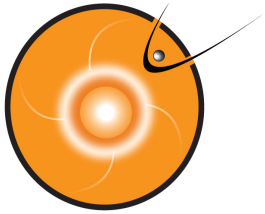


GEM Challenge 2008

Inner-Magnetospheric Magnetic Fields

L. Rastätter,
M. Kuznetsova, M. Hesse, A. Chulaki,
A Pulkkinen (CCMC)
H. Singer (NOAA),
M. Thompson (LANL)
A. Ridley, G. Millward,
A. Vapirev, M. Wiltberger (modelers)



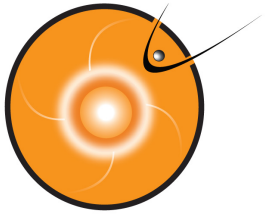
Data

Satellites in Geosynchronous orbit

- LANL: magnetopause crossings (LANL-90, LANL-91, LANL-94, LANL-95, LANL-97, LANL-01, LANL-02, as applicable) provided by M. Thompson.
- GOES: magnetic field measurements (GOES-8, GOES-10, GOES-11, GOES-12, as applicable) available through CDAWeb or NOAA (H. Singer).
- LANL plasma data available through CDAWeb.

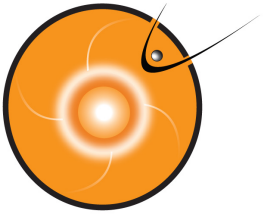
Selected storm events:

1. October 29, 2003 06:00 UT - October 30, 06:00 UT.
2. December 14, 2006 12:00 UT - December 16, 00:00 UT.
3. August 31, 2001 00:00 UT - September 1, 00:00 UT.
4. August 31, 2005 10:00 UT - September 1, 12:00 UT.

