CCMC-VMR Partnership

http://vmr.engin.umich.edu/

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Virtual Model Repository

- The VMR is a virtual observatory that enables scientific analysis of numerical model results. A variety of model results are made available in a consistent and intuitive way through visualization tools and data/model comparisons. Open access to most model output is provided.
- The VMR enables browse/search of model output and satellite data for time periods of scientific interest. Data discovery and exchange is coordinated through various APIs from multiple sites to bring in the relevant data for visualization.
- Collaborate by sharing plots and movies or commenting in run wikis.

What's in the VMR?

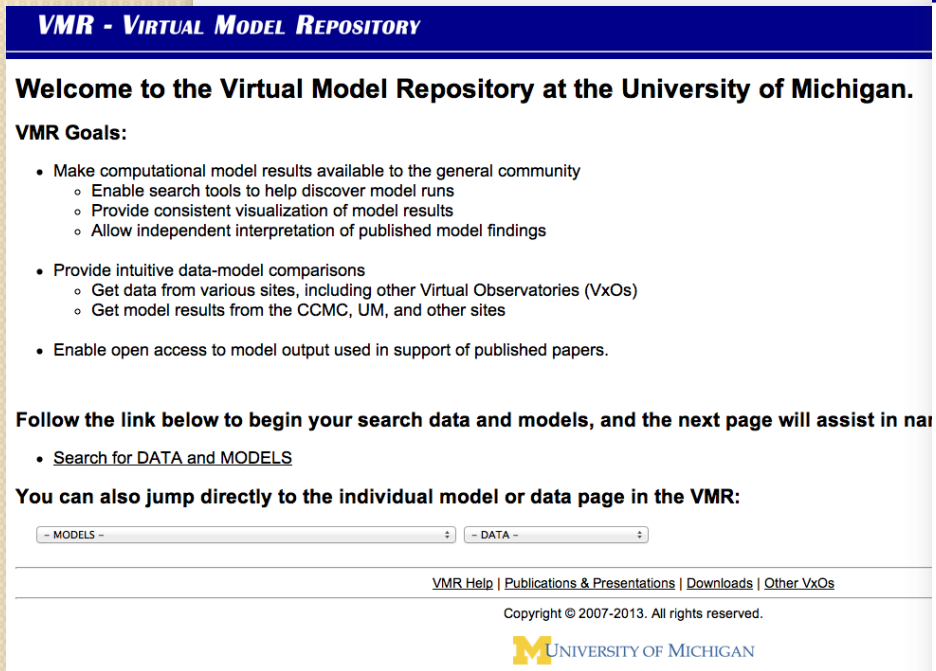
- Models
  - CCMC event runs
  - SWMF runs at Michigan
  - GITM
  - HEIDI
  - AMIE
  - IRI (from CCMC)
- Data
  - Kyoto Dst
  - SWPC F10.7
  - CDAWeb
  - Madrigal (CEDAR)
  - DMSP
  - Magnetospheric satellite magnetic field plotting

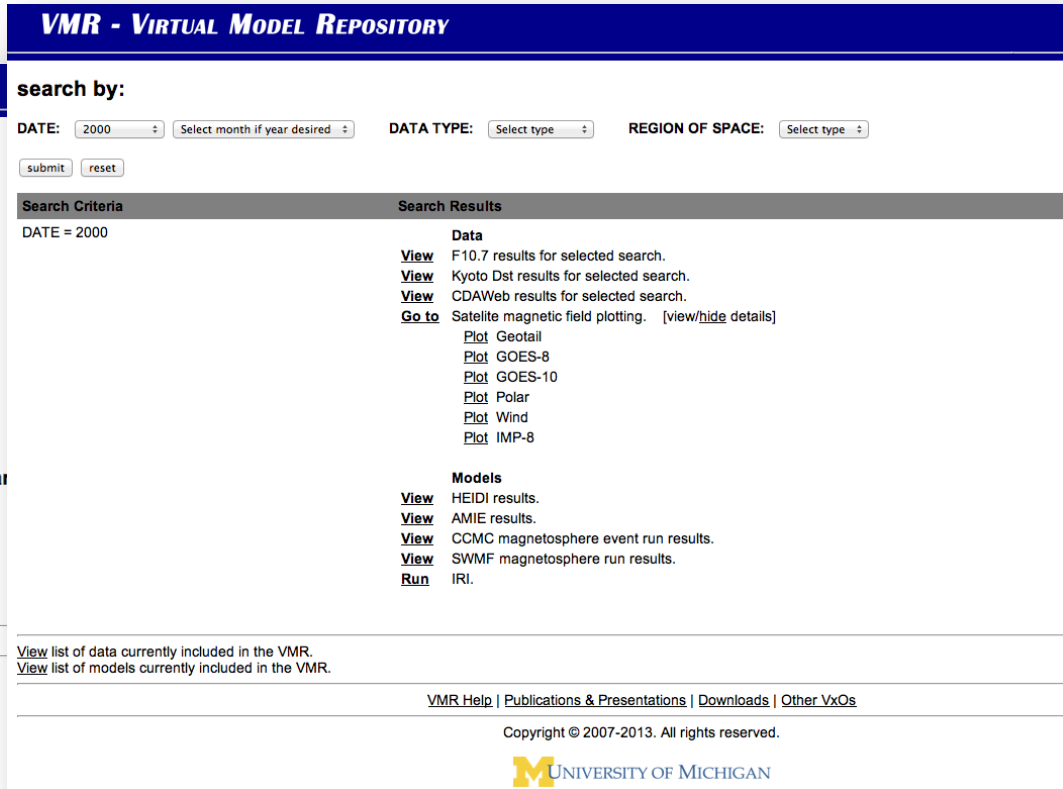
CCMC Collaboration

- We have a long history of collaboration between Michigan and the CCMC, going back to 2000.
- The CCMC has the largest collection of model output, and was the first group the VMR collaborated with when it was created.
- The VMR mostly interacts with "event" data for Earth's global magnetosphere runs, though it is also using other CCMC resources (ie. IRI runs).

VMR Homepage

The VMR homepage allows you to quickly get to the information you want. You can filter the search by date, data type, and region of space, or just jump to a specific type of data and refine the search further there.





DATA: satellite magnetic field

Visualization of magnetic field data from many satellites is provided, with instructions to use autoplot.

VMR - Virtual Model Repository HOME

Satellite Magnetic Field Data Plots

Geotail	View plot	GOES-8	View plot
GOES-9	View plot	GOES-10	View plot
GOES-11	View plot	GOES-12	View plot
Polar	View plot	Wind	View plot
Cluster-1	View plot	Cluster-2	View plot
Cluster-3	View plot	Cluster-4	View plot
IMP-8	View plot	Themis-A	View plot
Themis-B	View plot	Themis-C	View plot

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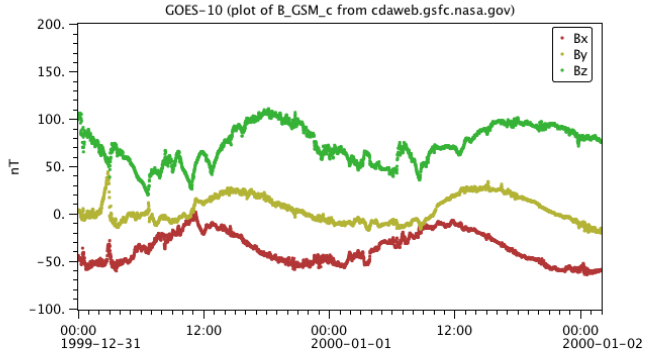
Plot of GOES-10 data



To make a *similar* plot yourself that you can modify further, paste the line below into autoplot yourself.

vap:ftp://cdaweb.gsfc.nasa.gov/pub/data/goes/goes10/mag_k0/%Y/g0_k0_mag_%Y%m%d_v...cdf?B_GSM_c&timerange=1999-12-31+through+2000-01-02

You can also download this file and load it into autoplot.

