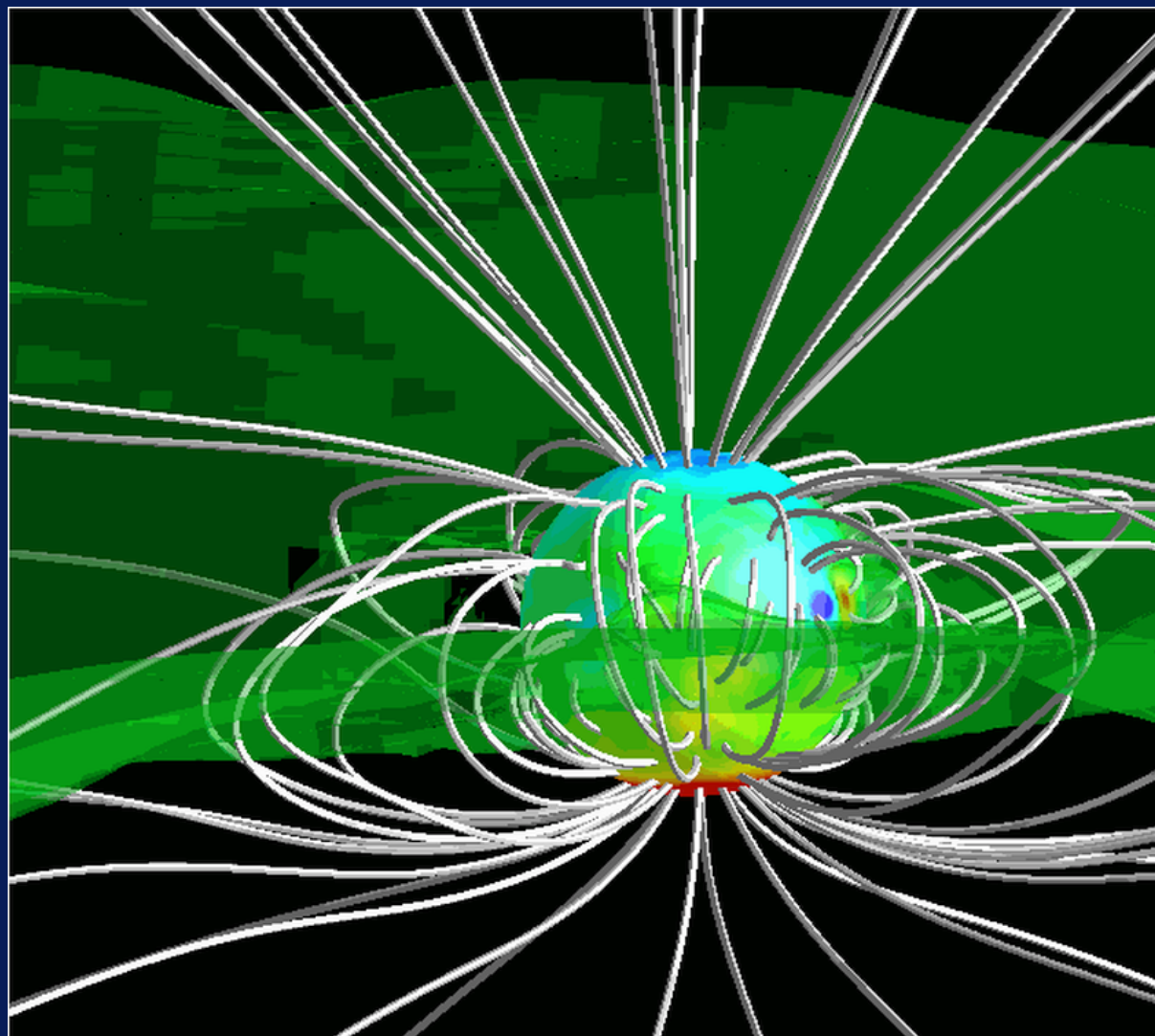
MDI Magnetogram for April 2007