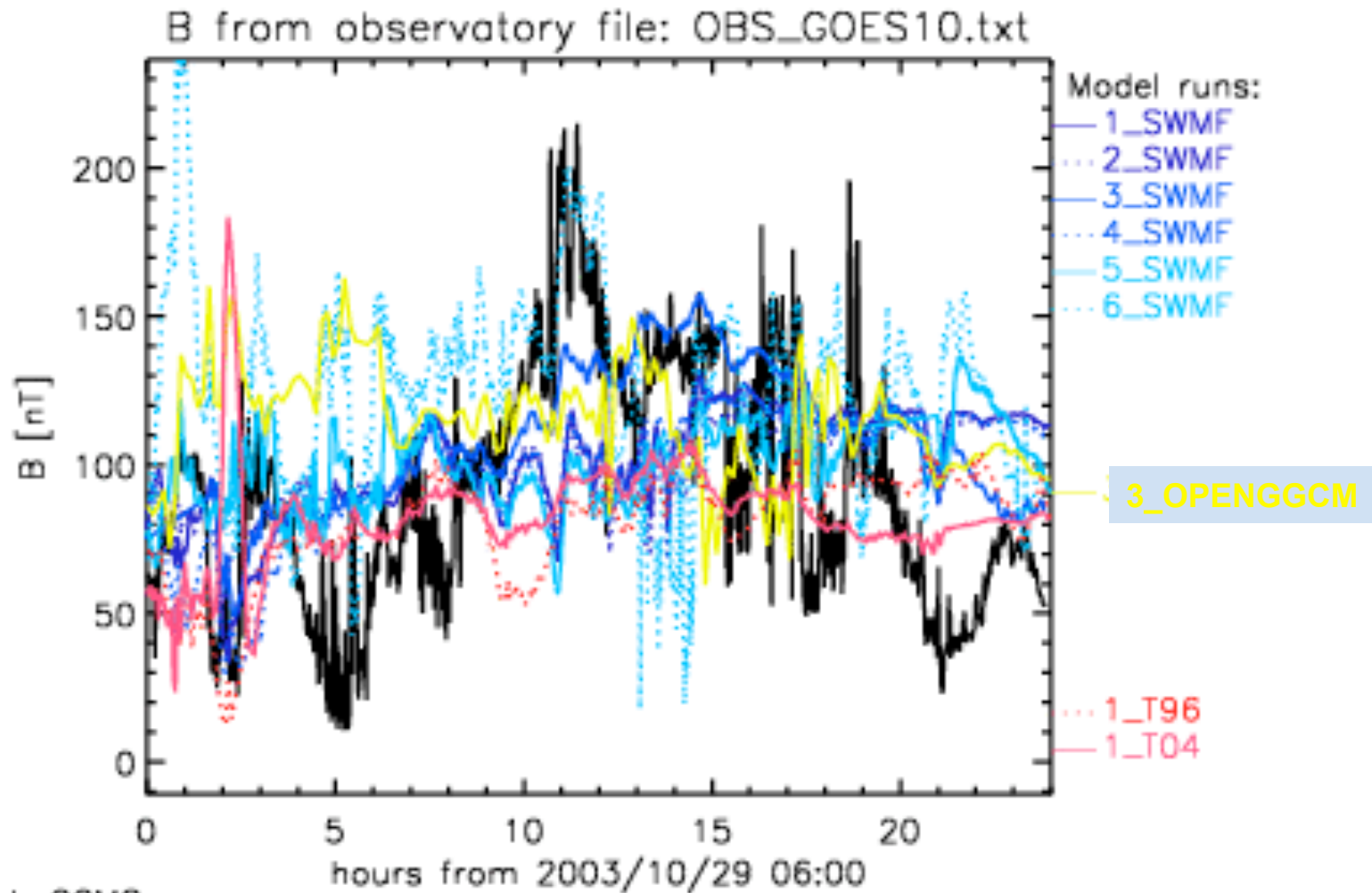


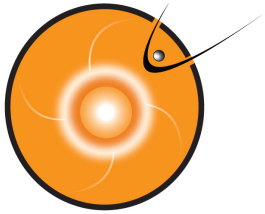
Model Submissions (new)

1_SWMF	BATSRUS 7.73, 2M cells, CCMC
2_SWMF	BATSRUS 7.73, 700k cells (real-time setup), CCMC
3_SWMF	BATSRUS 8.01 with RCM, 2M cells, CCMC
4_SWMF	BATSRUS 8.01, 3 M cells, CCMC
5_SWMF	BATSRUS 8.01 with RCM, 3M cells, CCMC
6_SWMF	SWMF V.20090403, BATSRUS+RCM2, 900k cells, min. res 0.25R_E A. Ridley
1_OPENGGCM	OpenGGCM 3.1, 3 M cells
2_OPENGGCM	OpenGGCM 3.1, 6.5M cells
3_OPENGGCM	OpenGGCM 3.1, Alexander Vapirev's submission
1_LFM	LFM, Michael_Wiltberger (13/11/2008, 15/05/2009)
1_CMIT	CMIT 2.0, George_Millward (28/05/2009, 04/06/2009)
1_T96	Tsyganenko 1996, CCMC
1_T04	Tsyganenko 2004, CCMC