Enter your own date/time range to view satellite data:

Enter date and time as YYYY-MM-DD / HH:MM:SS data range: 1999-03-21 - 2006-07-22

Begin: 1999-12-31 / 00:00:00

End: 2000-01-02 / 02:00:00

submit

View plots already created for this satellite from other runs: (3)

-SELECT PLOT-

NOTE: If your plot says 'no data set' in the upper left corner, then there is likely a gap in the data available from cdaweb for the time period selected. Date corre available, but not for gaps in availability. That feature will be added at some point.

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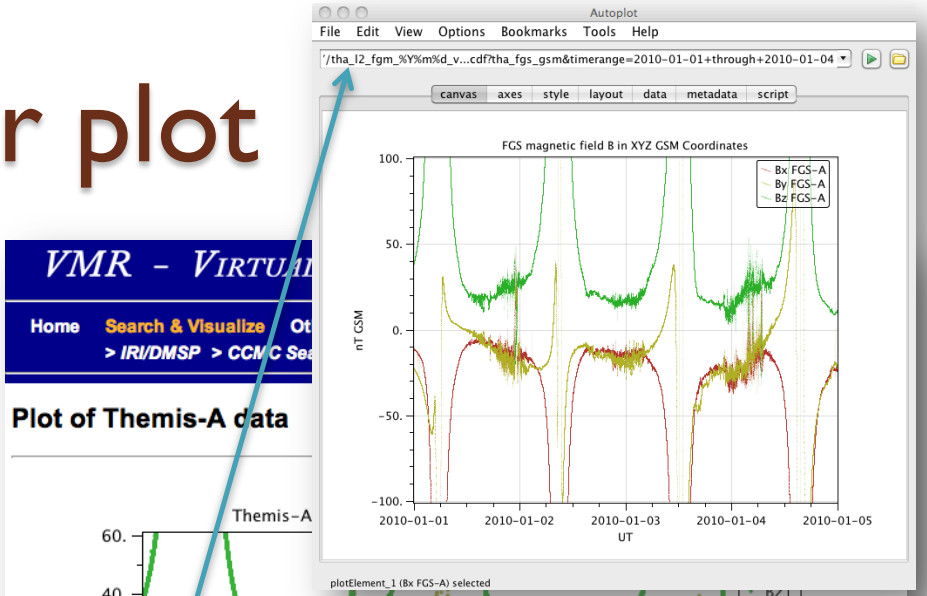
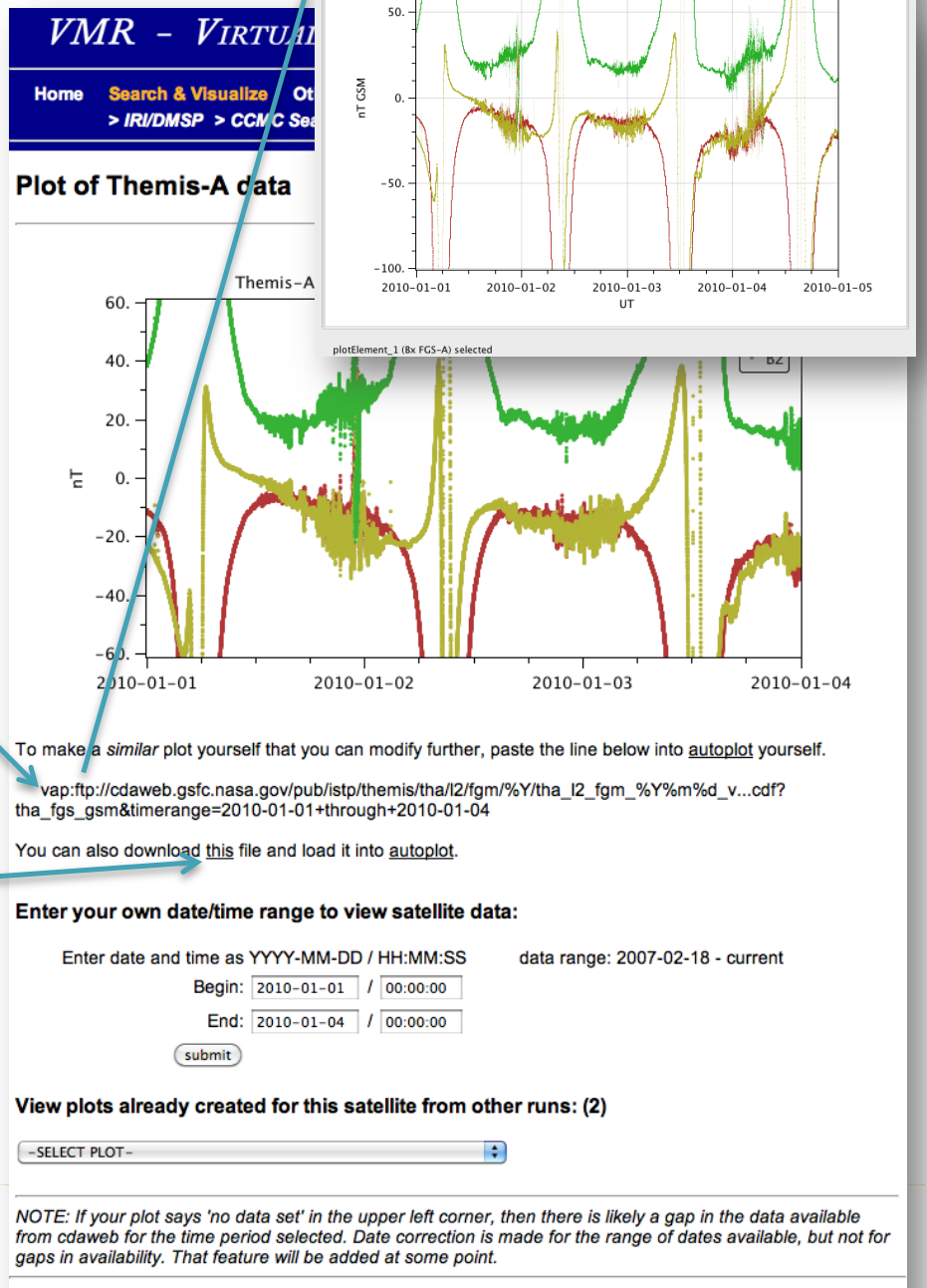
Customize your plot

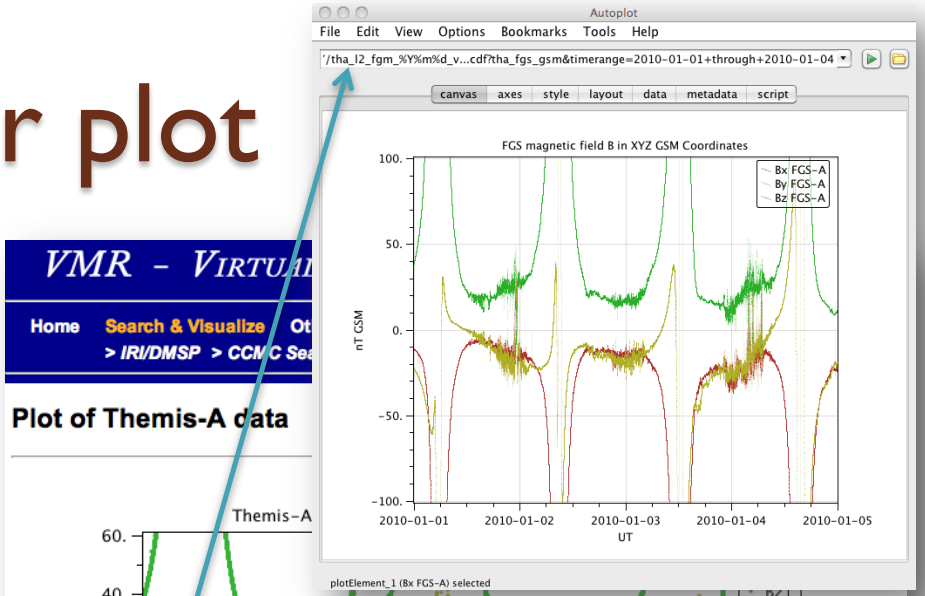
- Many plots are now created with autoplot (*http://autoplot.org*)
  - You can take the custom URL and view the data yourself.
  - You can also download the .vap file and load it into autoplot to then further customize the plot yourself.