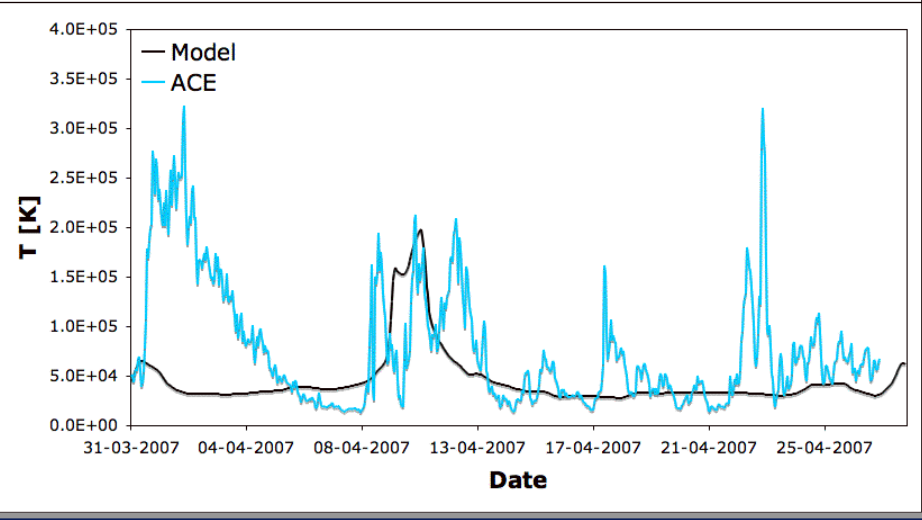
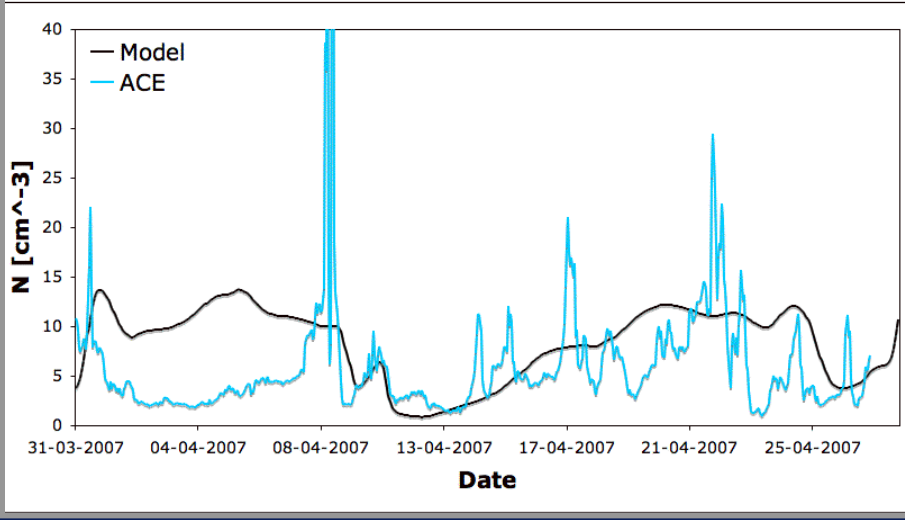
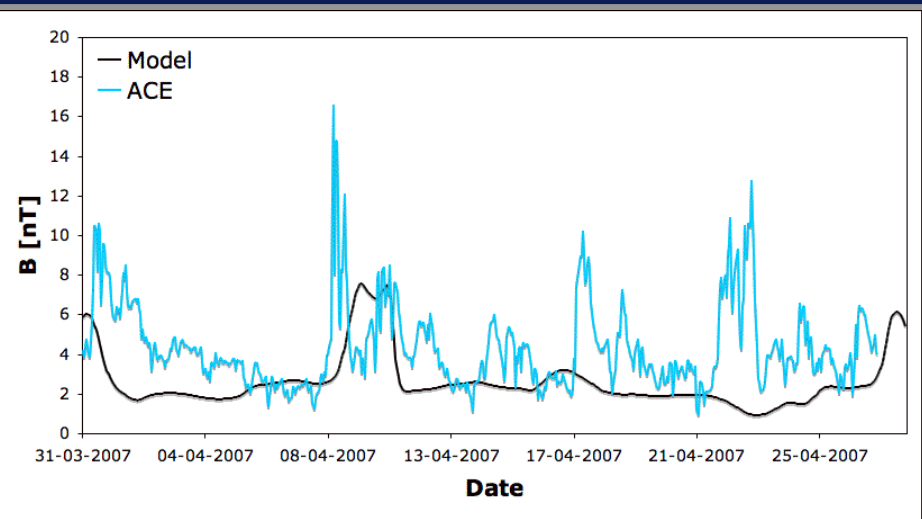
