

# GEM Challenge: Magnetic Fields at GOES Geosynchronous Satellites

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Also contributed:  
CCMC staff and modelers

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# Available data

- GOES series, 2 s/c at each event:
- Event 1: GOES 10, 12
- Event 2: GOES 11, 12
- Event 3: GOES 08, 10
- Event 4: GOES 10, 12

# Data preparation

- Data obtained from CDAweb.
- Trajectories from SSCweb
- Small data gaps (a few minutes) interpolated to 1-minute cadence

# Visualization

- Table to launch visualization at [http://ccmc.gsfc.nasa.gov/support/GEM\\_metrics\\_08/display/metrics\\_results.php](http://ccmc.gsfc.nasa.gov/support/GEM_metrics_08/display/metrics_results.php)

**GEM 2008/2009 Modeling Challenge Results**

**Challenge events:**

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

**Metrics studies:**

- 1: Magnetic field at geosynchronous orbit (GOES)
- 2: Magnetopause crossings by geosynchronous satellite (GOES and LANL)
- 3: Plasma density/temperature at geosynchronous orbit (LANL)
- 4: Ground magnetic perturbations (ground based magnetometers)

	Metrics Study 1	Metrics Study 2				Metrics Study 3			Metrics Study 4														
Event 1	GOES12 GOES10	LANL02	LANL01	LANL97	LANL94	LANL02	LANL01	LANL97	LANL94	LANL91	LANL90	YKC	MEA	NEW	FRN	IQA	PBQ	OTT	FRD	HRN	ABK	WNG	FUR
Event 2	GOES12 GOES11	LANL02	LANL01	LANL97	LANL94	LANL02	LANL01	LANL97	LANL94	LANL89		YKC	MEA	NEW	FRN	IQA	PBQ	OTT	FRD	HRN	ABK	WNG	FUR
Event 3	GOES10 GOES08	LANL01	LANL97	LANL94	LANL90	LANL01	LANL97	LANL94	LANL90			YKC	MEA	NEW	FRN	IQA	PBQ	OTT	FRD	ABK	WNG	FUR	
Event 4	GOES12 GOES10	LANL02	LANL01	LANL97	LANL94	LANL02	LANL01	LANL97	LANL94	LANL90		YKC	MEA	NEW	FRN	PBQ	OTT	FRD	HRN	ABK	WNG	FUR	

Curator: Anna Chulaki | NASA Official: Dr. Michael Hesse | | Privacy, Security Notices

CCMC logo designed by artist Nana Bagdavadze

# Visualization interface (Event 4, Metric 1, GOES10)

*Update Plot* will update (generate) the plot with the chosen time and plot parameters below.  
**This will take some time (typically 10-30s) as data is read in and processed.**

Start: Year:  Month:  Day:  Hour:  Minute:  Second:   
to End: Year:  Month:  Day:  Hour:  Minute:  Second:

Choose **Quantity** to be displayed:

Select quantity  
(here: B, Bx,By,Bz)

## **Plot Options:**

Image magnification

Line thickness

Character thickness  (all annotations)

**Lock plot range:**

Min.:  Max.:

## **Select model settings**

- 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, RT on 64 procs., A. Ridley
- 1\_OPENGGCM: OpenGGCM 3.1, 3 M cells
- 1\_LFM: LFM, Michael\_Wiltberger (13/11/2008,15/05/2009)

Available  
model settings

*Reset Form* will reset changes to the defaults specified by the previous run of this script.