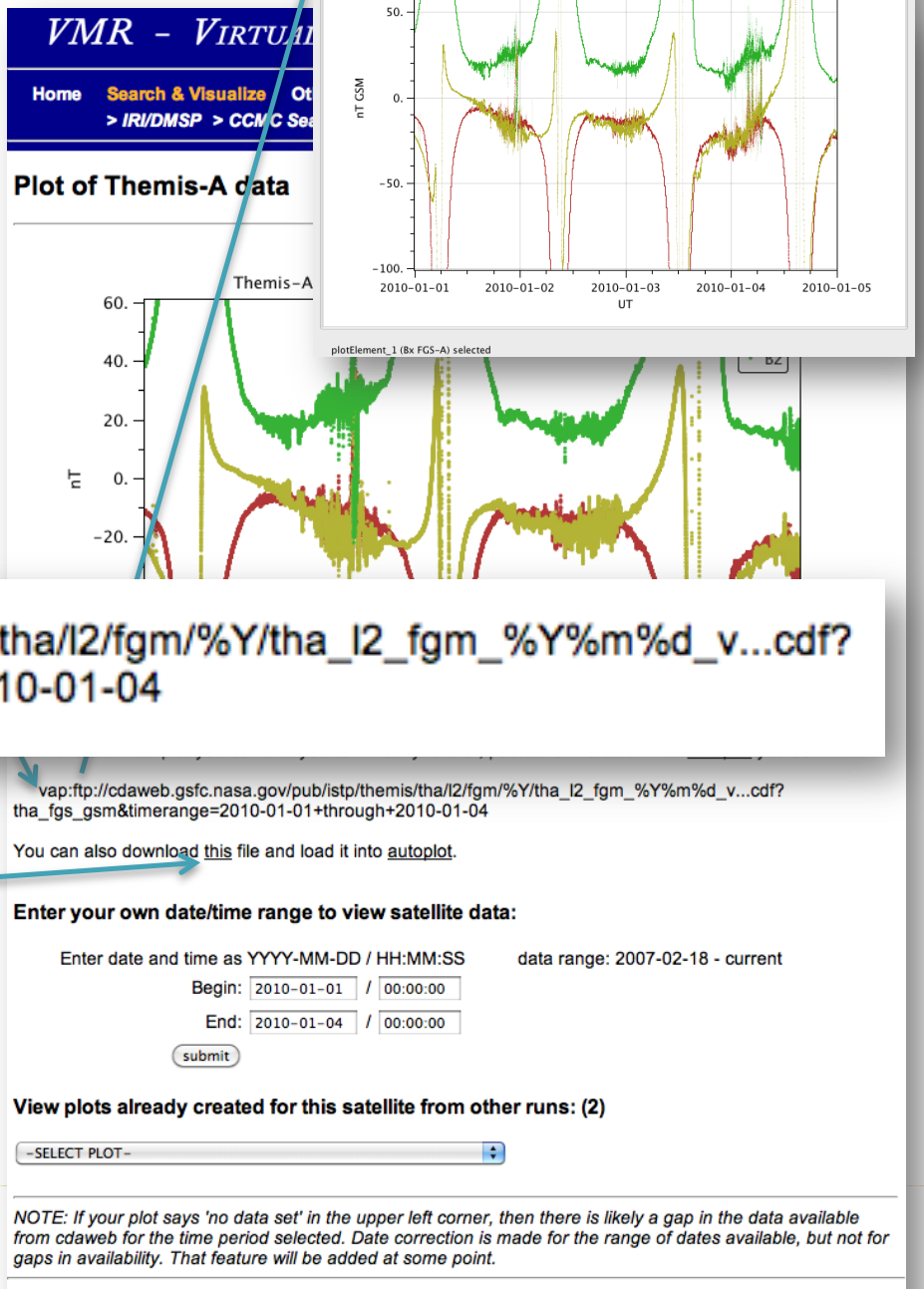




Customize your plot

- Many plots are now created with autoplot (*http://autoplot.org*)
  - You can take the custom URL and view the data yourself.
  - You can also download this file and load it into autoplot to then further customize the plot yourself.

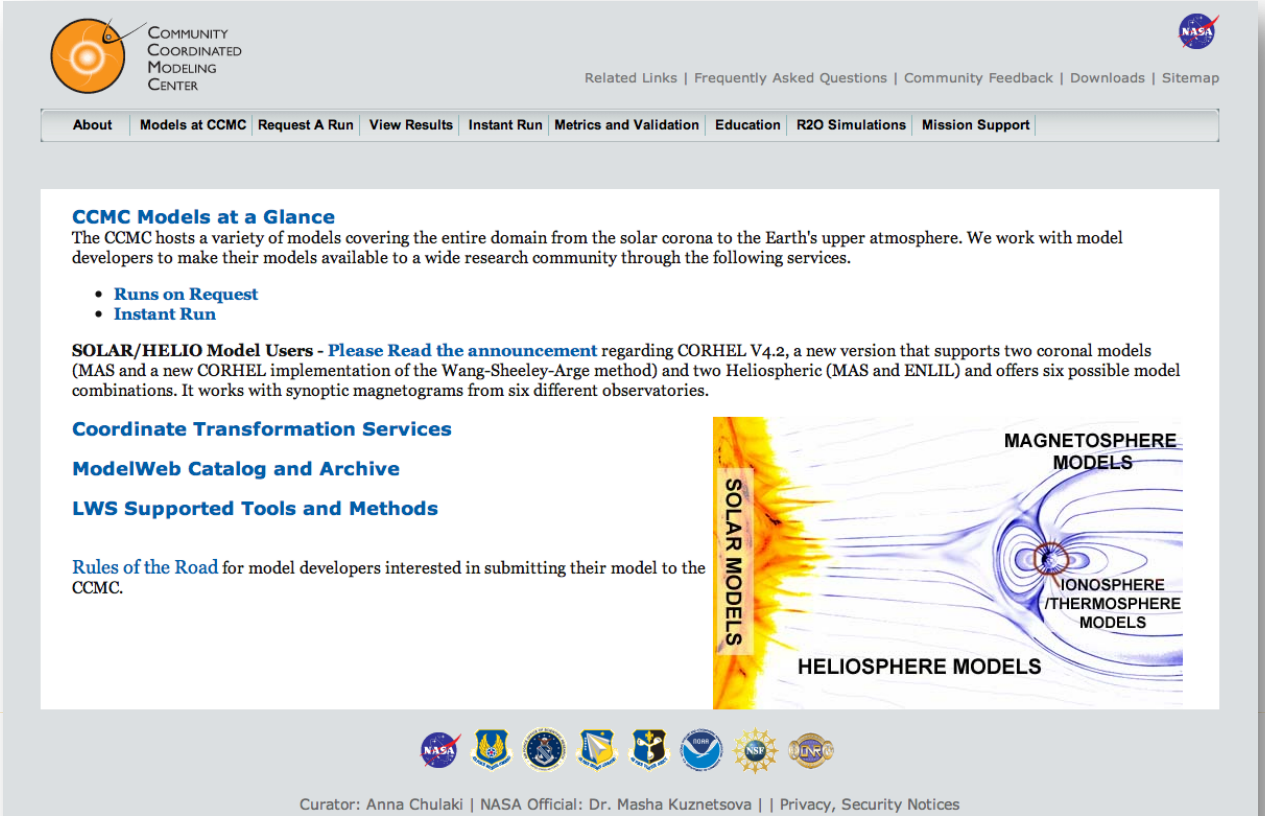




vap:ftp://cdaweb.gsfc.nasa.gov/pub/istp/themis/tha/l2/fgm/%Y/tha_l2_fgm_%Y%m%d_v...cdf?
tha_fgs_gsm&timerange=2010-01-01+through+2010-01-04