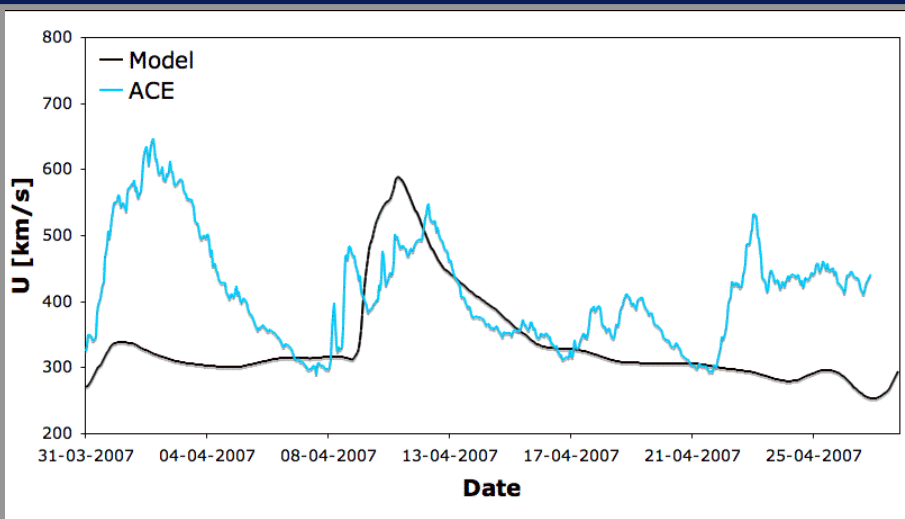
MHD Synoptic Corona for April 2007

