CCMC Models and Other Student Tools

GEM-CEDAR Summer Workshop
June 19, 2016

Community Coordinated Modeling Center (CCMC)

http://ccmc.gsfc.nasa.gov/

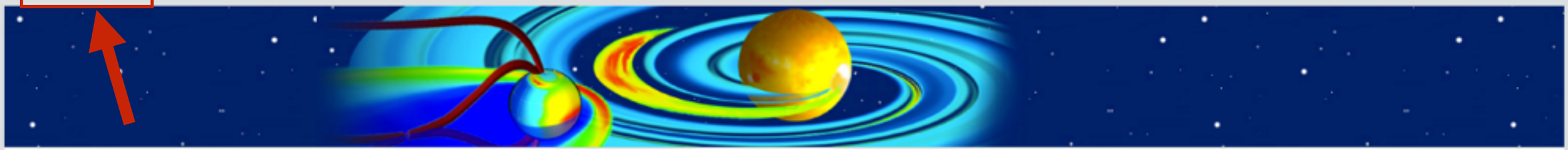
- Provides the research community and public access to modern space research models
- An automated system to request model runs
- Visualization and analysis tools
- Ability to download simulation data in various formats

COMMUNITY COORDINATED MODELING CENTER

Related Links | Frequently Asked Questions | Community Feedback | Downloads | Sitemap

About | Models at CCMC | Request A Run | View Results | Instant Run | Metrics and Validation | Education | R2O Support | Mission Support | Community Support

Models At A Glance | ModelWeb Catalog and Archive



CCMC mission statement

The CCMC is a multi-agency partnership to enable, support and perform the research and development for next-generation space science and space weather models.

Space Weather REDI Bootcamp

This year Space Weather Bootcamp is being held on June 7-17, 2016. Last year's Bootcamp was attended by over 50 participants from multiple countries and proved a great success. Learn more about the Bootcamp (agenda, details, participant experiences) and find out more about the SW REDI initative.

CEDAR Grand Challenge

CCMC is supporting the CEDAR Grand Challenge: Storms and Substorms Without Borders (SSWB). The CEDAR Grand Challenge Session will be held at the upcoming 2016 Joint CEDAR-GEM Workshop in Santa Fe (June 23, 2016).

Click here to learn more

CEDAR-GEM Modeling Challenge

Modelers, data providers, science and operational users of space weather models are invited to participate in the CEDAR-GEM Modeling Challenge Sessions at the upcoming 2016 Joint CEDAR-GEM Workshop in Santa Fe (June 20-21, 2016).

Click here to learn more

Mid-Tail Modeling Challenge

The CCMC has begun work on a modeling challenge to assess global MHD models' capability to predict large-scale and meso-scale dynamics of the mid-tail at 60 RE in response to the solar

CCMC Services

- We provide, to the scientific community, access to modern space research models
- We test and evaluate models
- We support Space Weather forecasters
- We support space science education

Flare Scoreboard Planning

CCMC, together with the UK Met Office, is in the planning phase for the development of a community "Flare Scoreboard" which will show probabilistic flare forecasts from a variety of models. Click here to learn more about the flare scoreboard and to join the planning.

CME Arrival Time Scoreboard

CME arrival time predictions from the research community

- **Access the CME Scoreboard**
- See a list of available CME propagation models

The CME Scoreboard is a research-based forecasting methods validation activity which provides a central location for the community to:

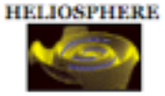
- submit their forecast in real-time
- quickly view all forecasts at once in real-time
- compare forecasting methods when the event has arrived

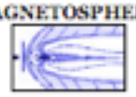
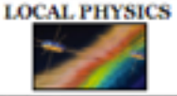
Highlighted CCMC services

- **Kameleon software**: model output from different models can be stored uniformly in a common science data format. Users can request the CDF-formatted output for a CCMC run.
- **MAGIC**: new magnetogram processing suite of tools.

CCMC Hosted Models at a Glance

Domain	Model Name	Developer(s)	Institution	Model Class	Services Available				
					Runs on Request	Instant Run	Real Time Run	iSWA Cygnet	Source Code link
COUPLED SOLAR - HELIOSPHERE	CORHEL/MAS/WSA/ENLIL/	J. Linker, Z. Mikic, R. Lionello, P. Riley, N. Arge, D. Odstrcil	PSI, AFRL, U.Colorado	Physics-based MHD	X				
	SWMF/SC/IH	Bart van der Holst, Igor Sokolov, Ward Manchester, Gabor Toth, Darren DeZeeuw and Tamas Gombosi	CSEM	Physics-based MHD	X				
	SWMF AWSoM R	Bart van der Holst, Igor Sokolov, Ward Manchester, Gabor Toth, Darren DeZeeuw and Tamas Gombosi	CSEM	Physics-based	X				
COUPLED MAGNETOSPHERE	SWMF/BATS-R-US with RCM	Tamas Gombosi et al., Richard Wolf et al., Stanislav Sazykin et al., Gabor Toth et al.	CSEM	Physics-based MHD	X			X	
	SWMF/BATS-R-US with CRCM	Tamas Gombosi et al., Mei-Ching Fok et al., Gabor Toth et al.	CSEM	Physics-based MHD	X				
	WINDMI	W. Horton, M. L. Mays, E. Spencer and I. Doxas	Univ. of Texas at Austin	Physics-based		X	X	X	
SOLAR	AMOS	Kangjin Lee, Jongyeob Park, Yong-Jae Moon	Kyung Hee University	Empirical			X	X	
	CORHEL/MAS/WSA/ENLIL/	J. Linker, Z. Mikic, R. Lionello, P. Riley, N. Arge, D. Odstrcil	PSI, AFRL, U.Colorado	Physics-based MHD	X				
	PFSS	J. Luhmann et al.	SSL/UC Berkeley	Potential Magnetic Field	X		X	X	
	WSA/PF with CS	Nick Arge	AFRL	Potential-based			X	X	
	SWMF/SC/IH	Bart van der Holst, Igor Sokolov, Ward Manchester, Gabor Toth, Darren DeZeeuw and Tamas Gombosi	CSEM	Physics-based MHD	X				
	ANMHD	Bill Abbett, Dave Bercik, George Fisher, Yuhong Fan	UC Berkeley	Physics-based MHD	X				
	REleASE	Arik Posner, NASA HQ	NASA HQ				X	X	
	NLFF	T. Tadesse, T. Wiegelmann	MaxPlanck Lindau	Physics-based MHD	X				
	GL flux rope CME model	Bart van der Holst, Igor Sokolov, Ward Manchester, Gabor Toth, Darren DeZeeuw and Tamas Gombosi	CSEM	Physics-based					
	SWMF AWSoM R	Bart van der Holst, Igor Sokolov, Ward Manchester, Gabor Toth, Darren DeZeeuw and Tamas Gombosi	CSEM	Physics-based	X				
	ASSA	Sangwoo Lee[2], Sunhak Hong[1], KiChang Yoon[1], JaeHun Kim[1], YungKyu Kim[1], JeongDeok Lee[2], SeungJun Oh[2] [1]Korean Space Weather Center (KSWC), [2]SELab Inc.	KSWC				X	X	
	CORHEL/MAS/WSA/ENLIL/	J. Linker, Z. Mikic, R. Lionello, P. Riley, N. Arge, D. Odstrcil	PSI, AFRL, U.Colorado	Physics-based MHD	X				
	ENLIL	D. Odstrcil	Univ. of Colorado at Boulder	Physics-based MHD	X		X	X	
	SWMF/SC/IH	Bart van der Holst, Igor Sokolov, Ward Manchester, Gabor Toth, Darren DeZeeuw and Tamas Gombosi	CSEM	Physics-based MHD	X				
	ENLIL with Cone Model	D. Odstrcil	Univ. of Colorado at Boulder	Physics-based MHD	X				
	Heliospheric Tomography with IPS data	B. Jackson, P. Hick	CASS/UCSD (SMEI or IPS)	Data Assimilative	X				
	Heliospheric Tomography with SMEI data	B. Jackson, P. Hick	CASS/UCSD (SMEI)	Data Assimilative	X				
	Exospheric Solar Wind	H.Lamy, V.Pierrard	IASB-BIRA	Physics-based Kinetic	X				