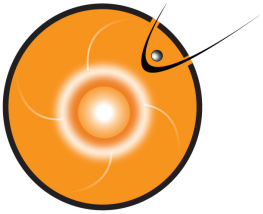
Event 1, IBI from GOES10



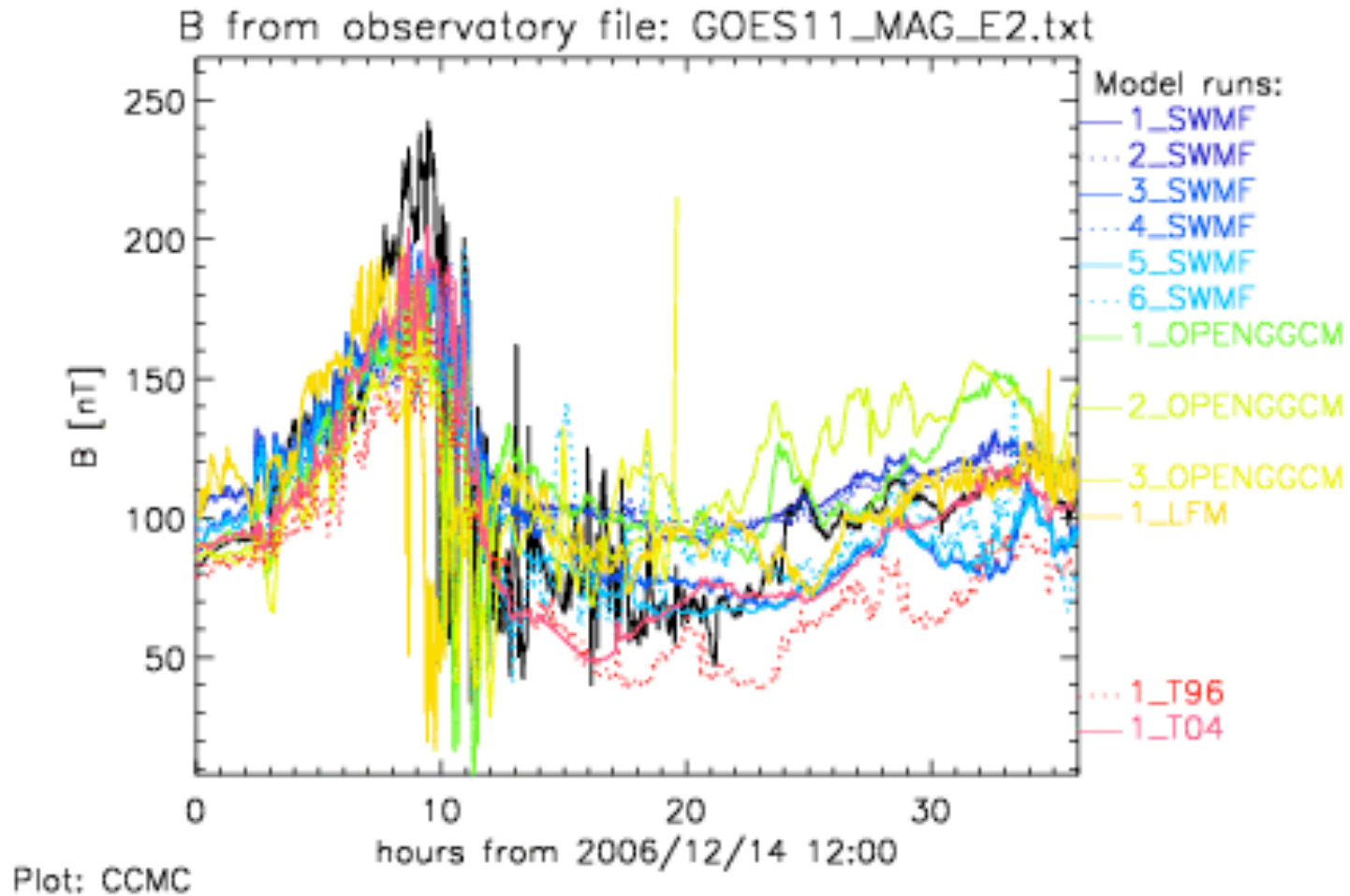


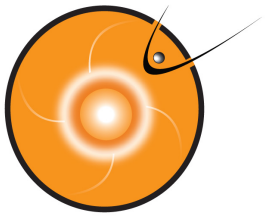
Event 1 scores

Variable: B	GOES10		GOES12	
Model_Setting	PredEff	LogSpecDist	PredEff	LogSpecDist
1_SWMF	-0.113	1.286	-0.426	1.390
2_SWMF	-0.141	1.573	-0.569	1.542
3_SWMF	0.303	1.222	-0.037	1.112
4_SWMF	-0.099	1.679	-0.447	1.247
5_SWMF	-0.236	1.553	-0.135	1.619
6_SWMF	-1.014	0.330	-0.148	0.504
3_OPENGGCM	-0.700	0.819	-0.570	0.847
1_T96	-0.148	1.225	-0.557	0.984
1_T04	-0.045	1.238	-0.041	1.495