(Ofer Cohen & Chip Manchester)





Comparison with ACE, April 2007 (Ofer Cohen)

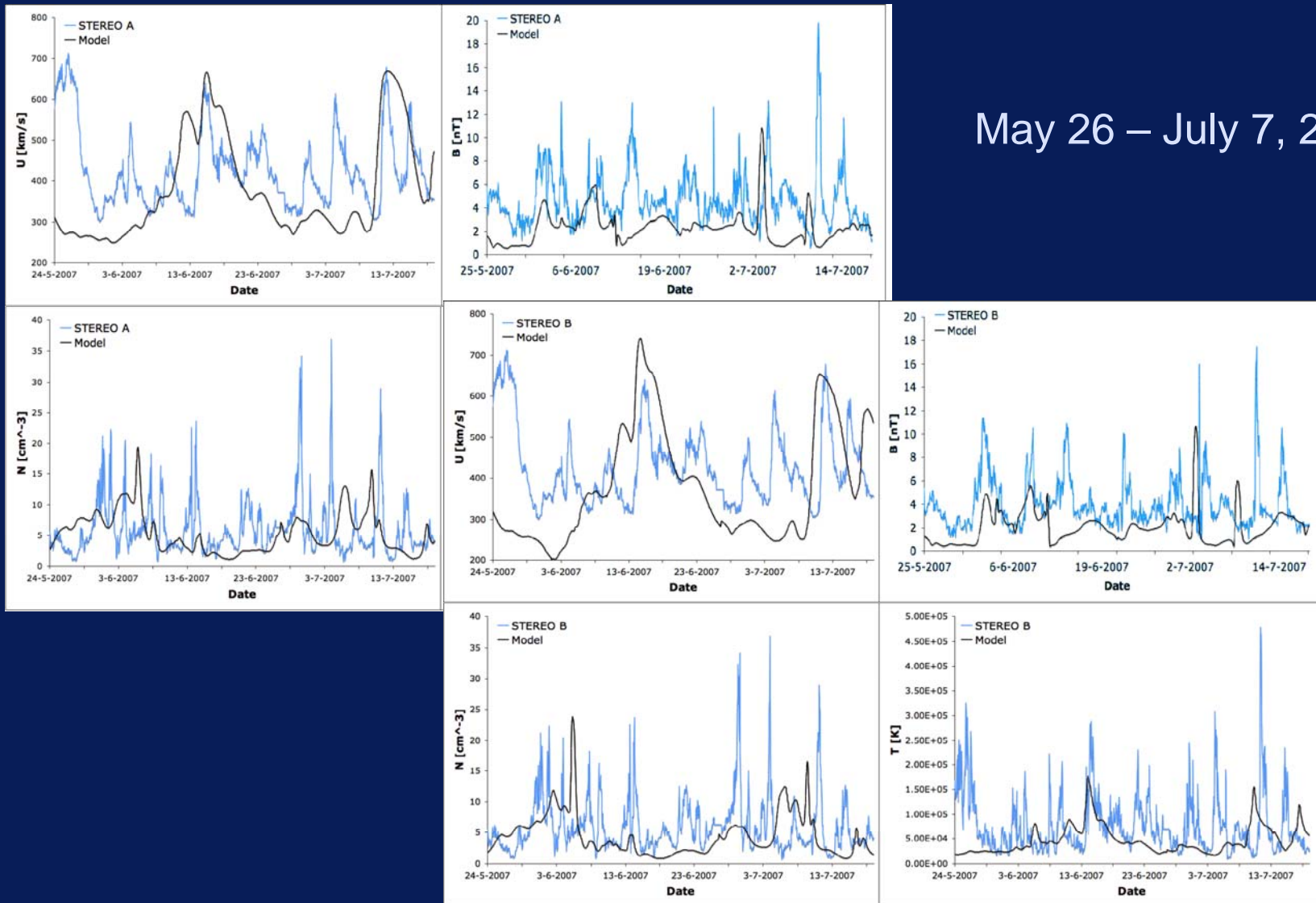




Comparison with ACE at 1 AU (Ofer Cohen)