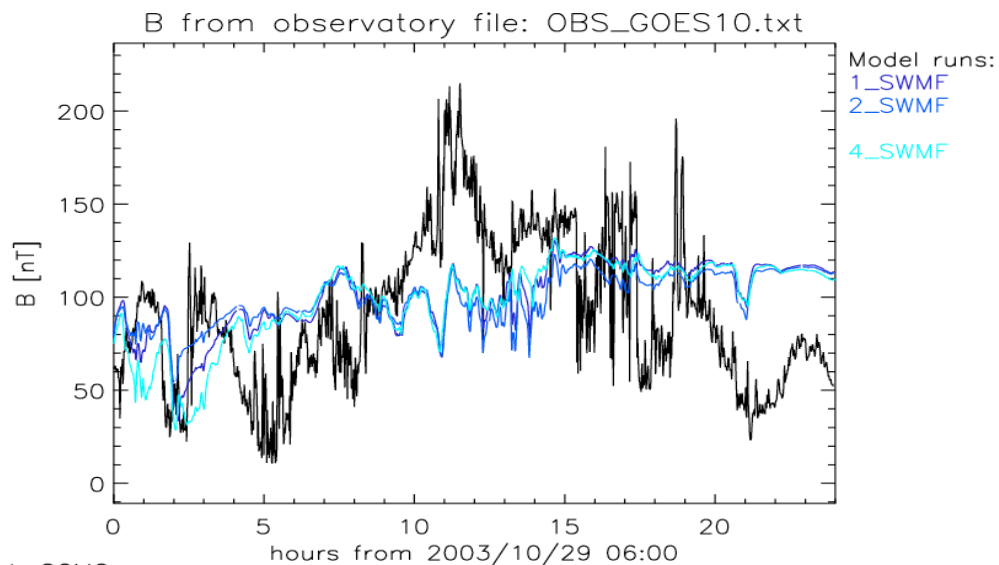
*Update Plot* will update (generate) the plot with the chosen time and plot parameters above.

Runs-on-Request: [Contact CCMC Staff](#)

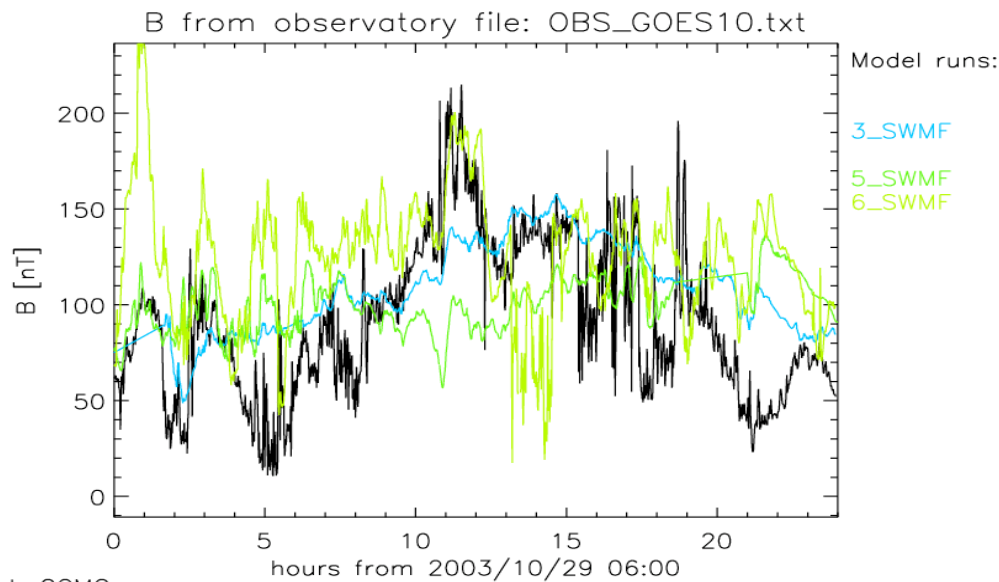
Visualization: [Dr. Lutz Rastätter](#)