Event 2, IBI from GOES11

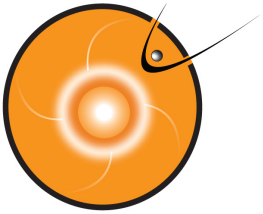




Summary: Events 1 and 2

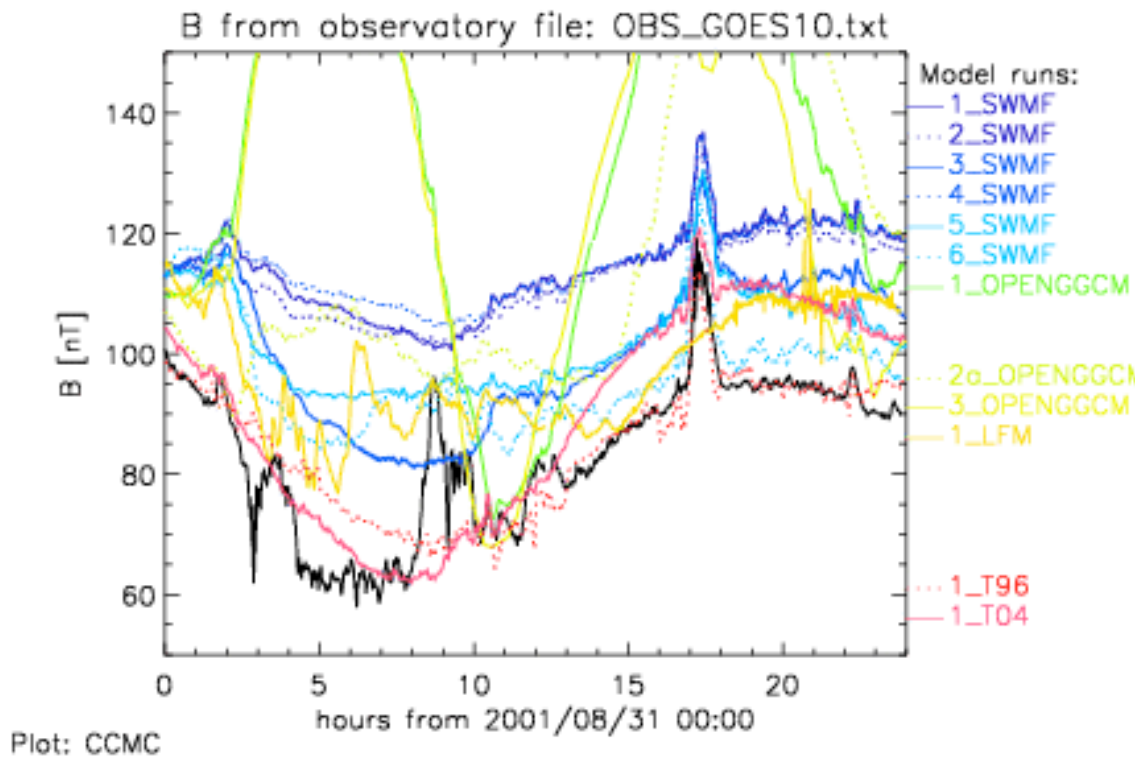
- Event 1: Beginning of Halloween storm
 - Tsyganenko models and most MHD models see one onset of activity between 12:00 and 16:00 UT on 10/29
 - Models miss most of the variations afterwards.
- Event 2: 1st day of 2006 “AGU” storm
 - Models track the pronounced changes seen in measurements.

Prediction Efficiencies better in Event 2.



Event 3 (and Event 4)

- Smaller events dominated by diurnal variation



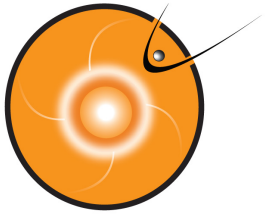
Dayside features well tracked

All models do not 'get' nightside.

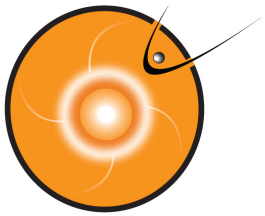
All models have significant offsets which dominate Prediction Efficiencies.

SWMF runs have offset that diminishes with better physics.

OpenGGCM runs are way off. Performance may be better if run in SM coordinates to follow Earth's magnetic field.

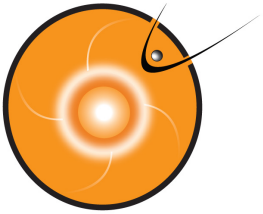


Extra slides



Scores – Event2

Model Run	GOES11		GOES12		
	PredEff	LogSpecDist	PredEff	LogSpecDist	
1_SWMF	0.601	1.648	0.230	1.037	
2_SWMF	0.574	1.614	0.219	0.927	
3_SWMF	0.657	1.616	0.397	1.024	
4_SWMF	0.591	2.623	0.234	2.046	
5_SWMF	0.703	2.758	0.354	2.068	
6_SWMF	0.568	0.602	0.271	0.292	
1_OPENGGCM	0.394	Infinity	-0.183	Infinity	need to review data
2_OPENGGCM	0.205	3.247	-0.487	2.198	
3_OPENGGCM	-19609	0.573	-123.6	0.358	need to review data
1_LFM	0.158	0.526	0.120	0.198	
1_T96	0.239	0.603	0.282	0.403	
1_T04	0.667	0.637	0.534	0.634	



Event 1, IBI from GOES12