May 26 – July 7, 2007



SOHO C2 2005 05 15 21:05

SOHO C2 2005 05 17 21:05

SOHO C2 2005 05 19 21:05



SOHO C2 2005 05 14 21:03

SOHO C2 2005 05 16 21:00

SOHO C2 2005 05 18 21:00



SOHO C2 2005 05 27 23:44



SOHO C2 2005 05 27 21:00

SOHO C2 2005 05 26 21:05



SOHO C2 2005 05 25 21:00



SOHO C2 2005 05 24 21:05



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SOHO C2 2005 05 22 21:05



SOHO C2 2005 05 21 03:06



SOHO C2 2005 05 20 21:00



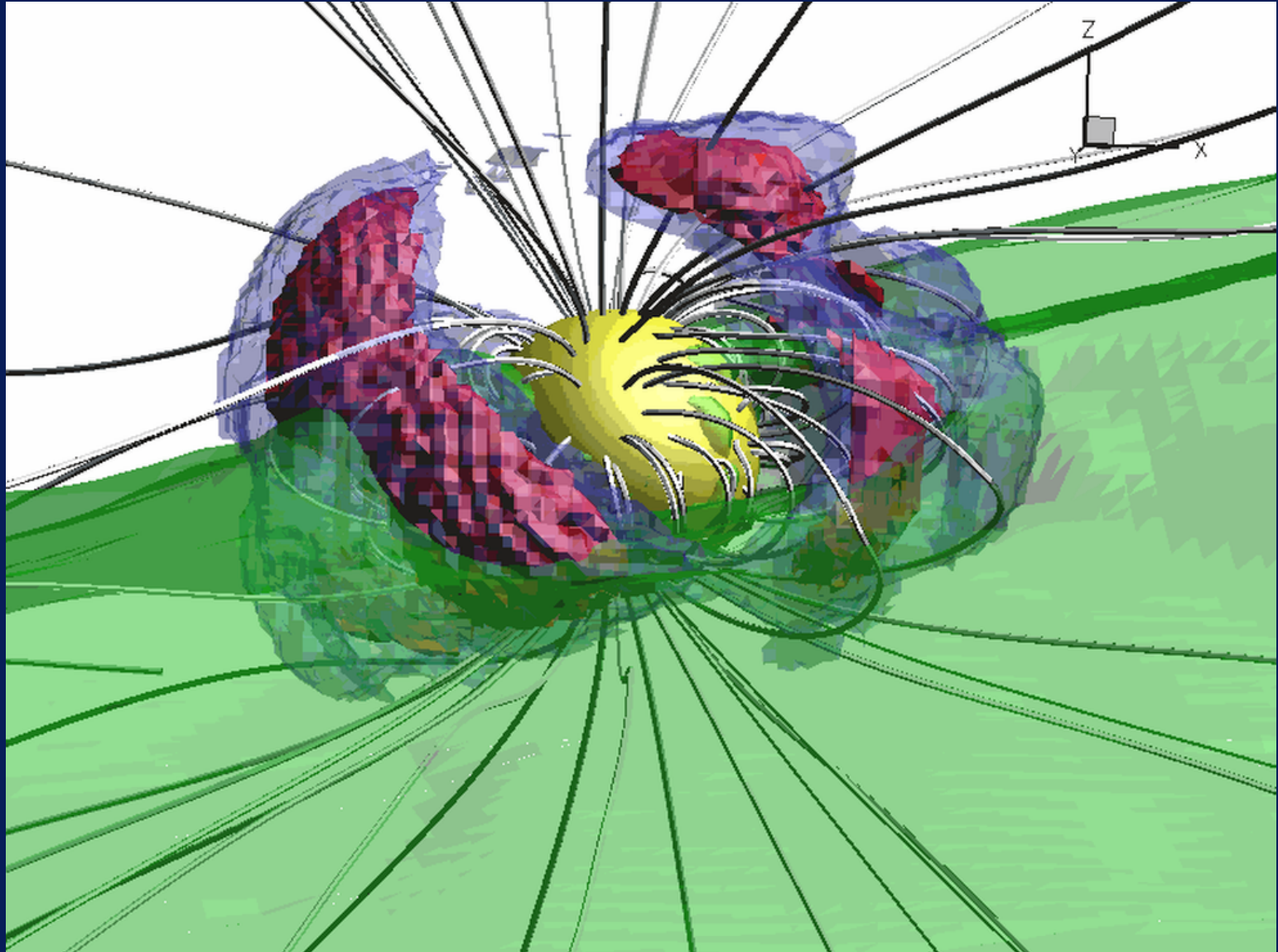
SOHO C2 2005 05 21 21:05

Rich Frazin brought 3D tomography capability to CSEM. His line-of-sight image inversion technology can reproduce the global coronal electron density distribution using coronagraph images. It takes half a solar rotation of imaging data to create a full 3D electron density distribution between $1 R_s$ and $\sim 6 R_s$.