HELIOSPHERE 	CORHEL/MAS/WSA/ENLIL/	J. Linker, Z. Mikic, R. Lionello, P. Riley, N. Arge, D. Odstrcil	PSI, AFRL, U.Colorado	Physics-based MHD	X				
	ENLIL	D. Odstrcil	Univ. of Colorado at Boulder	Physics-based MHD	X		X	X	
	SWMF/SC/IH	Bart van der Holst, Igor Sokolov, Ward Manchester, Gabor Toth, Darren DeZeeuw and Tamas Gombosi	CSEM	Physics-based MHD	X				
	ENLIL with Cone Model	D. Odstrcil	Univ. of Colorado at Boulder	Physics-based MHD	X				
	Heliospheric Tomography with IPS data	B. Jackson, P. Hick	CASS/UCSD (SMEI or IPS)	Data Assimilative	X				
	Heliospheric Tomography with SMEI data	B. Jackson, P. Hick	CASS/UCSD (SMEI)	Data Assimilative	X				
	Exospheric Solar Wind	H.Lamy, V.Pierrard	IASB-BIRA	Physics-based Kinetic	X				
	EMMREM	N. Schwadron, H. Spence, L. Townsend, R. Squier, F. Cucinotta, M. H. Kim, K. Kozarev, R. Hatcher, M. PourArsalan, M. A. Dayeh	U. of New Hampshire, U. Tenn, Southwest Research Institute (SwRI), NASA JSC	Physics-based Lagrangian Kinetic Model for Primary Transport (Energetic Particle Radiation Environment Model); Physics-based Secondary Transport Model (EMMREM looping version of BaRYoN TRaNsport BRYNTRN Code)					
	BRYNTRN	N. Schwadron, H. Spence, L. Townsend, R. Squier, F. Cucinotta, M. H. Kim, K. Kozarev, R. Hatcher, M. PourArsalan, M. A. Dayeh	U. of New Hampshire, U. Tenn, Southwest Research Institute (SwRI), NASA JSC	Physics-based Lagrangian Kinetic Model for Primary Transport (Energetic Particle Radiation Environment Model); Physics-based Secondary Transport Model (EMMREM looping version of BaRYoN TRaNsport BRYNTRN Code)			X		
	SNB3GEO	Richard Boynton, Michael Balikhin, Stephen Billings	University of Sheffield				X		
	PREDICCs	Nathan Schwadron and Harlan Spence	U. of New Hampshire	Physics-based Lagrangian Kinetic Model for Primary Transport (Energetic Particle Radiation Environment Model); Physics-based Secondary Transport Model (EMMREM looping version of BaRYoN TRaNsport BRYNTRN Code)			X		
	DBM	T. Žic, B. Vršnak	Hvar Observatory	Physics-based		X			
	SWMF AWSoM R	Bart van der Holst, Igor Sokolov, Ward Manchester, Gabor Toth, Darren DeZeeuw and Tamas Gombosi	CSEM	Physics-based	X				
	DIPS	Yuming Wang, Chenglong Shen	STEP Group, USTC	Physics-based	X				
	Global Magnetosphere:								
	RECONX	Alex Glocer, John Dorelli, Code 673, Colin Komar, Catholic University of America, Code 673	NASA GSFC	Magnetic Topology Determination	X				
	LANL*	Yiqun Yu, Josef Koller	LANL			X			X
	BATS-R-US	Dr. Tamas Gombosi et al.	CSEM	Physics-based MHD	X		X	X	
	SWMF/BATS-R-US with RCM	Tamas Gombosi et al., Richard Wolf et al., Stanislav Sazykin et al., Gabor Toth et al.	CSEM	Physics-based MHD	X			X	
	SWMF/BATS-R-US with CRCM	Tamas Gombosi et al., Mei-Ching Fok et al., Gabor Toth et al.	CSEM	Physics-based MHD	X				
	OpenGGCM	Joachim Raeder, Timothy Fuller-Rowell	Space Science Center, UNH	Physics-based MHD	X				
	GUMICS	Pekka Janhunen et.al.	FMI	Physics-based MHD	X				
	CMIT/LFM-MIX	John Lyon, Wenbin Wang, Slava Merkin, Mike Wiltberger, Pete Schmitt, and Ben Foster	Dartmouth College/NCAR-HAO/JHU-APL/CISM	Physics-based MHD	X				
	Plasmasphere	Viviane Pierrard	IASB-BIRA		X				
	WINDMI	W. Horton, M. L. Mays, E. Spencer and I. Doxas	Univ. of Texas at Austin	Physics-based		X	X	X	
	Inner Magnetosphere:								

	Plasmasphere	Viviane Pierrard	IASB-BIRA		X				
	WINDMI	W. Horton, M. L. Mays, E. Spencer and I. Doxas	Univ. of Texas at Austin	Physics-based		X	X	X	
	Inner Magnetosphere:								
MAGNETOSPHERE 	SWMF/BATS-R-US with RCM	Tamas Gombosi et al., Richard Wolf et al., Stanislav Sazykin et al., Gabor Toth et al.	CSEM	Physics-based MHD	X			X	
	Plasmasphere	Viviane Pierrard	IASB-BIRA		X				
	RCM	Stanislav Sazykin, Richard A. Wolf	Department of Physics and Astronomy, Rice University		X				
	Fok Ring Current	Mei-Ching H. Fok	NASA, GSFC	Physics-based	X			X	
	Fok Radiation Belt Electron	Mei-Ching H. Fok	NASA, GSFC	Physics-based	X			X	
	CIMI	Mei-Ching H. Fok, Natalia Buzulukova	NASA, GSFC	Bounce-averaged drift-kinetic modeling of electrons, protons and oxygen ion particle distributions.	X			X	
	UPOS Radiation Belt	Tony Lui, Syau-Yun Hsieh	JHU/APL	Physics-based					
	Tsyganenko Magnetic Field	Nikolai Tsyganenko	Univ. of St.-Petersburg, Russia	Statistical	X	X			X (wait for connection)
	AE-8/AP-8 RADBELT	Contact Person: D. Bilitza, NASA/GSFC	NSSDC, GSFC, NASA	Statistical		X			X (wait for connection)
	Geomagnetic Field Models:								
	Tsyganenko Magnetic Field	Nikolai Tsyganenko	Univ. of St.-Petersburg, Russia	Statistical	X	X			X (wait for connection)
	IGRF	Susan Macmillan, Stefan Maus	IAGA Working Group on IGRF	Statistical		X			X (wait for connection)
		Ionosphere/Thermosphere:							
SAMI3		Joseph Huba, Glenn Joyce, Marc Swisdak	NRL and Icarus Research, Inc.	Physics-based	X				
CTIPe		Timothy Fuller-Rowell et al	NOAA SEC	Physics-based	X		X		
ABBYNormal		J. Vincent Eccles et al.	CASS/USU (Space Environment Corp.)	Physics-based		X	X		
USU-GAIM		R.W. Schunk, L. Scherliess, J.J. Sojka, D.C. Thompson, L. Zhu	Utah State University	Physics-based data assimilation	X				
IRI		D. Bilitza, NASA/GSFC	URSI/COSPAR Working Group on IRI	Statistical		X			X (wait for connection)
Cosgrove-PF	IONOSPHERE/THERMOSPHERE 	Russel B. Cosgrove	Center for Geospace Studies, SRI International, Menlo Park, California, USA	Empirical	X				
Ovation Prime		Patrick Newell	JHU APL	Empirical	X			X	
TIE-GCM		R. G. Roble et al.	HAO NCAR	Physics-based	X				
PBMOD		John M. Retterer		Physics-based				X	
GITM		A.J. Ridley et al.			X				
Ionosphere Electrodynamics:									
Weimer		Daniel R. Weimer	Virginia Tech	Statistical	X	X	X	X	
Atmosphere:									
MSISE		A. E. Hedin	retired from. NASA, GSFC	Statistical		X			X (wait for connection)
LOCAL PHYSICS 	MHD:								
	PAMHD	Ilja Honkonen	NASA GSFC	Physics-based MHD	X				X

Go to Request A Model Run to submit a run-on-request.

Weimer Ionosphere Models

CCMC Services available for Weimer

Request a Run
View Request Results
Run Instantly
View Real Time Run
View iSWA cygnet for this model

Model Developer(s)
Daniel R. Weimer
Virginia Tech

Model Description
Weimer models are statistical electric potential models for the high-latitude ionosphere, developed by Daniel Weimer of Solana Scientific Inc. Past satellite measurements of ionospheric electric fields, and the simultaneous measurements of solar wind and interplanetary magnetic field (IMF) conditions, have been used to create an empirical model of the high-latitude electric potential pattern.

The CCMC is using the IDL version of the Weimer models and added code to accomodate the input from the CCMC-developed web interface. The CCMC is running Weimer-2005 model in real time, driven by ACE solar wind data.

Model Input
Control parameters include the solar wind plasma number density N, velocity V_x (along Sun-Earth line), the transverse orientation of the solar wind magnetic field B_y, B_z (in GSM coordinates), and the orientation of the Earth's magnetic axis at the time of interest. An optional parameter is the Auroral Electrojet, AL index. These parameters are used to set up the model for the desired conditions, after which the only needed input parameters are the geomagnetic latitude and magnetic local time (MLT), in AACGM (Altitude Adjusted Corrected Geomagnetic) coordinates.

Model Output
The output from the model consists of the ionospheric electrostatic potential, in kilovolts (kV), as a function of the input AACGM latitude and MLT.

References and relevant publications

- Weimer, D. R., *Models of high-latitude electric potentials derived with a least error fit of spherical harmonic coefficients*, Journal of Geophysical Research., 100, 19,595-19,607, 1995.
- Weimer, D. R., *A flexible IMF dependent model of high-latitude electric potentials having "space weather" applications*, Geophysical Research Letter, 23, 2549-2553, 1996.
- Weimer, D. R., *An improved model of ionospheric electric potentials including substorm perturbations and application to the GEM November 24, 1996 event*, Journal of Geophysical Research, 106, 407, 2001.
- Weimer, D. R., Improved ionospheric electrodynamic models and application to calculating Joule heating rates, *Journal of Geophysical Research, 110*, A05306, doi:10.1029/2004JA010884, 2005.
- Weimer, D. R., Predicting Surface Geomagnetic Variations Using Ionospheric Electrodynamic Models, *Journal of Geophysical Research, 110*, A12307, doi:10.1029/ 2005JA011270, 2005.

Relevant links

- http://mist.nianet.org/weimer.html
- http://www-ssc.igpp.ucla.edu/gem/poster/weimer/ggcm/
- http://www-ssc.igpp.ucla.edu/gem/poster/weimer/substorm/

CCMC Contact(s)
Lutz Rastaetter
301-286-9571

Developer Contact(s)
Daniel R. Weimer
757-325-6908

Step 1: Fill in the Form and Generate a Registration Number for each Requested Run.

The Registration Number is composed of your first name (FirstName), your last name (LastName), date (mmddyy),model type (GM - Global Magnetosphere, IT - Ionosphere/Thermosphere, SH -Solar/Heliosphere), and run identification number (RunNumber):

FirstName_LastName_mmddyy_RunNumber, e.g., George_Siscoe_060601_IT_1.

At the present time you are allowed to make up to 4 different submissions on the the same date (mmddyy). For each new submission made on the same date you need to choose a new **Run Number** ("1", "2", "3", or "4"). Multiple submissions made on the same date with the same Run Number will overwrite the previous submission. You can use this feature to resubmit the request on the same date. If you decide to cancel or modify your submission at later date, please contact the CCMC staff:

e-mail: requests@ccmc.gsfc.nasa.gov
tel.: Michelle Mendoza (301-286-0761), Lutz Rastaetter (301-286-1085).