Last script update: June 12, 2009

- Event 1
- SWMF only
- Some improvement with RCM

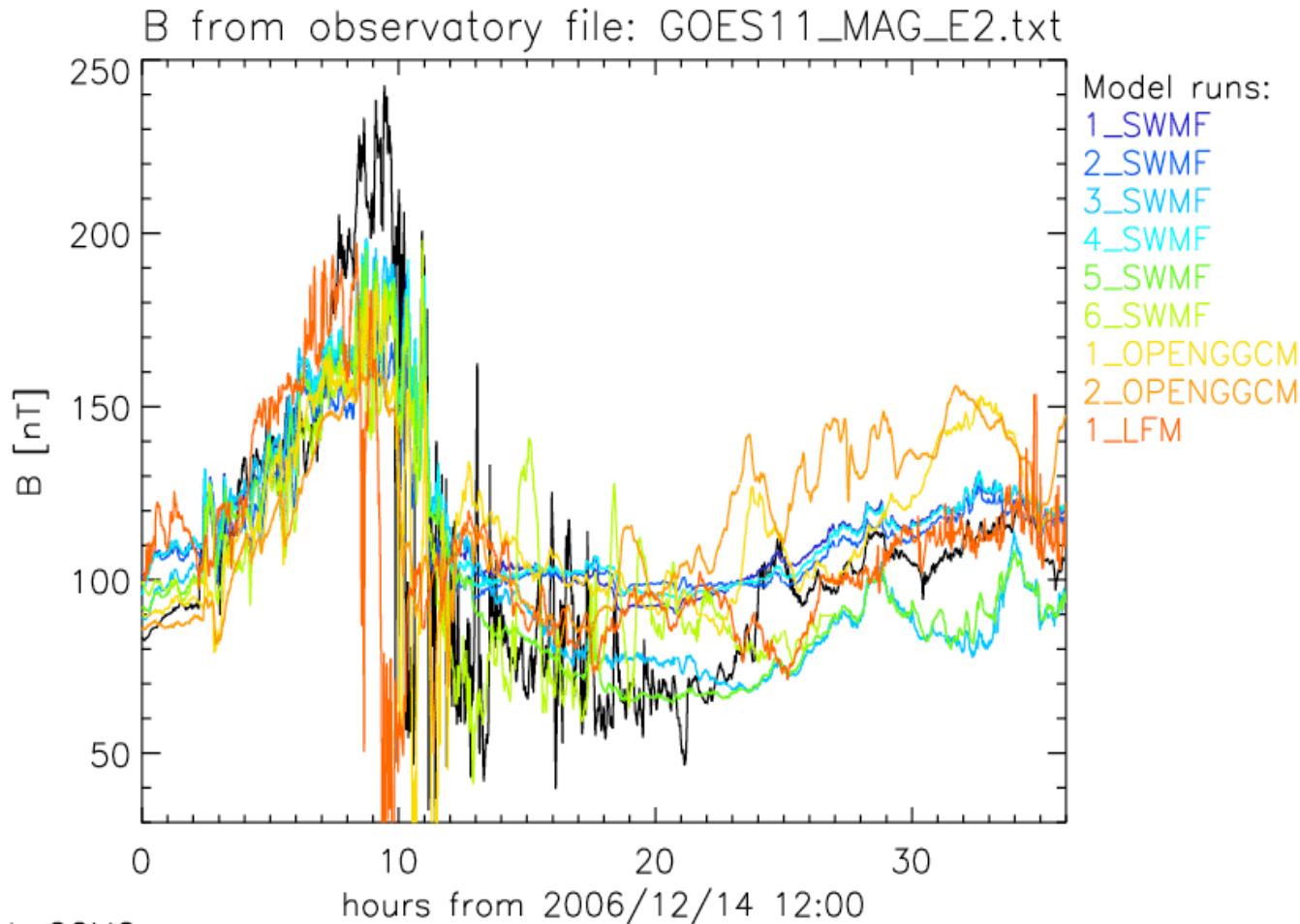