Tomography and WSA-MHD Field Lines

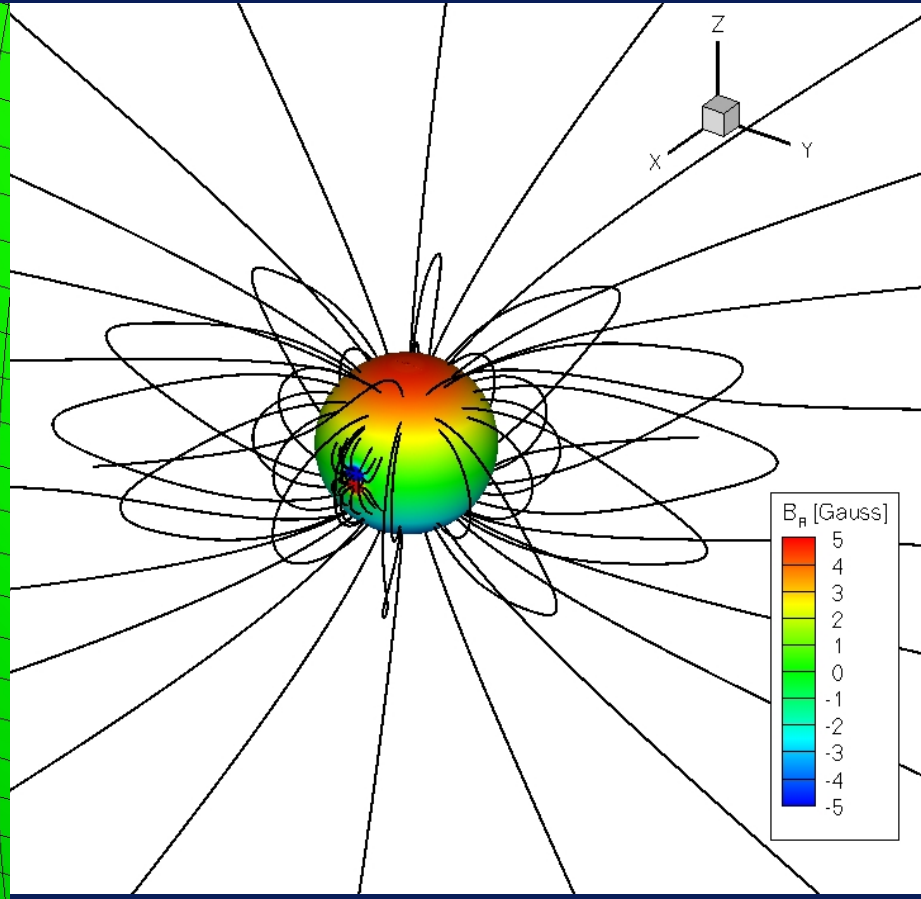
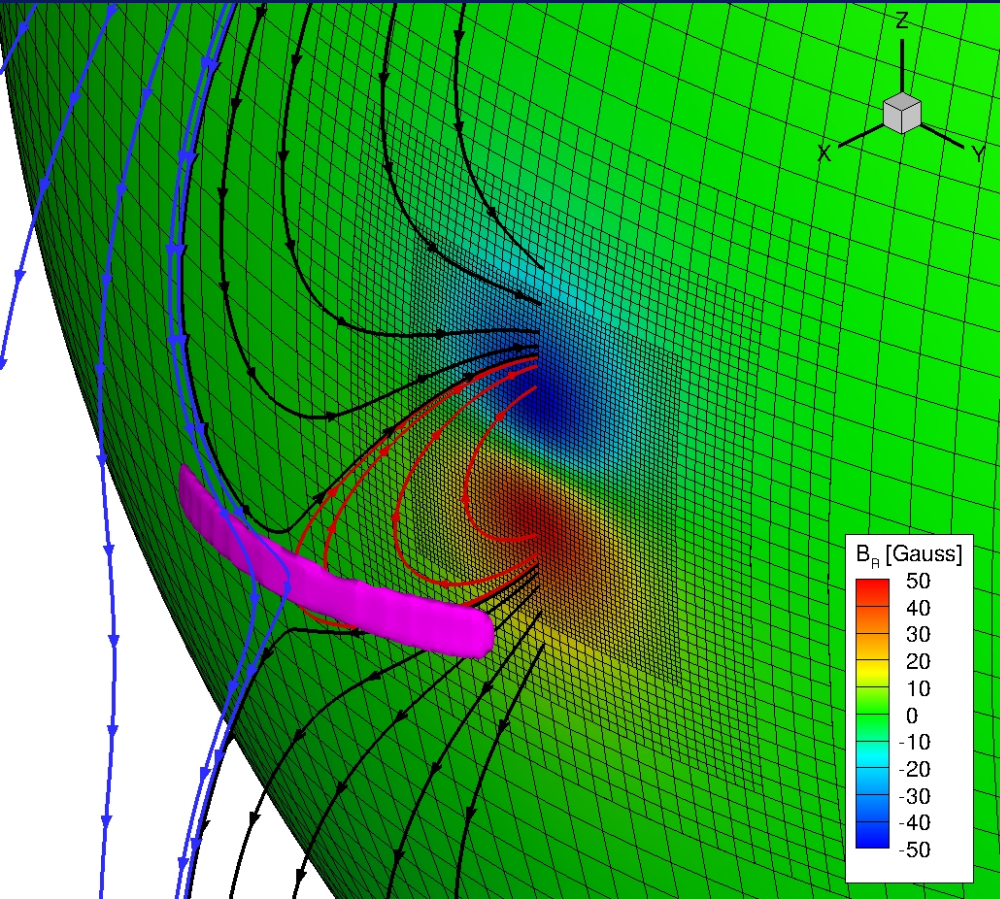
(Rich Frazin & Chip Manchester)