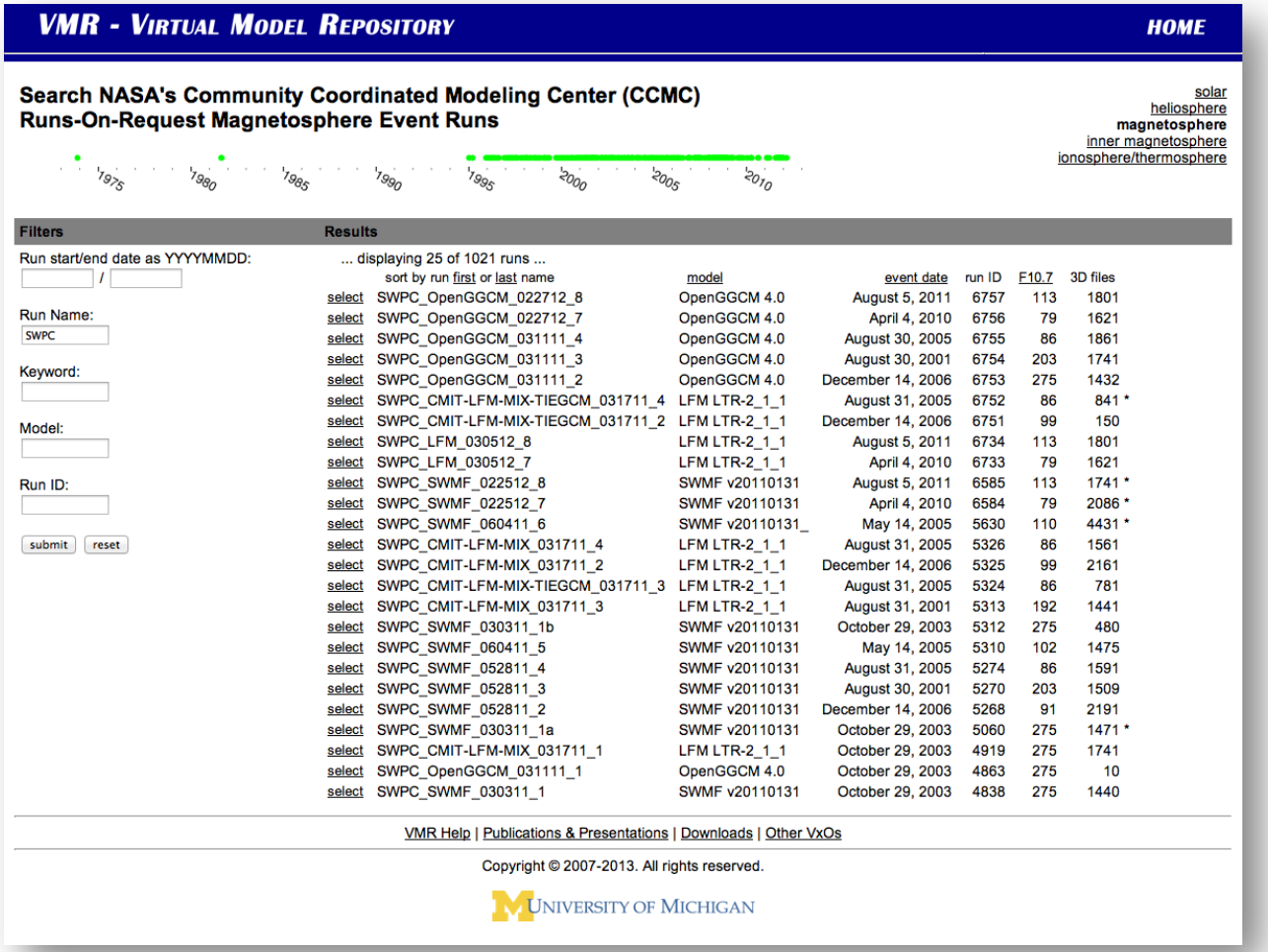
CCMC

The Community Coordinated Modeling Center is a great resource for its run-on-request model collection. CCMC has visualization tools to view the model results, but few tools for data/model comparisons. The CCMC website links to the VMR for that capability.



CCMC: run catalog

The Earth magnetosphere event run catalog at CCMC is searchable in the VMR.



VMR - VIRTUAL MODEL REPOSITORY HOME

Search NASA's Community Coordinated Modeling Center (CCMC)
Runs-On-Request Magnetosphere Event Runs

solar
heliosphere
magnetosphere
inner magnetosphere
ionosphere/thermosphere

'1975 '1980 '1985 '1990 '1995 '2000 '2005 '2010

Filters

Run start/end date as YYYYMMDD: /

Run Name: SWPC

Keyword:

Model:

Run ID:

submit reset

Results

... displaying 25 of 1021 runs ...

sort by run first or last name

		model	event date	run ID	F10.7	3D files
select	SWPC_OpenGGCM_022712_8	OpenGGCM 4.0	August 5, 2011	6757	113	1801
select	SWPC_OpenGGCM_022712_7	OpenGGCM 4.0	April 4, 2010	6756	79	1621
select	SWPC_OpenGGCM_031111_4	OpenGGCM 4.0	August 30, 2005	6755	86	1861
select	SWPC_OpenGGCM_031111_3	OpenGGCM 4.0	August 30, 2001	6754	203	1741
select	SWPC_OpenGGCM_031111_2	OpenGGCM 4.0	December 14, 2006	6753	275	1432
select	SWPC_CMIT-LFM-MIX-TIEGCM_031711_4	LFM LTR-2_1_1	August 31, 2005	6752	86	841 *
select	SWPC_CMIT-LFM-MIX-TIEGCM_031711_2	LFM LTR-2_1_1	December 14, 2006	6751	99	150
select	SWPC_LFM_030512_8	LFM LTR-2_1_1	August 5, 2011	6734	113	1801
select	SWPC_LFM_030512_7	LFM LTR-2_1_1	April 4, 2010	6733	79	1621
select	SWPC_SWMF_022512_8	SWMF v20110131	August 5, 2011	6585	113	1741 *
select	SWPC_SWMF_022512_7	SWMF v20110131	April 4, 2010	6584	79	2086 *
select	SWPC_SWMF_060411_6	SWMF v20110131_	May 14, 2005	5630	110	4431 *
select	SWPC_CMIT-LFM-MIX_031711_4	LFM LTR-2_1_1	August 31, 2005	5326	86	1561
select	SWPC_CMIT-LFM-MIX_031711_2	LFM LTR-2_1_1	December 14, 2006	5325	99	2161
select	SWPC_CMIT-LFM-MIX-TIEGCM_031711_3	LFM LTR-2_1_1	August 31, 2005	5324	86	781
select	SWPC_CMIT-LFM-MIX_031711_3	LFM LTR-2_1_1	August 31, 2001	5313	192	1441
select	SWPC_SWMF_030311_1b	SWMF v20110131	October 29, 2003	5312	275	480
select	SWPC_SWMF_060411_5	SWMF v20110131	May 14, 2005	5310	102	1475
select	SWPC_SWMF_052811_4	SWMF v20110131	August 31, 2005	5274	86	1591
select	SWPC_SWMF_052811_3	SWMF v20110131	August 30, 2001	5270	203	1509
select	SWPC_SWMF_052811_2	SWMF v20110131	December 14, 2006	5268	91	2191
select	SWPC_SWMF_030311_1a	SWMF v20110131	October 29, 2003	5060	275	1471 *
select	SWPC_CMIT-LFM-MIX_031711_1	LFM LTR-2_1_1	October 29, 2003	4919	275	1741
select	SWPC_OpenGGCM_031111_1	OpenGGCM 4.0	October 29, 2003	4863	275	10
select	SWPC_SWMF_030311_1	SWMF v20110131	October 29, 2003	4838	275	1440

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CCMC: data/model plotting

View a specific run and you can see the satellite extractions made from the model output and make the data/model comparisons. You can also view other model variables.