Please have registration numbers when making inquiries about your requests. You will need your registration number to view the results when the simulations have finished.

First Name: (required)

Last Name: (required)

E-mail: (required)

Run Number: 1
Select a different Run Number if you've already requested any Ionosphere/Thermosphere run today (unless you want to overwrite the run)

Title/Introduction (helps to arrange and sort runs):

Key words:

Ionospheric Model:

- Ovation Prime model
  - Ovation Prime 1.0
- Cosgrove Poynting Flux model
  - Poynting Flux version 1.0
- Weimer
  - Weimer 2K electric polar cap potential
  - Weimer 2005 electric polar cap potential

Weimer Ionosphere Models

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View Request Results
Run Instantly
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- Weimer, D. R., Predicting Surface Geomagnetic Variations Using Ionospheric Electrodynamic Models, *Journal of Geophysical Research, 110*, A12307, doi:10.1029/ 2005JA011270, 2005.

Relevant links

- http://mist.nianet.org/weimer.html
- http://www-ssc.igpp.ucla.edu/gem/poster/weimer/ggcm/
- http://www-ssc.igpp.ucla.edu/gem/poster/weimer/substorm/

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IONOSPHERE / THERMOSPHERE SIMULATION RESULTS

Perform advanced search or simple search in full database.

- **View ALL Ionosphere/Thermosphere Runs on Request**
- **View Runs for the following Model(s):**

  - AbbyNormal
  - Cosgrove-PF
  - CTIP
  - CTIPe
  - GITM
  - Ovation-Prime
  - SAMI2
  - SAMI3
  - TIE-GCM
  - USU-GAIM
  - Weimer

  VIEW RUNS

- **Check Run Status:**

  Enter Run Registration Number:

  CHECK STATUS

- **SEARCH Ionosphere / Thermosphere requests database for string(s):**

  Note: At present we do not support multiple string search, so please only enter one string (e.g., either one last name or requestor, one run number - such as John_Doe_013011_1 - or one first name) in this field.
  If searching for a date, use the following format: YYYY/MM/DD.

  Please CHOOSE one:

  - Search in All Columns
  - Search in Columns Below
    Key words automatically included, feel free to choose multiple columns

    - Run Number
    - Run Requestor's Last Name
    - Model
    - Event Date
    - Run Type
    - Date of Request

Runs on Request: IT Simulations Results

Total Number of Runs in the Database: 1973
Total Number of Search Results in this Database: 109

Status	Run Number	Key Words	Model	Model Version	Validation Level	Year	DoY at Start	F10.7 at Start	F10.7 (three year average)	Run Type	Input Type	Event Date	Start Time	Run Duration	2D or 3D Model	Geographic Latitude of Magnetic Longitudinal Slice (for 2D Model)	Geographic Longitude of Magnetic Longitudinal Slice (for 2D Model)	Minimum Altitude at Magnetic Equator (for 2D Model)	Maximum Altitude at Magnetic Equator (for 2D Model)	Ap Index	E-field Model	Maximum Drift (for Sinusoidal Model	Activity Level	Hemispheric Power	Dipole Tilt (in X-Y Plane) at Start
Published	Lisa_Rosenqvist_060316_IT_1	low activity	Weimer	2000	--	2012	69	0.0	0.00	event	var	March 09, 2012	00:00:00	1440	2D	0.00	0.00	--	--	--	--	--	--	0.00	-8.173
Published	Lisa_Rosenqvist_060316_IT_2	high activity	Weimer	2000	--	2012	82	0.0	0.00	event	var	March 22, 2012	00:00:00	1440	2D	0.00	0.00	--	--	--	--	--	--	0.00	-2.370
Published	Sebastian_Sevilla_052116_IT_3	FACs, electric potential	Weimer	2005	--	2015	227	0.0	0.00	event	var	August 15, 2015	10:00:00	1320	2D	0.00	0.00	--	--	--	--	--	--	0.00	13.143
Published	Sebastian_Sevilla_052116_IT_2	FACs, electric potential	Weimer	2005	--	2015	158	0.0	0.00	event	var	June 07, 2015	20:00:00	780	2D	0.00	0.00	--	--	--	--	--	--	0.00	29.801
Published	Sebastian_Sevilla_052116_IT_1	FACs, electric potential	Weimer	2005	--	2015	310	0.0	0.00	event	var	November 06, 2015	20:00:00	720	2D	0.00	0.00	--	--	--	--	--	--	0.00	-10.063
Published	Sebastian_Sevilla_051916_IT_1	FACs, electric potential	Weimer	2005	--	2015	310	0.0	0.00	event	var	November 06, 2015	20:00:00	720	2D	0.00	0.00	--	--	--	--	--	--	0.00	-10.063
Published	Sebastian_Sevilla_051216_IT_4	FACs, electric potential	Weimer	2005	--	2015	280	0.0	0.00	event	var	October 07, 2015	02:00:00	1260	2D	0.00	0.00	--	--	--	--	--	--	0.00	-13.229
Published	Sebastian_Sevilla_051216_IT_1	FACs, electric potential	Weimer	2005	--	2015	263	0.0	0.00	event	var	September 20, 2015	07:00:00	540	2D	0.00	0.00	--	--	--	--	--	--	0.00	-7.766
Published	Sebastian_Sevilla_051216_IT_2	FACs, electric potential	Weimer	2005	--	2015	276	0.0	0.00	event	var	October 03, 2015	23:00:00	660	2D	0.00	0.00	--	--	--	--	--	--	0.00	-5.047
Published	Sebastian_Sevilla_051216_IT_3	FACs, electric potential	Weimer	2005	--	2015	290	0.0	0.00	event	var	October 17, 2015	23:00:00	660	2D	0.00	0.00	--	--	--	--	--	--	0.00	-10.483
Published	Sebastian_Sevilla_050916_IT_4	FACs, electric potential	Weimer	2005	--	2015	250	0.0	0.00	event	var	September 07, 2015	05:00:00	1260	2D	0.00	0.00	--	--	--	--	--	--	0.00	-3.752
Published	Sebastian_Sevilla_050916_IT_3	FACs, electric potential	Weimer	2005	--	2015	238	0.0	0.00	event	var	August 26, 2015	08:00:00	2220	2D	0.00	0.00	--	--	--	--	--	--	0.00	4.321
Published	Sebastian_Sevilla_050916_IT_2	FACs, electric potential	Weimer	2005	--	2015	227	0.0	0.00	event	var	August 15, 2015	10:00:00	1320	2D	0.00	0.00	--	--	--	--	--	--	0.00	13.143
Published	Sebastian_Sevilla_050916_IT_1	FACs, electric potential	Weimer	2005	--	2015	202	0.0	0.00	event	var	July 21, 2015	02:00:00	3300	2D	0.00	0.00	--	--	--	--	--	--	0.00	13.554
Published	Sebastian_Sevilla_050816_IT_1	FACs, electric potential	Weimer	2005	--	2015	158	0.0	0.00	event	var	June 07, 2015	20:00:00	780	2D	0.00	0.00	--	--	--	--	--	--	0.00	29.801
Published	Sebastian_Sevilla_050816_IT_2	FACs, electric potential	Weimer	2005	--	2015	172	0.0	0.00	event	var	June 21, 2015	19:00:00	2040	2D	0.00	0.00	--	--	--	--	--	--	0.00	31.662
Published	Sebastian_Sevilla_050816_IT_3	FACs, electric potential	Weimer	2005	--	2015	185	0.0	0.00	event	var	July 04, 2015	16:00:00	840	2D	0.00	0.00	--	--	--	--	--	--	0.00	32.475

Lisa_Rosenqvist_060316_IT_1

Title/Introduction:

Key Word: low activity

Model Type: IT
Model: Weimer version 2000
CS output: MAG
Run type: event
Boundary condition type: var
Start Time: 2012/03/09 00:00:00
End Time: 2012/03/10 00:00:00
Initial solar wind conditions:

SW Density: 1.982 n/cc
SW Temperature [Kelvin]: 37045 Kelvin
X Component of SW Velocity: -632.899
Y Component of SW Velocity: -15.359 km/sec
Z Component of SW Velocity: -9.76 km/sec
IMF Bx: 10.248 nT
IMF By: -16.804 nT
IMF Bz: 6.01 nT
IMF |B|: 17.85 nT
IMF Clock Angle: -70.32 deg.

- View solar wind input data
- List solar wind input data in ASCII format (see format description here).
- View 2D Ionosphere/Electrodynamics
- Generate timeseries of 2D electrodynamics

This interface has been recently updated. If you experience problems or have any questions please contact the CCMC staff.

Weimer Ionosphere Models

CCMC Services available for Weimer
Request a Run
View Request Results
Run Instantly
View Real Time Run
View iSWA cygnet for this model

Model Developer(s)
Daniel R. Weimer
Virginia Tech

Model Description
Weimer models are statistical electric potential models for the high-latitude ionosphere, developed by Daniel Weimer of Solana Scientific Inc. Past satellite measurements of ionospheric electric fields, and the simultaneous measurements of solar wind and interplanetary magnetic field (IMF) conditions, have been used to create an empirical model of the high-latitude electric potential pattern.

The CCMC is using the IDL version of the Weimer models and added code to accomodate the input from the CCMC-developed web interface. The CCMC is running Weimer-2005 model in real time, driven by ACE solar wind data.

Model Input
Control parameters include the solar wind plasma number density N, velocity V_x (along Sun-Earth line), the transverse orientation of the solar wind magnetic field B_y, B_z (in GSM coordinates), and the orientation of the Earth's magnetic axis at the time of interest. An optional parameter is the Auroral Electrojet, AL index. These parameters are used to set up the model for the desired conditions, after which the only needed input parameters are the geomagnetic latitude and magnetic local time (MLT), in AACGM (Altitude Adjusted Corrected Geomagnetic) coordinates.