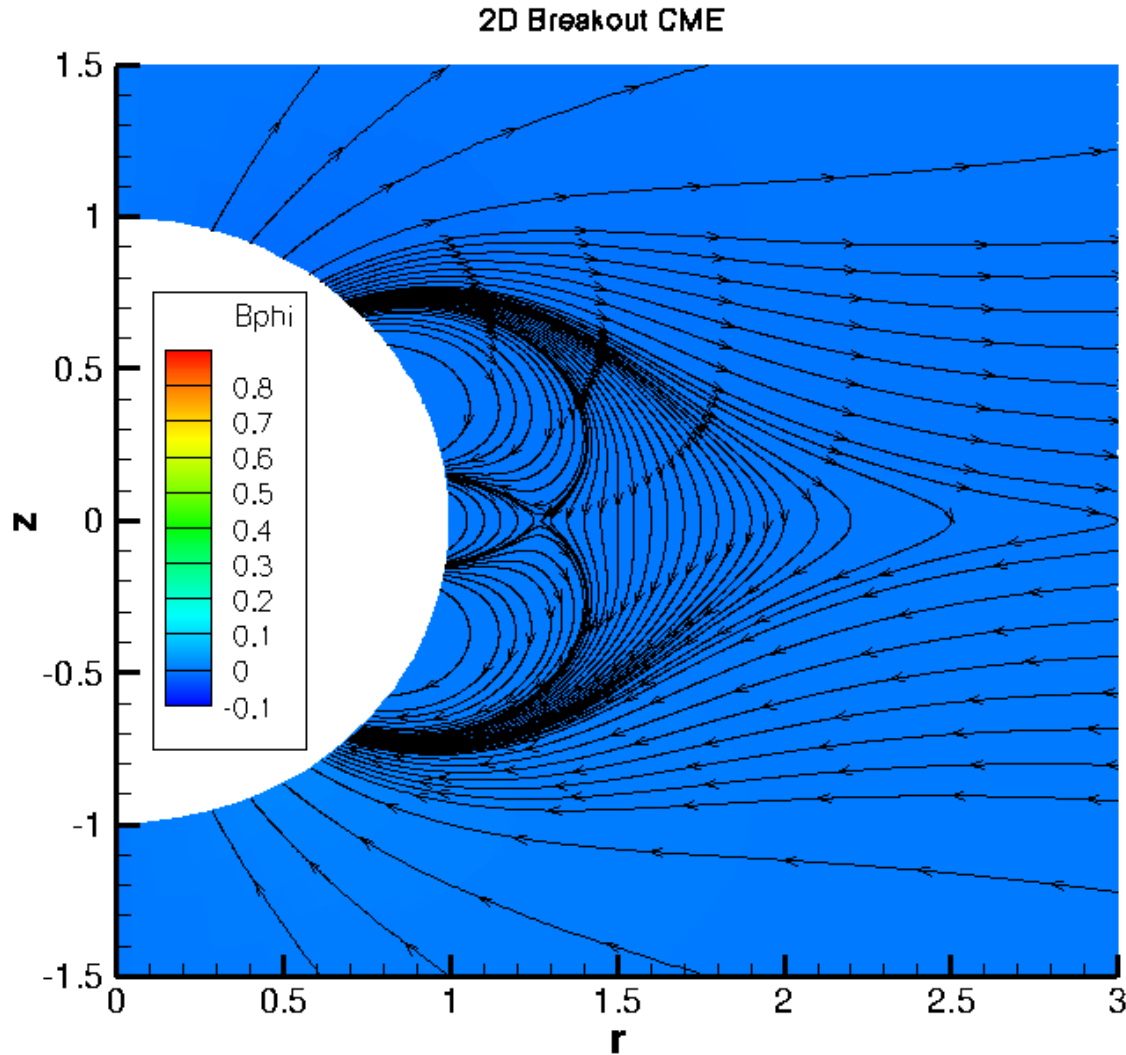
Breakout Simulation Geometry

(Bart van der Holst)