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return **Detail view for CCMC event run SWPC_SWMF_052811_4**

Satellite Data Available			Data-Model Comparison		Model on Satellite Track	
Satellite			**Satellite**		**Satellite**	
Cluster-1	N/A		Cluster-1		Cluster-1	plot model
Cluster-2	N/A		Cluster-2		Cluster-2	plot model
Cluster-3	N/A		Cluster-3		Cluster-3	plot model
Cluster-4	N/A		Cluster-4		Cluster-4	plot model
GOES-9	N/A		GOES-9		GOES-9	plot model
GOES-10	N/A		GOES-10		GOES-10	plot model
GOES-11	N/A		GOES-11		GOES-11	plot model
GOES-12	N/A		GOES-12		GOES-12	plot model
Geotail	plot B data	plot B data +/-1 day	Geotail	plot B	Geotail	plot model
IMP-8	N/A		IMP-8		IMP-8	plot model
Polar	plot B data	plot B data +/-1 day	Polar	view B	Polar	plot model
Wind	plot B data	plot B data +/-1 day	Wind		Wind	

Run information:

View run at CCMC site.

Event Date	August 31 2005
Start Time	2005/08/31 05:00
End Time	2005/09/01 12:00
Key Words	dB/dt R2O Challenge 2
Model	SWMF
Model Version	v20110131
Validation Level	0
Coordinate System for Input	GSM
Coordinate System for Output	GSM
Dipole Tilt, in the X-Z Plane, at Start deg	-2.60
Dipole Tilt, in Y-Z GSE plane, deg	-22.60
Update Dipole Orientation with Time	yes
Inflow Boundary R_E	32
F10.7	86
Conductance Model	auroral
Corotation	yes
Run Number	SWPC_SWMF_052811
3D files saved	1591

Would you like to see other CCMC model runs that have a time overlap with this run? [Yes / No]

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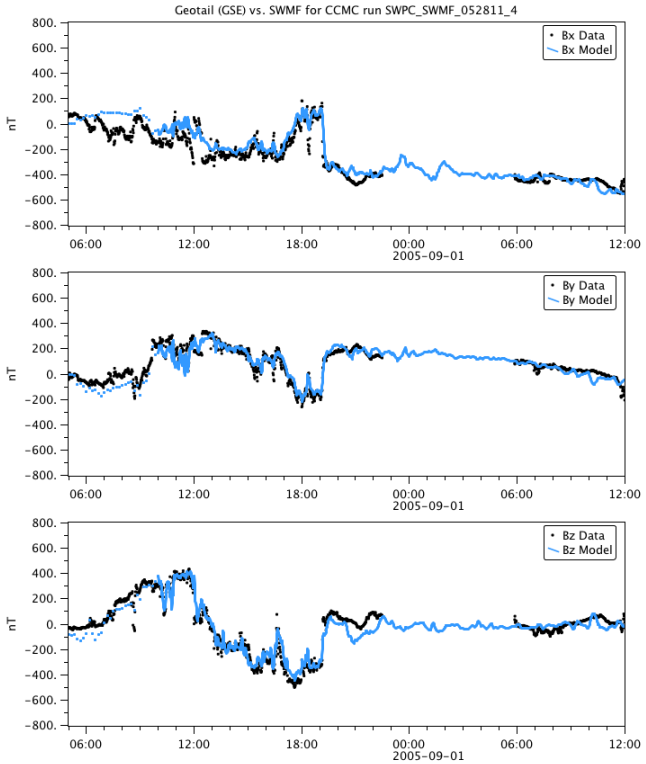
Plot of CCMC event run SWPC_SWMF_052811_4
SWMF run vs. Geotail data for 2005-08-31 05:00:00 to 2005-09-01 12:00:00



You can download this file and load it into autoplot to make further modifications.

NOTE: If there is no model values on the plot, then it is likely that the satellite position is outside of the modeled region. View the satellite p the modeled time.

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return

Detail view for CCMC event run SWPC_SWMF_030311_1a

Satellite Data Available			Data-Model Comparison		Model on Satellite Track	
Satellite			**Satellite**		**Satellite**	
Cluster-1	N/A		Cluster-1		Cluster-1	plot model
Cluster-2	N/A		Cluster-2		Cluster-2	plot model
Cluster-3	N/A		Cluster-3		Cluster-3	plot model
Cluster-4	N/A		Cluster-4		Cluster-4	plot model
GOES-8	N/A		GOES-8		GOES-8	plot model
GOES-9	N/A		GOES-9		GOES-9	plot model
GOES-10	plot B data	plot B data +/-1 day	GOES-10	view B	GOES-10	plot model
GOES-11	N/A		GOES-11		GOES-11	plot model
GOES-12	plot B data	plot B data +/-1 day	GOES-12	view B	GOES-12	plot model
Geotail	plot B data	plot B data +/-1 day	Geotail	plot B	Geotail	plot model
IMP-8	N/A		IMP-8		IMP-8	plot model
Polar	plot B data	plot B data +/-1 day	Polar	plot B	Polar	plot model
Wind	plot B data	plot B data +/-1 day	Wind		Wind	

Run information:

View run at CCMC site.

Event Date	October 29 2003
Start Time	2003/10/29 01:00
End Time	2003/10/30 06:00
Key Words	dB/dt R2O Challenge 2011
Model	SWMF
Model Version	v20110131
Validation Level	0
Coordinate System for Input	GSM
Coordinate System for Output	GSM
Dipole Tilt, in the X-Z Plane, at Start deg	-20.20
Dipole Tilt, in Y-Z GSE plane, deg	-10.20
Update Dipole Orientation with Time	yes
Inflow Boundary R_E	32
F10.7	275
Conductance Model	auroral
Corotation	yes
Run Number	SWPC_SWMF_030311_1a
3D files saved	1471

Would you like to see other CCMC model runs that have a time overlap with this run? [Yes / No]

Other runs that have a time overlap with this run:

run	GOES-10	GOES-12	Geotail	Polar
view CCMC_CCMC_110503_1				
view CCMC_CCMC_110503_2.2	x	x	x	x
view CCMC_CCMC_110503_2.3	x	x	x	x
view CCMC_CCMC_111003_1				
view weili_jiang_031012_4	x	x	x	x
view SWPC_SWMF_030311_1b	x	x	x	x
view SWPC_OpenGGCM_031111_1	x	x	x	x
view SWPC_CMIT-LFM-MIX_031711_1	x	x	x	x
view SWPC_SWMF_030311_1	x	x	x	x
view GEM2008_CHALLENGE_061410_1				
view CCMC_CCMC_040209_1				
view CCMC_CCMC_122408_1				
view CCMC_CCMC_123008_1				
view CCMC_CCMC_102708_1	x	x	x	x
view ccmc_ccmc_082208_1	x	x	x	x
view CCMC_CCMC_082808_2b				
view ccmc_ccmc_082208_1a	x	x		
view Tony_Mannucci_032408_1	x	x	x	x
view Nishu_Karna_042212_1	x	x	x	x
	plot	plot	plot	plot

CCMC: multiple run comparison

- You can now compare multiple runs with data including RMS errors.
- You can also load the data into autoplot to make more detailed analysis.