Model Output
The output from the model consists of the ionospheric electrostatic potential, in kilovolts (kV), as a function of the input AACGM latitude and MLT.

References and relevant publications

- Weimer, D. R., *Models of high-latitude electric potentials derived with a least error fit of spherical harmonic coefficients*, Journal of Geophysical Research., 100, 19,595-19,607, 1995.
- Weimer, D. R., *A flexible IMF dependent model of high-latitude electric potentials having "space weather" applications*, Geophysical Research Letter, 23, 2549-2553, 1996.
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- Weimer, D. R., Improved ionospheric electrodynamic models and application to calculating Joule heating rates, *Journal of Geophysical Research, 110*, A05306, doi:10.1029/2004JA010884, 2005.
- Weimer, D. R., Predicting Surface Geomagnetic Variations Using Ionospheric Electrodynamic Models, *Journal of Geophysical Research, 110*, A12307, doi:10.1029/ 2005JA011270, 2005.

Relevant links

- http://mist.nianet.org/weimer.html
- http://www-ssc.igpp.ucla.edu/gem/poster/weimer/ggcm/
- http://www-ssc.igpp.ucla.edu/gem/poster/weimer/substorm/

CCMC Contact(s)
Lutz Rastaetter
301-286-9571

Developer Contact(s)
Daniel R. Weimer
757-325-6908

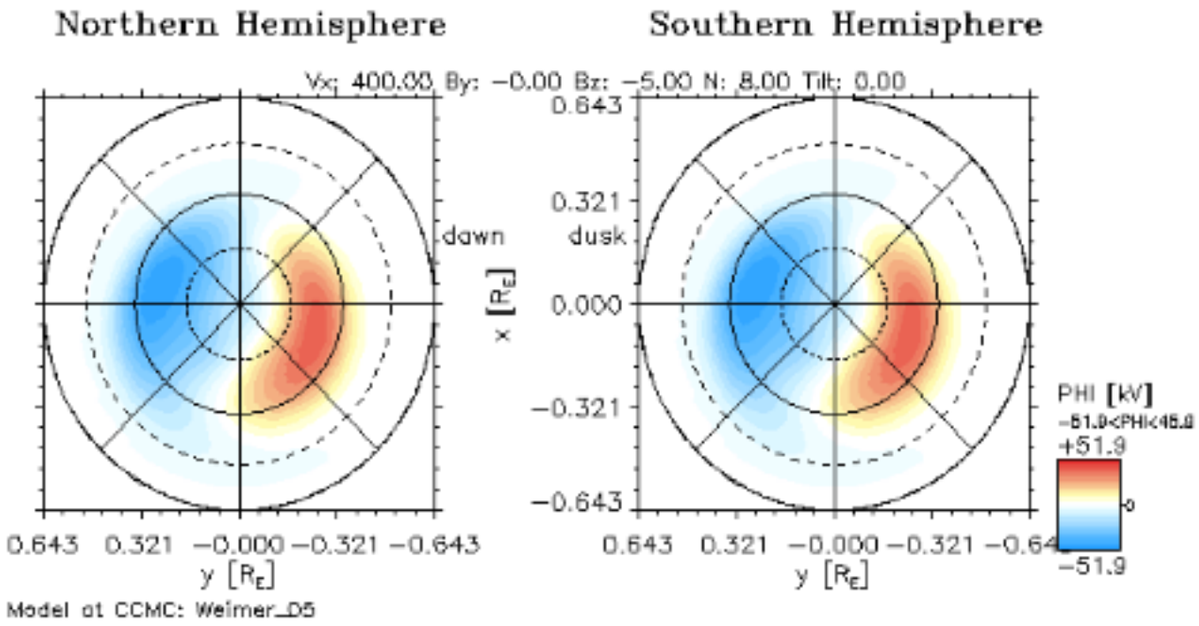

Figure: Weimer Ionosphere statistical model.

Publication Policy: Please contact the model owner before you use results for any presentation or publication (full Publication Policy).
To track usage for our government sponsors, we ask that you notify CCMC staff whenever you use CCMC results in a scientific publication or presentation. Thank you.

Update Plot *Update Plot* will update (generate) the plot with the chosen time and plot parameters below.
This will take some time (typically 5-10s) as data is read in and processed.

Weimer model version:

- **Weimer-2K** (release 2 with FAC model)
- **Weimer-2005** (PHI and FAC)

Earth system input parameters:

- **use Date** ("MM/DD/YYYY HH:MM"): 01 / 01 / 2000 00 : 00
- select **Tilt of Earth's dipole** (Range: -34°<tilt<34°): 0.00

Solar Wind input parameters:

- **specify |B|, angle**
  - **IMF B magnitude** (0<B<50nT, **recommended: |B|<15nT**): 5.000
  - **IMF B angle** (-180°<angle<180°; 0=north): 180.000
- **specify B_y and B_z**
  - **IMF B_y:** -0.000 ($[B_y^2+B_z^2]^{1/2}$ < 50 nT)
  - **IMF B_z:** -5.000 **(model works best for $|B_y|$ and $|B_z|$ < 15 nT)**

Plasma velocity magnitude V: 400.00 (200 km/s < V < 1100 km/s)
Plasma particle density N: 8.000 (0.2 cm^{-3} < N < 100 cm^{-3})

Weimer Ionosphere Models

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Virginia Tech

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Relevant links

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- http://www-ssc.igpp.ucla.edu/gem/poster/weimer/ggcm/
- http://www-ssc.igpp.ucla.edu/gem/poster/weimer/substorm/

CCMC Contact(s)
Lutz Rastaetter
301-286-9571

Developer Contact(s)
Daniel R. Weimer
757-325-6908

Real-time electric potential with Weimer 2005 model

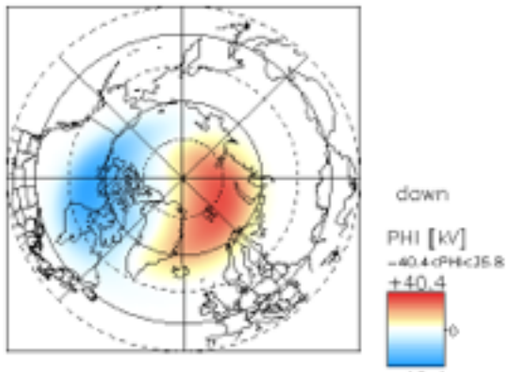
These plots are using NOAA-SEC ACE real-time data. The solar wind data are propagated to Earth with a 1-minute velocity average **$<V_X>$=281.7 km/s** from ACE's L1-position at around X_{GSM}=224.9 R_E (ACE's real-time X-position.). The **lead time** is thus **72 min**.

This page was loaded at Tue Jun 14 00:36:07 UTC 2016 and will reload in 2 minutes. Images are updated every 5 minutes.

Image features: **Magnetic local time (MLT)** (1-hour intervals) and **magnetic latitudes** (10-degree intervals) in *Altitude Adjusted Corrected Geomagnetic Coordinates* (AACGM) are shown as a web of **solid lines**.
Geographic coordinates are shown as dotted lines on a map of the continents. **Local noon** is at the top of the images and the **dashed line** indicates **MLT=noon,midnight**.
The top image is the forecast (around 72 min in the future), the bottom image the nowcast (about 60 min earlier).
Solar wind data were averaged over a 15 minute interval before the two times.

06/14/2016 Time = 01:09:00

Northern Hemisphere

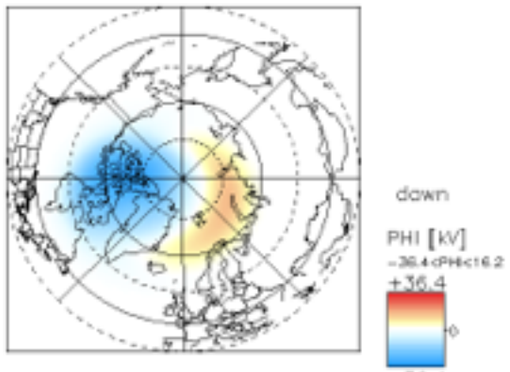


PHI [kV]
-40.4<PHI<35.8
+40.4
0
-40.4

Model at CCMC: Weimer_05

06/14/2016 Time = 00:09:00

Northern Hemisphere



PHI [kV]
-36.4<PHI<16.2
+36.4
0
-36.4

Model at CCMC: Weimer_05

Model: "Weimer_2005" by Daniel Weimer, Virginia Polytechnic Institute, National Institute of Aerospace, Hampton, VA
References: Weimer, D. R., An improved model of ionospheric electric potentials including substorm perturbations and application to the GEM November 24, 1996 event, *Journal of Geophysical Research, Vol. 106*, p. 407, 2001.
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Weimer Ionosphere Models

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Model Developer(s)
Daniel R. Weimer
Virginia Tech

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- http://www-ssc.igpp.ucla.edu/gem/poster/weimer/substorm/

CCMC Contact(s)
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Coordinated Data Analysis Web (CDAWeb)

http://cdaweb.gsfc.nasa.gov/

- Provides public data from current and past space physics missions
- Download data in ASCII and binary formats
- Supports interactive plotting of variables from multiple instruments simultaneously

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+ Autoplot.org **(non-NASA)** interface to public CDAWeb database