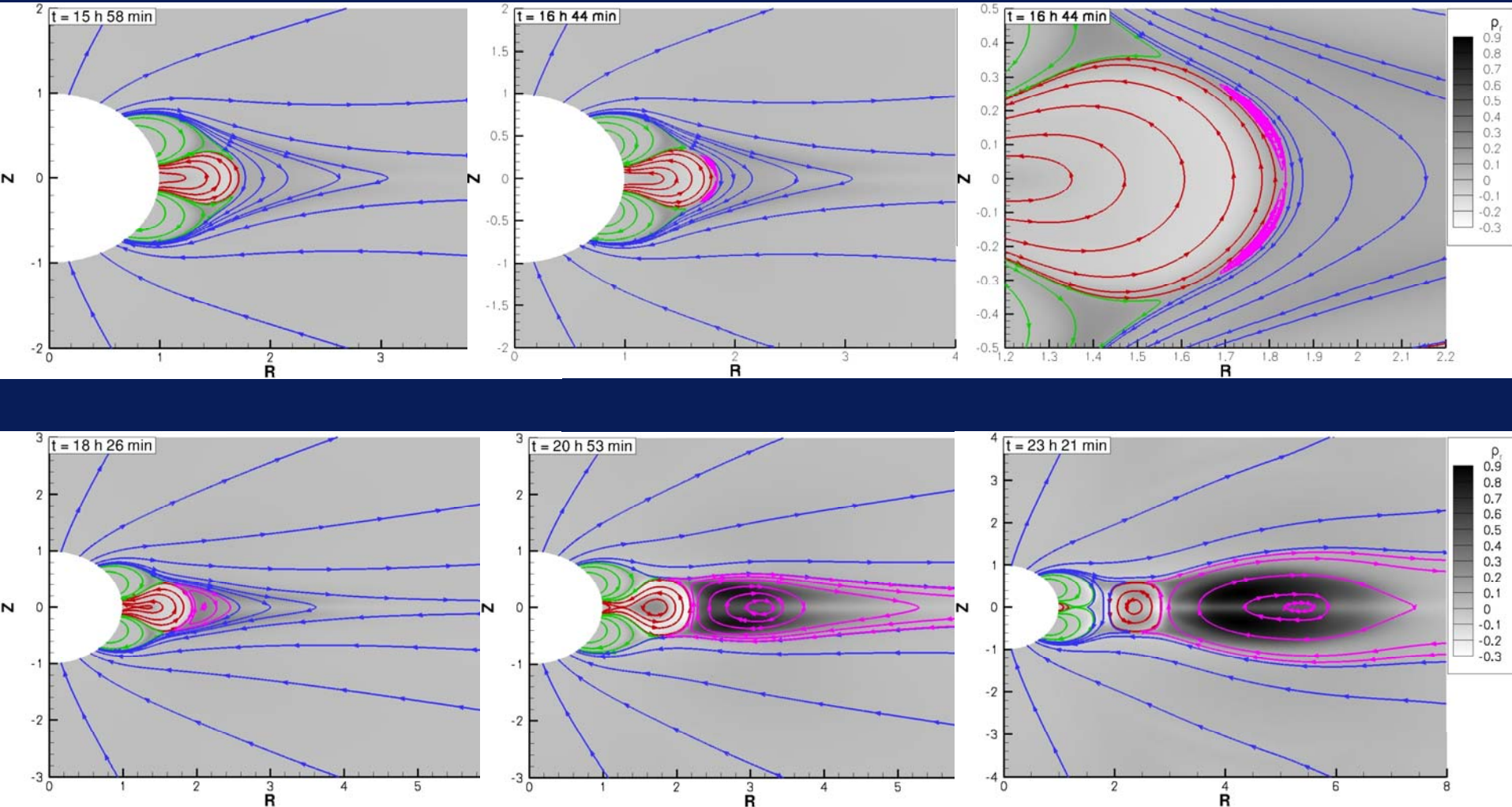


2D Breakout Simulation





CME Formation





M Magnetogram based synoptic MHD simulation is working

- Results are as good as the magnetogram input
- Detailed validation is needed

M April 20, 2007 event is investigated

- Interaction with comet Encke

M Coronal tomography looks very promising

M Breakout CME initiation has been implemented

- 2S results are promising
- 3D simulation is under way