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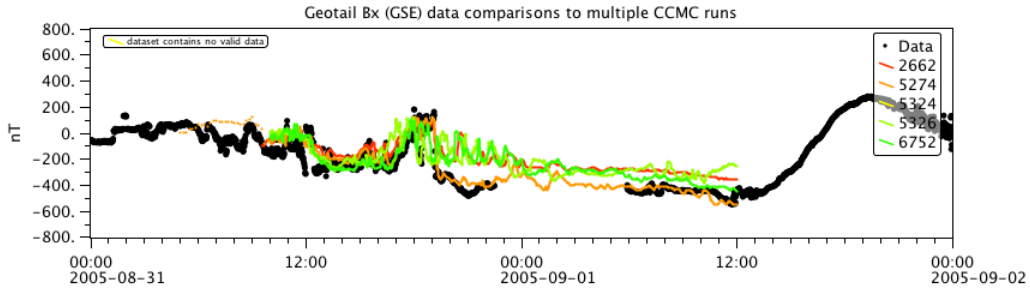
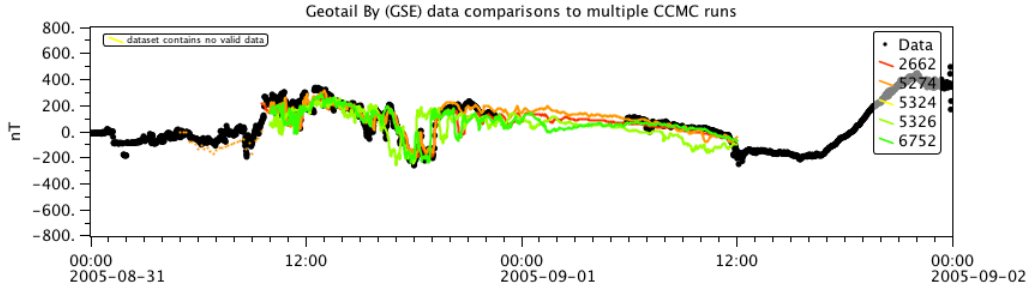
Plot of multiple CCMC event runs with Geotail data for 2005-08-31 through 2005-09-01

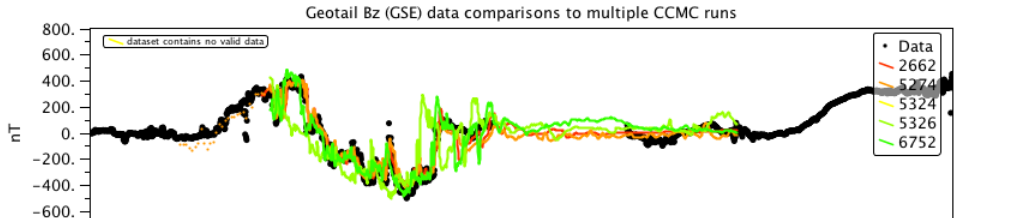
	RMS Error	Bx	By	Bz
2662 = CCMC_CCMC_082808_4a		39%	49%	62%
5274 = SWPC_SWMF_052811_4		14%	45%	66%
5324 = SWPC_CMIT-LFM-MIX-TIEGCM_031711_3		-	-	-
5326 = SWPC_CMIT-LFM-MIX_031711_4		43%	78%	132%
6752 = SWPC_CMIT-LFM-MIX-TIEGCM_031711_4		26%	43%	78%



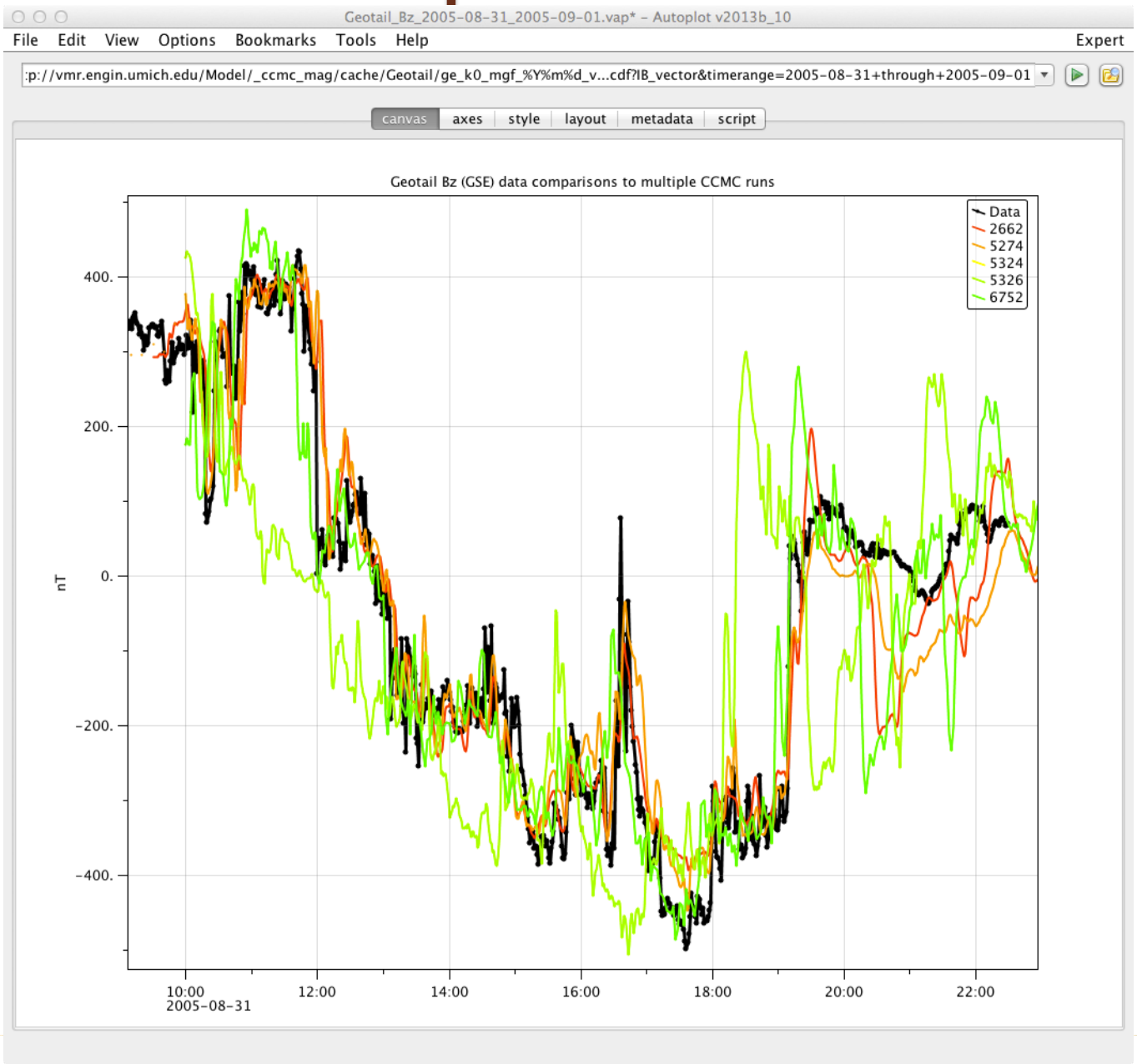
You can download this file and load it into autoplot to make further modifications.



You can download this file and load it into autoplot to make further modifications.