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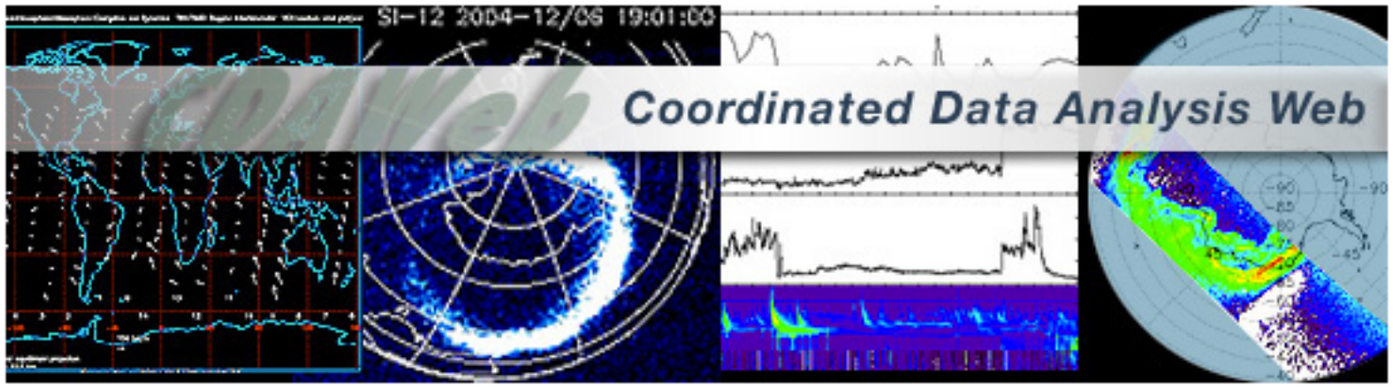
+ Space Physics Use of CDF



CDAWeb Data Views

- Public data from current (1992 -> present) space physics missions
  (including ACE, Cluster, C/NOFS, FAST, Geotail, GOES 5-12, IMAGE, LANL 1989-2002, NOAA 10-14, OMNI, Polar, STEREO, THEMIS, TIMED, Ulysses, Van Allen Probes, Voyager, Wind and others).
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Curator: Tami Kovalick
NASA Official: Robert McGuire
(301)286-7794, Robert.E.McGuire@nasa.gov
Updated: Daily

- **Select one OR more Sources** (default = All unless no Instrument Types selected)

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- ARTEMIS
- BARREL
- CNOFS
- CRRES
- Cluster
- Cubesats
- DMSP
- Equator-S
- FAST
- GOES
- GPS
- Genesis
- Geotail
- Helios
- IMAGE
- IMP (All)
- ISS
- Interball
- LANL
- MESSENGER
- MMS
- NOAA
- OMNI (Combined 1AU IP Data; Magnetic and Solar Indices)
- POES/MetOp
- Pioneer
- Polar
- ROCSAT-1(FORMOSAT-1)/IPEI
- SAMPEX
- SNOE
- SOHO
- ST5
- STEREO
- THEMIS
- TIMED
- TWINS
- Ulysses
- Van Allen Probes (RBSP)
- Voyager
- Wind
- Ground-Based Investigations

- **AND Select one OR more Instrument Types** (default = All unless no Sources selected)

- Activity Indices
- Electric Fields (space)
- Electron Precipitation Bremsstrahlung
- Engineering
- Ephemeris
- Ephemeris/Attitude/Ancillary
- Gamma and X-Rays
- Housekeeping
- Imaging and Remote Sensing (ITM/Earth)
- Imaging and Remote Sensing (Magnetosphere/Earth)
- Imaging and Remote Sensing (Sun)
- Magnetic Fields (Balloon)
- Magnetic Fields (space)
- Particles (space)
- Plasma and Solar Wind
- Radio and Plasma Waves (space)
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Coordinated Data Analysis Web

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- To go forward to plot, list and retrieve your selected data, press the "submit" button directly below or at the bottom of this page.
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- As needed to select the datasets of actual interest to you:

  - manually check/uncheck one or more data sets from the list below OR
  - Click here to CLEAR All checkboxes, OR
  - Click here to SELECT All checkboxes

Submit

- [ ] OMNI_HRO_1MIN: OMNI Combined, Definitive, 1-minute IMF and Plasma Data Time-Shifted to the Nose of the Earth's Bow Shock, plus Magnetic Indices - J.H. King, N. Papatashvilli (AdnetSystems, NASA GSFC)
  [Available Time Range: 1981/01/01 00:00:00 - 2016/05/07 00:27:00]
- [x] OMNI_HRO_5MIN: OMNI Combined, Definitive, 5-minute IMF and Plasma, and Energetic Proton Fluxes, Time-Shifted to the Nose of the Earth's Bow Shock, plus Magnetic Indices - J.H. King, N. Papatashvilli (AdnetSystems, NASA GSFC)
  [Available Time Range: 1981/01/01 00:00:00 - 2016/05/23 23:55:00]
- [ ] OMNI2_H0_MRG1HR: OMNI Combined, Definitive, Hourly IMF and Plasma Data, and Energetic Proton Fluxes, Time-Shifted to the Nose of the Earth's Bow Shock, plus Solar and Magnetic Indices - J.H. King, N. Papatashvilli (ADNET, NASA GSFC)
  [Available Time Range: 1963/01/01 00:00:00 - 2016/05/27 14:00:00]
- [ ] OMNI_COHO1HR_MERGED_MAG_PLASMA: OMNI Combined merged hourly magnetic field, plasma and ephermis data - J.H. King, N. Papatashvilli (AdnetSystems, NASA GSFC)
  [Available Time Range: 1963/01/01 00:00:00 - 2016/05/15 00:00:00]

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CDAWeb Data Explorer

Select start and stop times from which to GET or PLOT data:

Use pre-defined start/stop times

September 2005 Events 2005/09/07 00:00:00 2005/09/20 00:00:00

Use custom start/stop times

Start: 2015/03/17 00:00:00.0 (YYYY/MM/DD HH:MM:SS.mmm)

Stop: 2015/03/19 00:00:00.0 (YYYY/MM/DD HH:MM:SS.mmm)

Select an activity:

Plot Data : *select one or more variables from list below and press submit.*

Also create PS and PDF outputs (all plot types except images and plasmagrams).

Many panels per dataset are allowed but <=4 panels optimal for standard Y-axis height and single page display.

List Data (ASCII): *select one or more variables from list below and press submit. (Works best for < 31 days)*

Output listing times as year and seconds of year (Default is dd-mm-yyyy hh:mm:ss)

Download original CDFs : *press submit button to retrieve list of files. (Max. 200 days - use FTP site for larger requests)*

Create V3.6 CDFs for download or VIRBO Autoplot demonstration: *select one or more variables from the list below and press submit.*

Create Version 2.7.2 compatible CDFs (Default is Version 3.6)

Note: CDF patch required for reading Version 3.6 CDFs in IDL or MATLAB.
Get CDFX - IDL GUI plotting/listing toolkit software. To be used with either the daily or "created" CDF files available above.

Plotting Options

Use coarse noise filtering to remove values outside 3 deviations from mean of all values in the plotted time interval.

Double the Y-axis height for time-series and spectrogram plots.

Combine all time-series and spectrogram plots, for all requested datasets, into one plot file.

NEW **Pressing the "Submit" button will spawn a new window/tab in order to support the new "Previous" and "Next" functions.**

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OMNI_HRO_5MIN

OMNI Combined, Definitive, 5-minute IMF and Plasma, and Energetic Proton Fluxes, Time-Shifted to the Nose of the Earth's Bow Shock, plus Magnetic Indices - J.H. King, N. Papatashvilli (AdnetSystems, NASA GSFC)

Available dates: 1981/01/01 00:00:00 - 2016/05/23 23:55:00
(Continuous coverage not guaranteed - check the inventory graph for coverage)