Plot: CCMC



Plot: CCMC

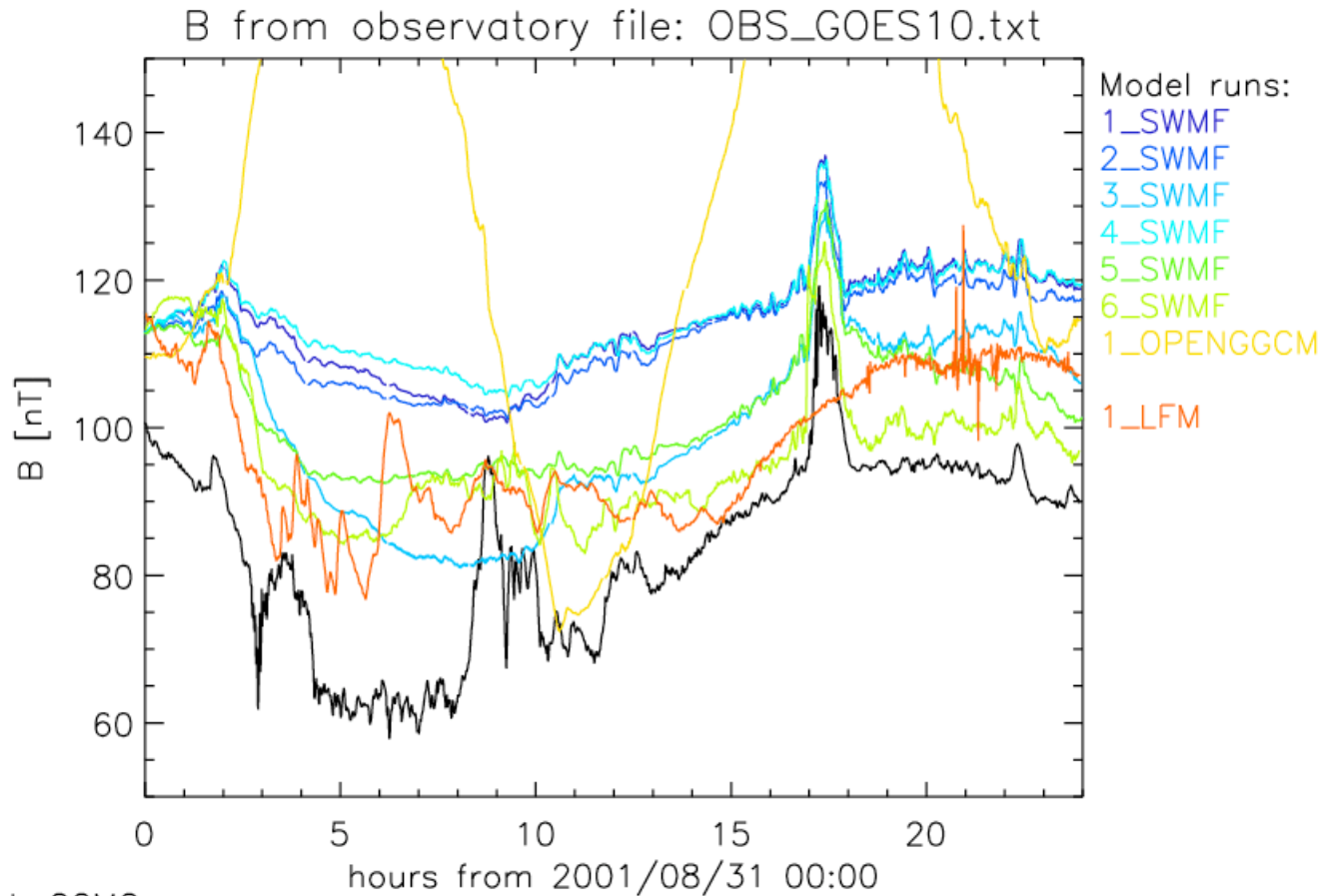
# Strong event (2: AGU Storm)