CCMC: multiple run detail

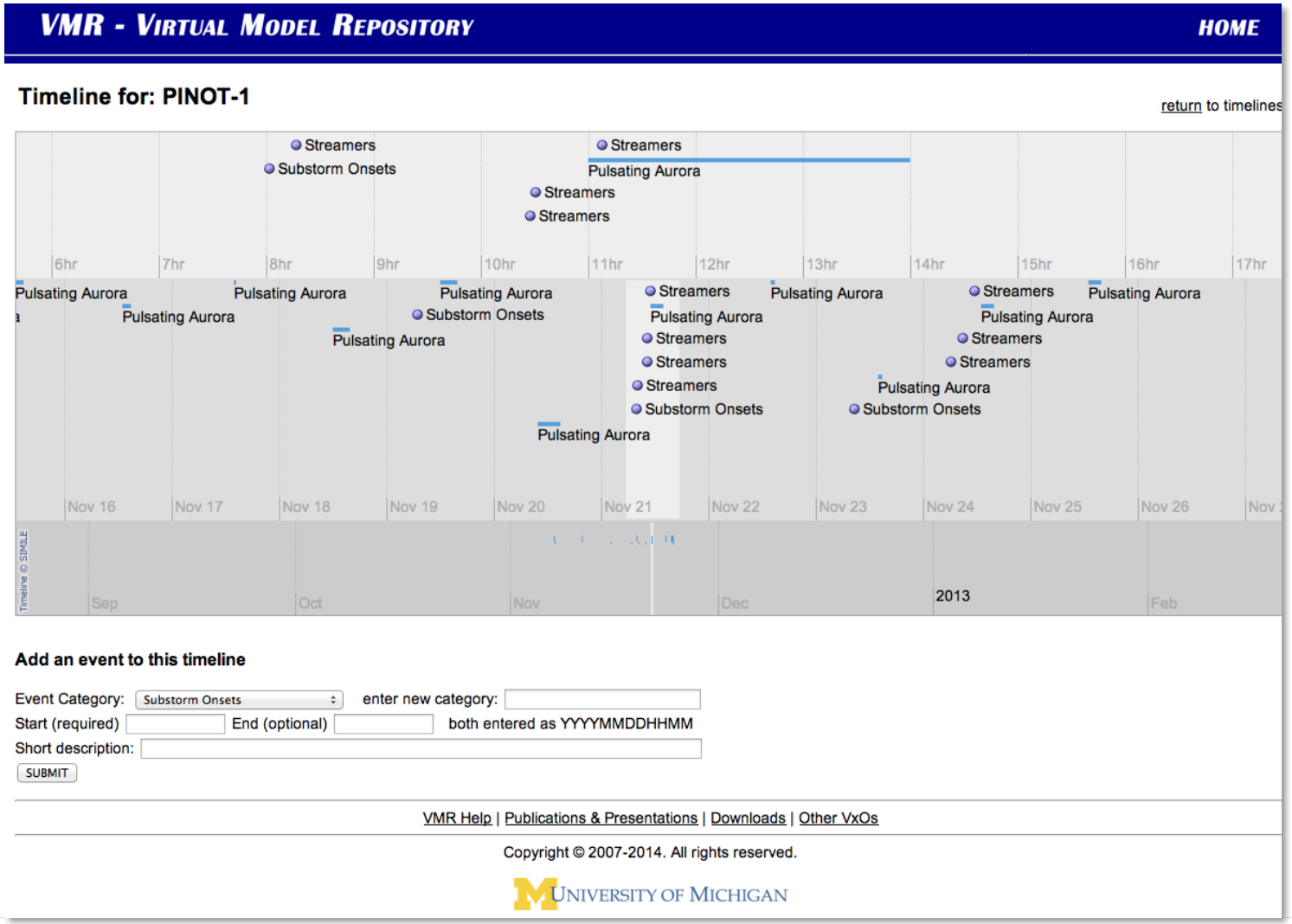


CCMC: scripts find glitches

- The more you use automated scripts to process and use the data products, the more small errors you will find.
- Errors such as missing files, NaNs, incorrect date formats, etc. will cause scripts to die.
- The VMR is working to report these glitches, and this has led to more consistent and accurate data products from the CCMC.

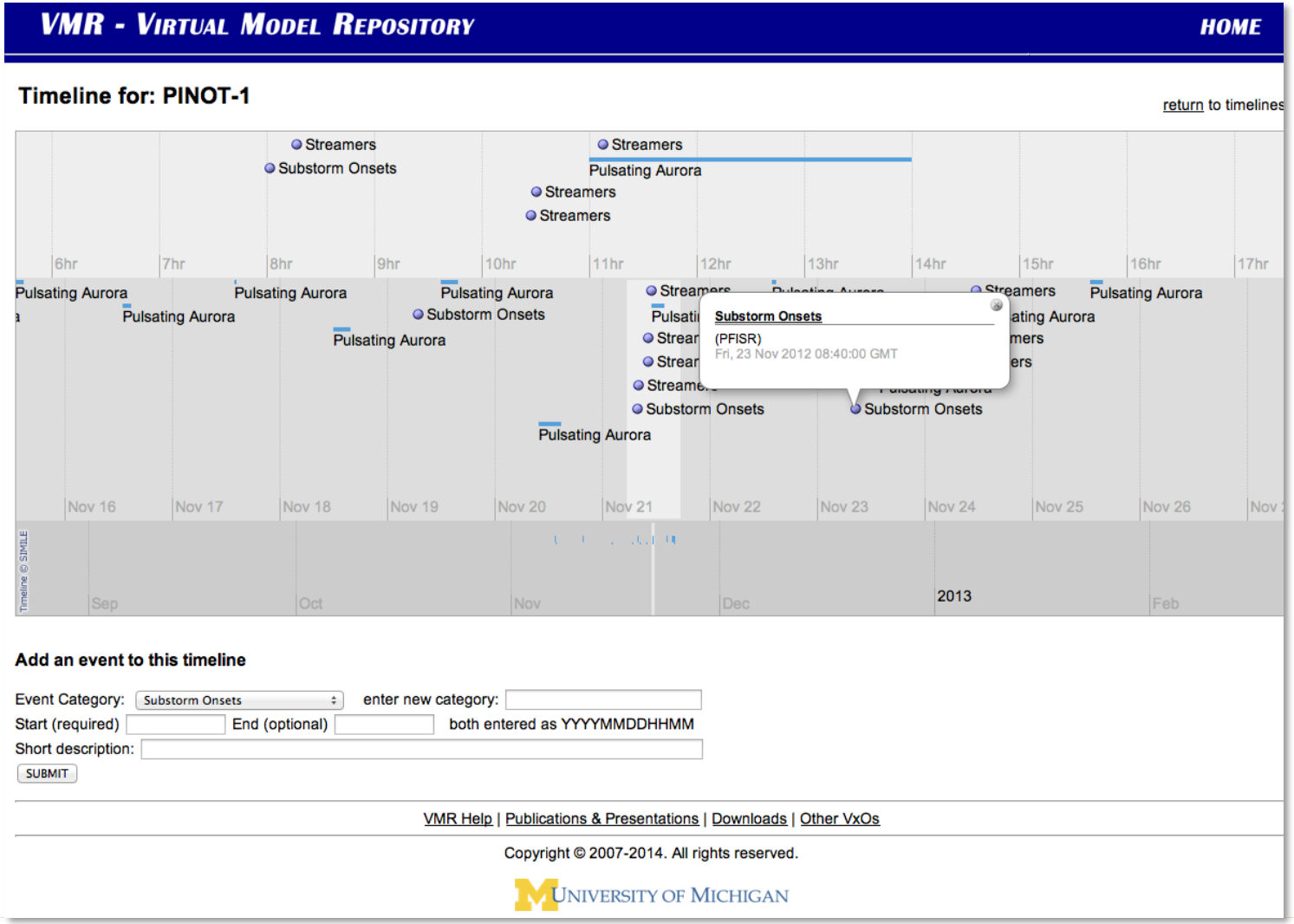
Collaborative Tools

Timelines are a new tool under development.