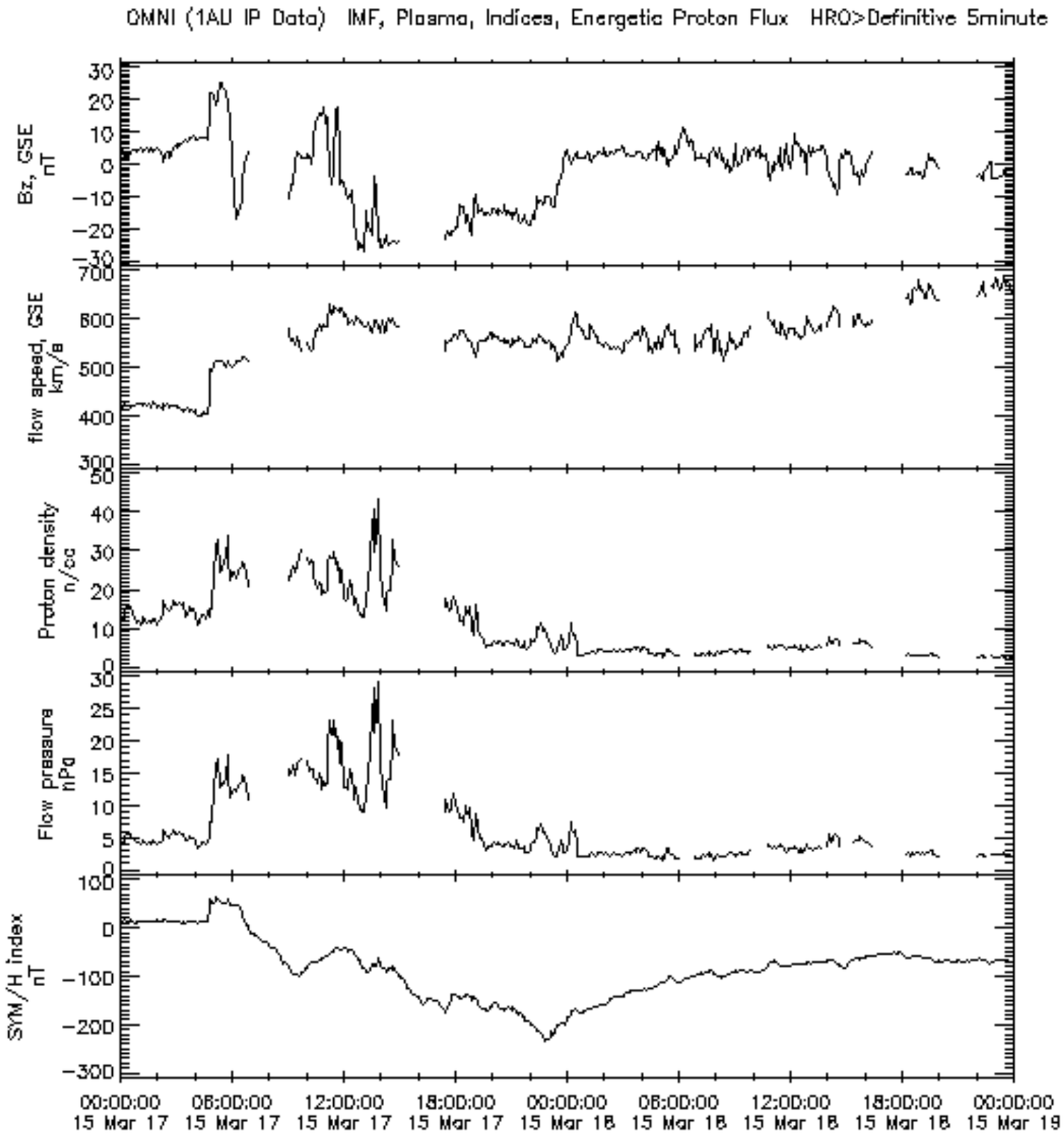
- [ ] OMNI ID code for the source spacecraft for time-shifted IMF values (see OMNI documentation link for codes)
- [ ] OMNI ID code for the source spacecraft for time-shifted IP plasma values (see OMNI documentation link for codes)
- [ ] Number of fine time scale points in IMF averages
- [ ] Number of fine time scale points in plasma averages
- [ ] Percent interpolated
- [ ] Timeshift (seconds)
- [ ] RMS Timeshift (seconds)
- [ ] Time between observations (seconds)
- [ ] Magnitude of avg. field vector (nT) (last currently-available OMNI B-field data May 06, 2016)
- [ ] Bx (nT), GSE
- [ ] By (nT), GSE
- [x] Bz (nT), GSE
- [ ] By (nT), GSM, determined from post-shift GSE components
- [ ] Bz (nT), GSM, determined from post-shift GSE components
- [ ] RMS SD B scalar (nT)
- [ ] RMS SD field vector (nT)
- [x] Flow Speed (km/s), GSE
- [ ] Vx Velocity (km/s), GSE
- [ ] Vy Velocity (km/s), GSE
- [ ] Vz Velocity (km/s), GSE
- [x] Proton density (n/cc) (last currently-available OMNI plasma data May 06, 2016)
- [ ] Temperature (K)
- [x] Flow pressure (nPa)
- [ ] Electric Field (mV/m)
- [ ] Plasma beta
- [ ] Alfven mach number
- [ ] 1AU IP Magnetosonic mach number
- [ ] X s/c (Re), GSE
- [ ] Y s/c (Re), GSE
- [ ] Z s/c (Re), GSE
- [ ] Bow Shock Nose (Re) location, X, GSE
- [ ] Bow Shock Nose (Re) location, Y, GSE
- [ ] Bow Shock Nose (Re) location, Z, GSE
- [ ] AE - 5-minute AE-index, from WDC Kyoto (Final 1981/001-1988/366, Provisional 1989/001-2015/334)
- [ ] AL - 5-minute AL-index, from WDC Kyoto (Final 1981/001-1988/366, Provisional 1989/001-2015/334)
- [ ] AU - 5-minute AU-index,from WDC Kyoto (Final 1981/001-1988/366, Provisional 1989/001-2015/334)
- [ ] SYM/D - 5-minute SYM/D index,from WDC Kyoto (1981/001-2016/091)
- [x] SYM/H - 5-minute SYM/H index,from WDC Kyoto (1981/001-2016/091)
- [ ] ASY/D - 5-minute ASY/D index,from WDC Kyoto (1981/001-2016/091)
- [ ] ASY/H - 5-minute ASY/H index,from WDC Kyoto (1981/001-2016/091)
- [ ] PC - 5-minute Polar Cap index (North, Qaanaaq geomagnetic observatory), from DTU Space, Technical University of Denmark (1981/001-2014/365)
- [ ] Proton flux >10 MeV (1/(SQcm-ster-s)) (all fluxes from GOES 1986/001-2016/144)
- [ ] Proton flux >30 MeV (1/(SQcm-ster-s))
- [ ] Proton flux >60 MeV (1/(SQcm-ster-s))

[Additional information for all parameters are available from OMNI Data documentation]
[Additional data access options available at SPDF's OMNIWeb Service]
[Recent omni high resolution updates Release Notes]

NEW **Processing the "Submit" button will spawn a new window/tab in order to support the new "Previous" and "Next" functions.**

Submit Reset

OMNI_HRO_5MIN



CDAWeb Data Explorer

Select start and stop times from which to GET or PLOT data:

Use pre-defined start/stop times

September 2005 Events 2005/09/07 00:00:00 2005/09/20 00:00:00

Use custom start/stop times

Start: 2015/03/17 00:00:00.0 (YYYY/MM/DD HH:MM:SS.mmm)

Stop: 2015/03/19 00:00:00.0 (YYYY/MM/DD HH:MM:SS.mmm)

Select an activity:

Plot Data: *select one or more variables from list below and press submit.*

Also create PS and PDF outputs (all plot types except images and plasmagrams).

Many panels per dataset are allowed but <=4 panels optimal for standard Y-axis height and single page display.

List Data (ASCII): *select one or more variables from list below and press submit. (Works best for < 31 days)*

Output listing times as year and seconds of year (Default is dd-mm-yyyy hh:mm:ss)

Download original CDFs : *press submit button to retrieve list of files. (Max. 200 days - use FTP site for larger requests)*

Create V3.6 CDFs for download or VIRBO Autoplot demonstration: *select one or more variables from the list below and press submit.*

Create Version 2.7.2 compatible CDFs (Default is Version 3.6)

Note: CDF patch required for reading Version 3.6 CDFs in IDL or MATLAB.
Get CDFX - IDL GUI plotting/listing toolkit software. To be used with either the daily or "created" CDF files available above.

Plotting Options

Use coarse noise filtering to remove values outside 3 deviations from mean of all values in the plotted time interval.

Double the Y-axis height for time-series and spectrogram plots.

Combine all time-series and spectrogram plots, for all requested datasets, into one plot file.

NEW **Pressing the "Submit" button will spawn a new window/tab in order to support the new "Previous" and "Next" functions.**

Submit Reset

Select dataset listings to view/download:

OMNI_HRO_5MIN

(click here for) Combined Dataset Listing (tar/gzip, all times and all datasets selected)

listing (58K)

gzip listing (10K)

Combined Listing (tar/gzip, all times and all datasets selected) (10K)

Notes:

- Click on the hyperlinked words above to view/download the listings for the selected datasets.
- Listings are often wider than the screen, so listings saved to disk must be saved as "**source**" (AS IS) and not as "**text**" to avoid wrapping the lines.
- Very wide listings (many variables or variables with many dimensions) may not correctly display with all browsers, even once downloaded as a file. Listings of this nature can only be viewed when they are downloaded as files and then opened with a text or word processing editor.
- Listings and plots are automatically deleted after 8 hours (DO NOT SAVE THE URLs TO THESE FILES) -- **save these files to your computer now**.

```
#     PI_NAME                         J.H. King, N. Papatashvilli
#     PI_AFFILIATION                  AdnetSystems, NASA GSFC
#     GENERATION_DATE                 Ongoing
#     ACKNOWLEDGEMENT                 NSSDC
#     ADID_REF                        NSSD0110
#     RULES_OF_USE                    Public
#     INSTRUMENT_TYPE                 Plasma and Solar Wind
#                                     Magnetic Fields (space)
#                                     Electric Fields (space)
#     GENERATED_BY                    King/Papatashvilli
#     TIME_RESOLUTION                 5 minute
#     LOGICAL_SOURCE                  omni_hro_5min
#     LOGICAL_SOURCE_DESCRIPTION      OMNI Combined, Definitive, 5-minute IMF and Plasma, and Energetic Proton Fluxes,
#                                      Time-Shifted to the Nose  of the Earth's Bow Shock, plus Magnetic Indices
#     LINK_TEXT                       Additional information for all parameters are available from
#                                     Additional data access options available at
#                                     Recent omni high resolution updates
#     LINK_TITLE                      OMNI Data documentation
#                                     SPDF's OMNIWeb Service
#                                     Release Notes
#     HTTP_LINK                       http://omniweb.gsfc.nasa.gov/html/HROdocum.html
#                                     http://omniweb.gsfc.nasa.gov/ow_min.html
#                                     http://omniweb.gsfc.nasa.gov/html/hro_news.html
#     ALT_LOGICAL_SOURCE              Combined_OMNI_1AU-MagneticField-Plasma-HRO_5min_cdf
#     MISSION_GROUP                   OMNI (Combined 1AU IP Data; Magnetic and Solar Indices)
#                                     ACE
#                                     Wind
#                                     IMP (All)
#                                     !___Interplanetary Data near 1 AU
#     SPASE_DATASETRESOURCEID         spase://VMO/NumericalData/OMNI/PT5M
#     CDFMAJOR                        ROW_MAJOR
#
#               ************************************
#               ****  RECORD VARYING VARIABLES  ****
#               ************************************
#
#  1. Epoch Time
#  2. Bz (nT), GSE
#  3. Flow Speed (km/s), GSE
#  4. Proton density (n/cc) (last currently-available OMNI plasma data May 06, 2016)
#  5. Flow pressure (nPa)
#        NOTES:  Derived parameters are obtained from the following equations. Flow pressure = (2*10**-6)*Np*Vp**2 nPa (Np in cm**-3, Vp in km/s, subscript p for proton)
#  6. SYM/H - 5-minute SYM/H index,from WDC Kyoto (1981/001-2016/091)
#
EPOCH_TIME                  BZ,_GSE FLOW_SPEED,_GSE PROTON_DENSITY FLOW_PRESSURE SYM/H_INDEX
dd-mm-yyyy hh:mm:ss.ms           nT            km/s          n/cc          nPa          nT
17-03-2015 00:00:00.000      1.19000         423.900       12.8800      4.63000          15
17-03-2015 00:05:00.000      4.56000         413.800       11.8900      4.07000          15
17-03-2015 00:10:00.000      3.39000         423.400       12.6200      4.52000          18
17-03-2015 00:15:00.000      2.82000         425.600       14.4700      5.25000          16
17-03-2015 00:20:00.000      2.43000         421.200       15.7300      5.58000          15
17-03-2015 00:25:00.000      2.37000         421.500       15.5000      5.51000          15
17-03-2015 00:30:00.000      3.10000         421.500       15.4400      5.48000          16
17-03-2015 00:35:00.000      3.49000         416.600       15.5100      5.38000          14
17-03-2015 00:40:00.000      4.44000         418.400       13.6500      4.78000          12
17-03-2015 00:45:00.000      4.53000         421.300       12.8000      4.54000          11
17-03-2015 00:50:00.000      4.72000         426.200       11.4600      4.17000          11
17-03-2015 00:55:00.000      3.98000         426.200       12.0200      4.36000          12
17-03-2015 01:00:00.000      4.62000         426.400       11.9100      4.33000          12
17-03-2015 01:05:00.000      4.90000         426.300       10.9500      3.98000          13
17-03-2015 01:10:00.000      4.47000         423.100       11.6700      4.17000          14
17-03-2015 01:15:00.000      3.93000         422.200       12.9500      4.62000          15
17-03-2015 01:20:00.000      4.71000         424.300       11.7800      4.24000          14
17-03-2015 01:25:00.000      5.07000         420.600       11.4900      4.07000          13
17-03-2015 01:30:00.000      3.93000         422.900       11.6800      4.18000          13
17-03-2015 01:35:00.000      5.04000         417.000       11.9200      4.15000          13
17-03-2015 01:40:00.000      5.04000         415.300       11.2900      3.89000          13
17-03-2015 01:45:00.000      3.70000         426.600       12.4800      4.54000          13
17-03-2015 01:50:00.000      4.67000         423.100       12.3800      4.43000          14
17-03-2015 01:55:00.000      4.89000         422.100       10.7700      3.84000          17
```