All models  
see the large  
event

phase shifts  
seen between  
models and  
settings

# Event 3

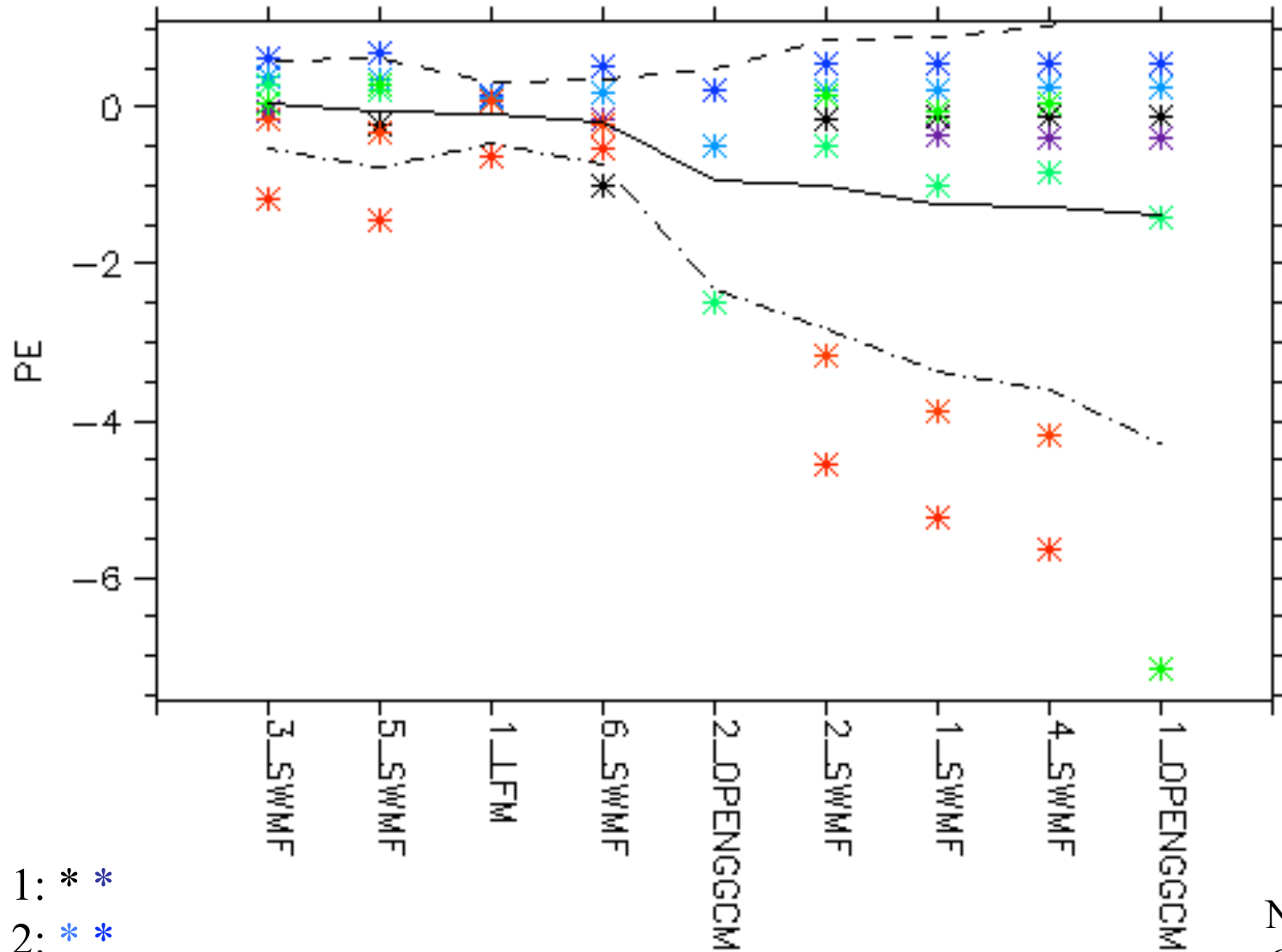


Plot: CCMC

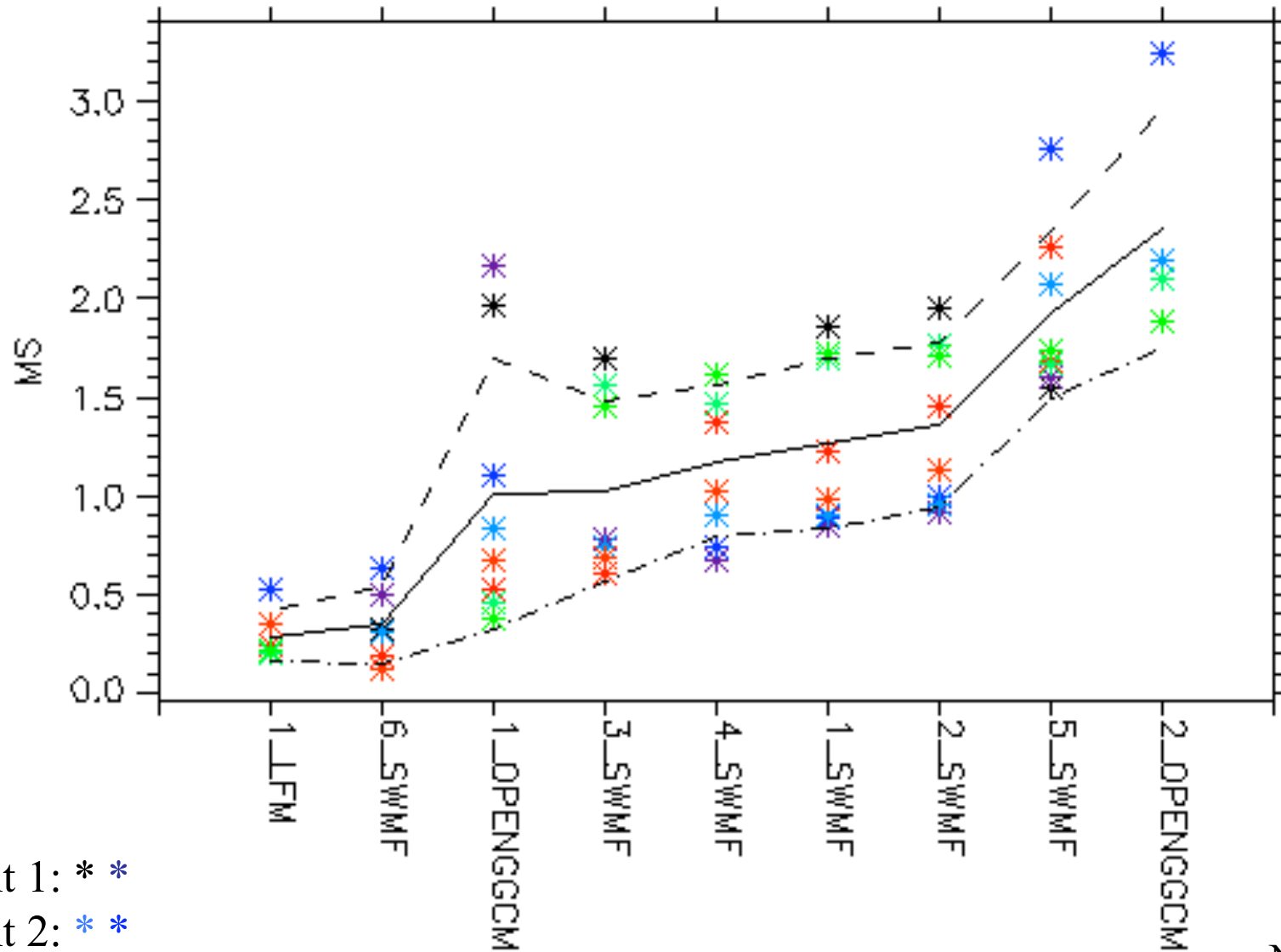
models  
follow diurnal  
variations –  
miss  
features in  
night side



# Prediction Efficiencies



# Log-Spectral Distances



- Event 1: \* \*
- Event 2: \* \*
- Event 3: \* \*
- Event 4: \* \*

better ----- worse

Not all events for  
6\_SWMF, 1\_LFM,  
2\_OPENGGCM