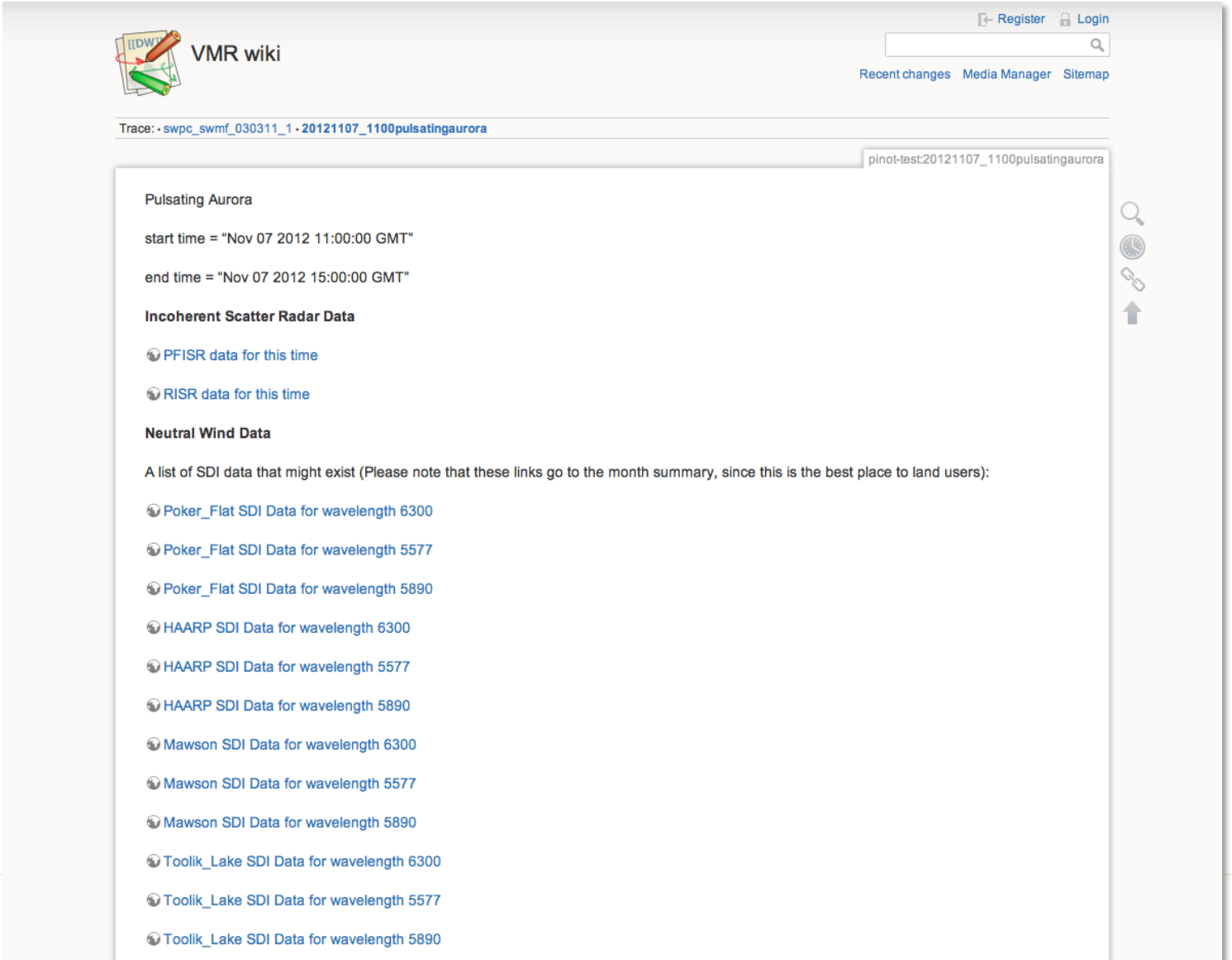
Collaborative Tools

Scroll in time, click on an item, go to plot or wiki page.



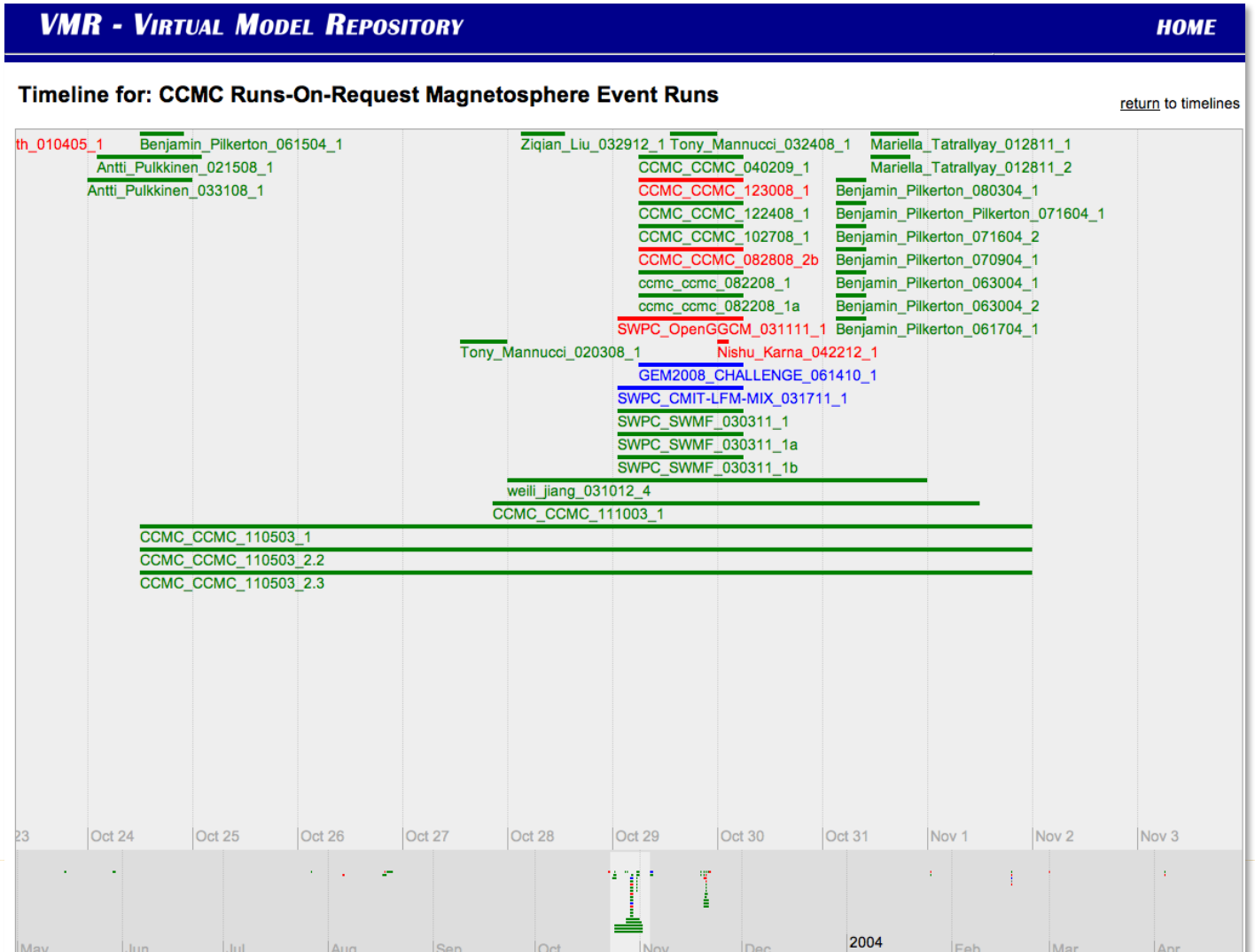
Collaborative Tools

Wiki page enables open comment and discussion.



Collaborative Tools

The timeline tool is a great visual way to see all of the runs at CCMC for a given time period.



Future Plans

- Timeline and wiki tools are a big focus and will see active testing from Cassini and Rosetta missions this summer.
- Comparing multiple runs with data, including RMS errors, will continue to be developed and improved.
- We will be working with the CCMC to make heliospheric model output available with data/model visualization.
- We are collaborating with Rice to make stand-alone RCM runs available through the VMR.
- The CEDAR community conducting new data/model validations and we will provide tools to support that effort.