Space Weather Prediction Center (SWPC) Tools

http://www.swpc.noaa.gov/products-and-data

- Provides the researcher and casual user access to numerous tools, graphics and datasets needed to understand space weather.
- Several types of forecasting tools are available to predict upcoming space activity, and models provide longer term outlooks for future events.

Forecasts

27-Day Outlook of 10.7 cm Radio Flux and Geomagnetic Indices

3-Day Forecast

3-Day Geomagnetic Forecast

Forecast Discussion

Predicted Sunspot Numbers and Radio Flux

Report and Forecast of Solar and Geophysical Activity

Solar Cycle Progression

Space Weather Advisory Outlook

USAF 45-Day Ap and F10.7cm Flux Forecast

Weekly Highlights and 27-Day Forecast

Reports

Forecast Verification

Geoalert - Alerts, Analysis and Forecast Codes

Geophysical Alert

Solar and Geophysical Event Reports

USAF Magnetometer Analysis Report

Models

Aurora - 30 Minute Forecast

D Region Absorption Predictions (D-RAP)

Relativistic Electron Forecast Model

STORM Time Empirical Ionospheric Correction

U.S. Total Electron Content

WSA-Enlil Solar Wind Prediction

Wing Kp

Observations

ACE Real-Time Solar Wind

Boulder Magnetometer

GOES Electron Flux

GOES Magnetometer

GOES Proton Flux

GOES Solar X-ray Imager

GOES X-ray Flux

LASCO Coronagraph

Planetary K-index

Real Time Solar Wind

Satellite Environment

Solar Synoptic Map

Space Weather Overview

Station K and A Indices

Summaries

Solar & Geophysical Activity Summary

Solar Region Summary

Summary of Space Weather Observations

Alerts, Watches and Warnings

Alerts, Watches and Warnings

Notifications Timeline

Experimental

Aurora - 3 Day Forecast

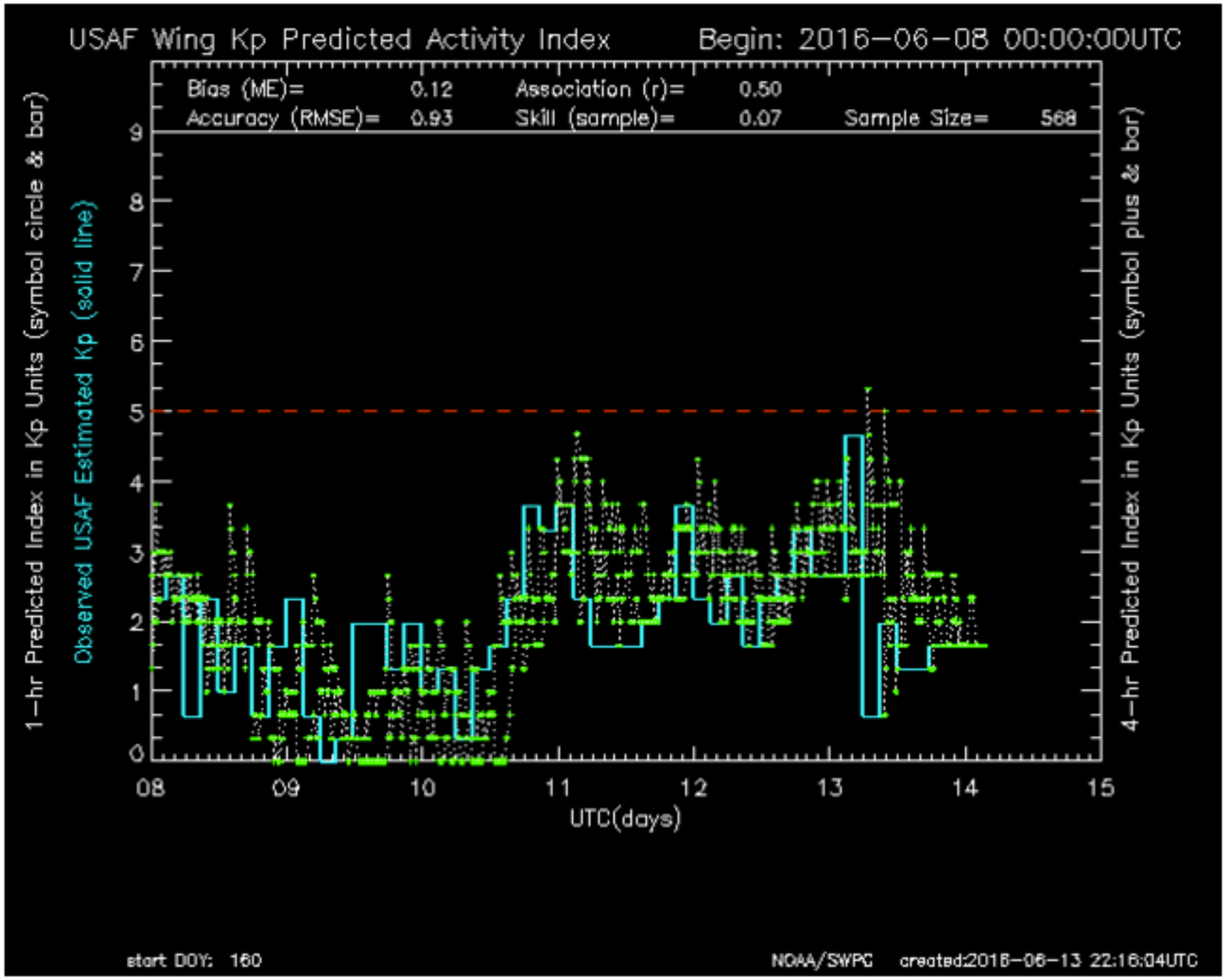
CTIPe Total Electron Content Forecast

Predicted Solar Wind at Earth

Solar Wind Transit Time

Data Access

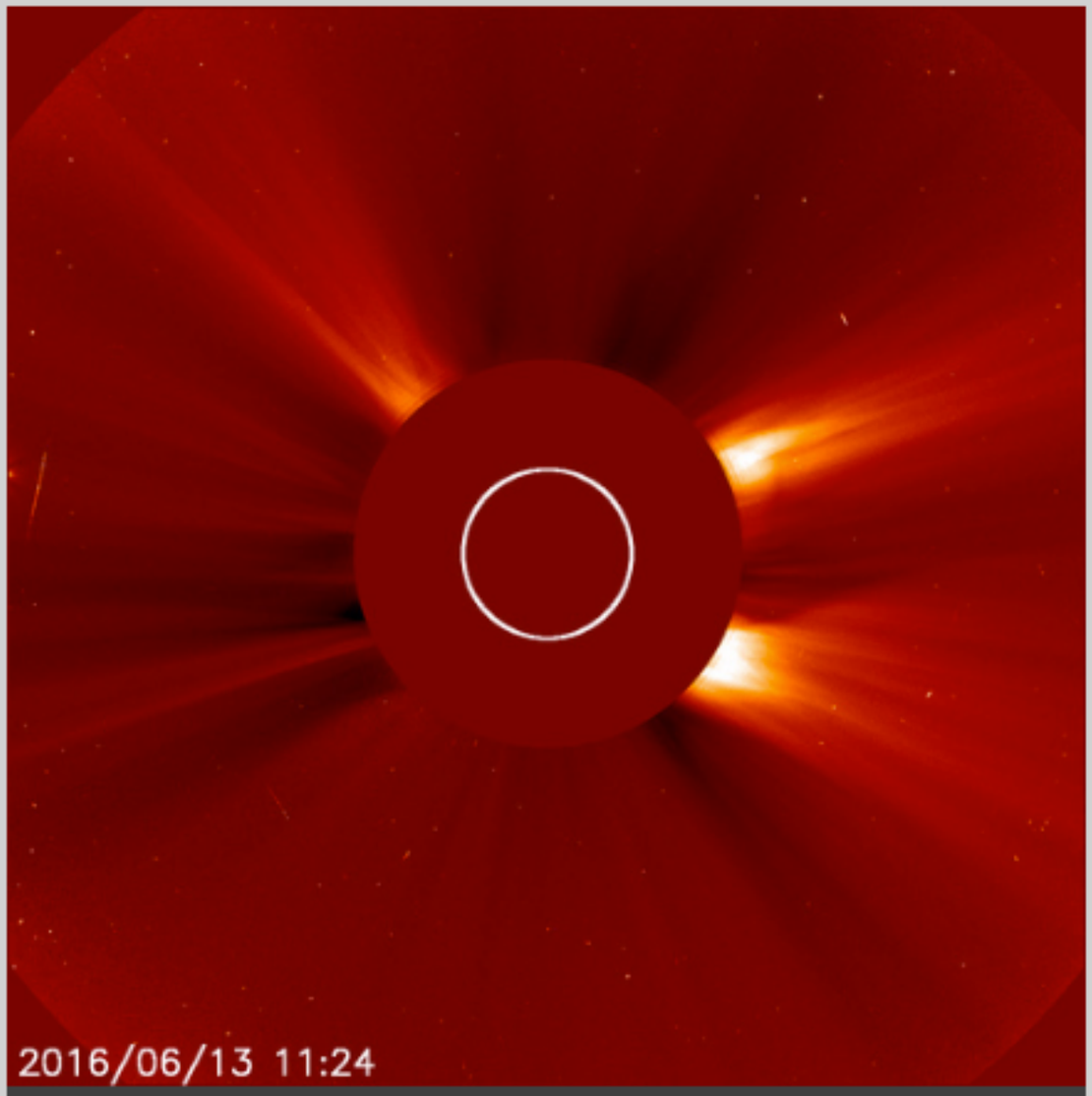
WING KP



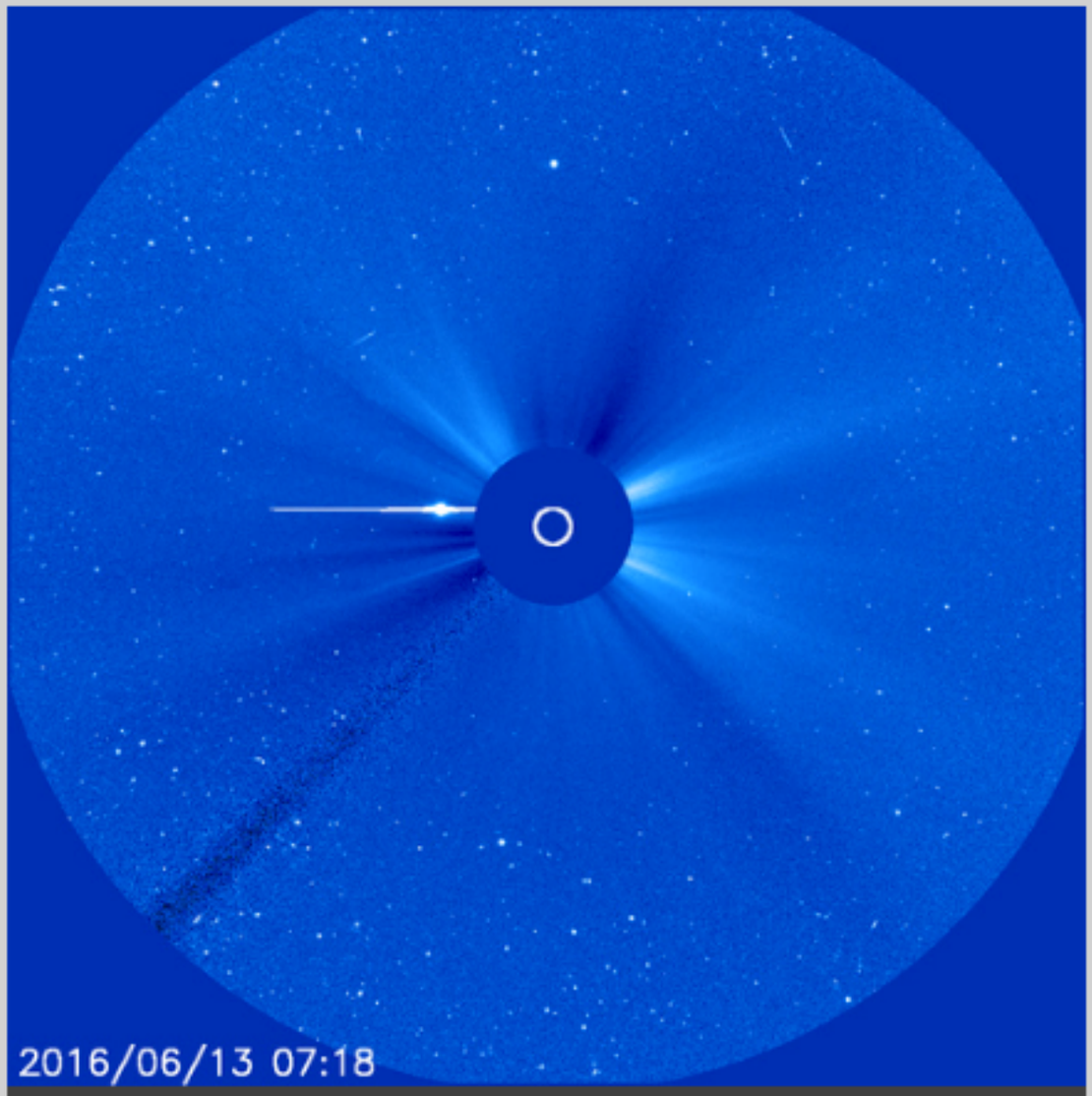
12-hour Plot -- 24-hour Plot -- 7 Day Model Performance

LASCO CORONAGRAPH

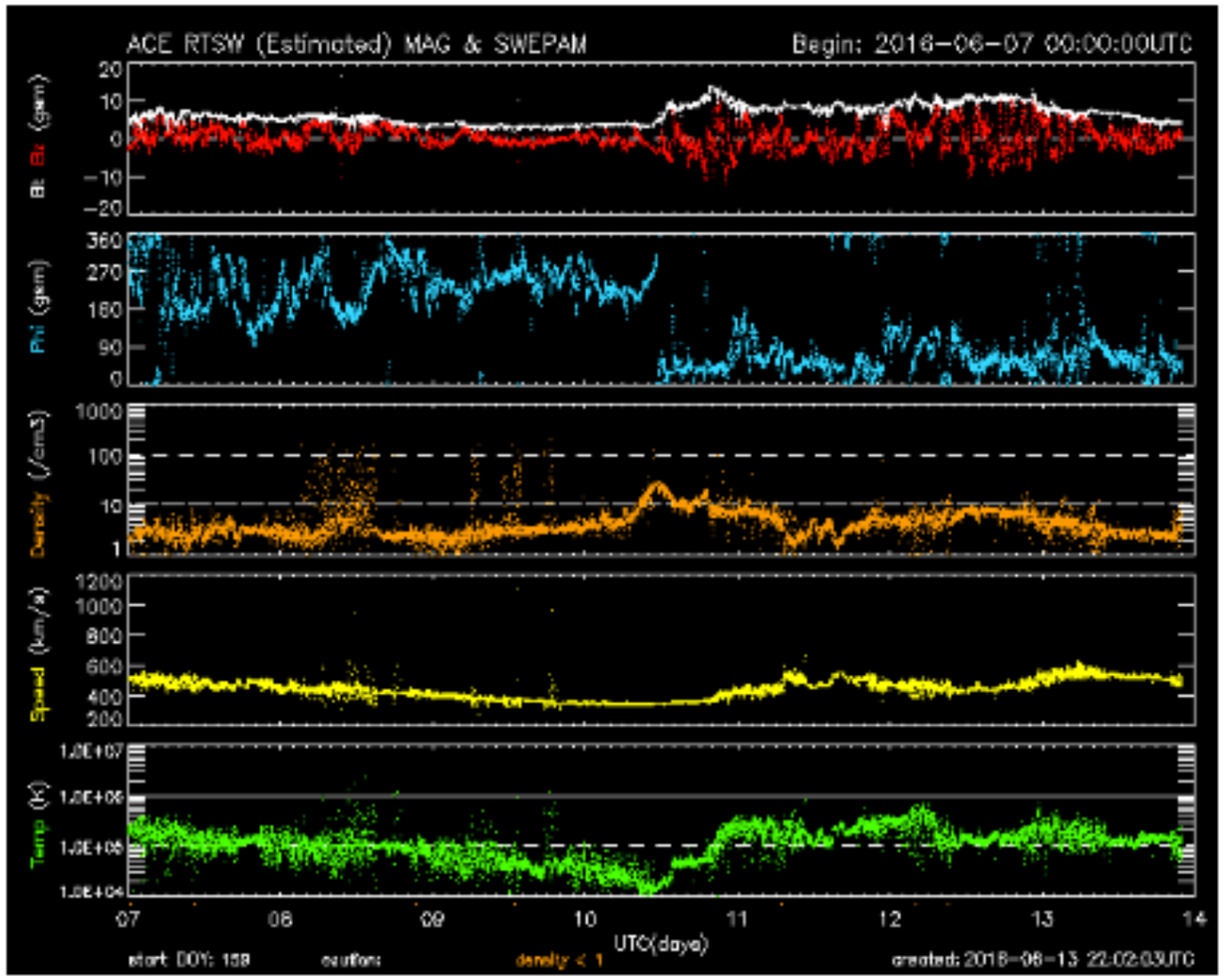
LASCO C2



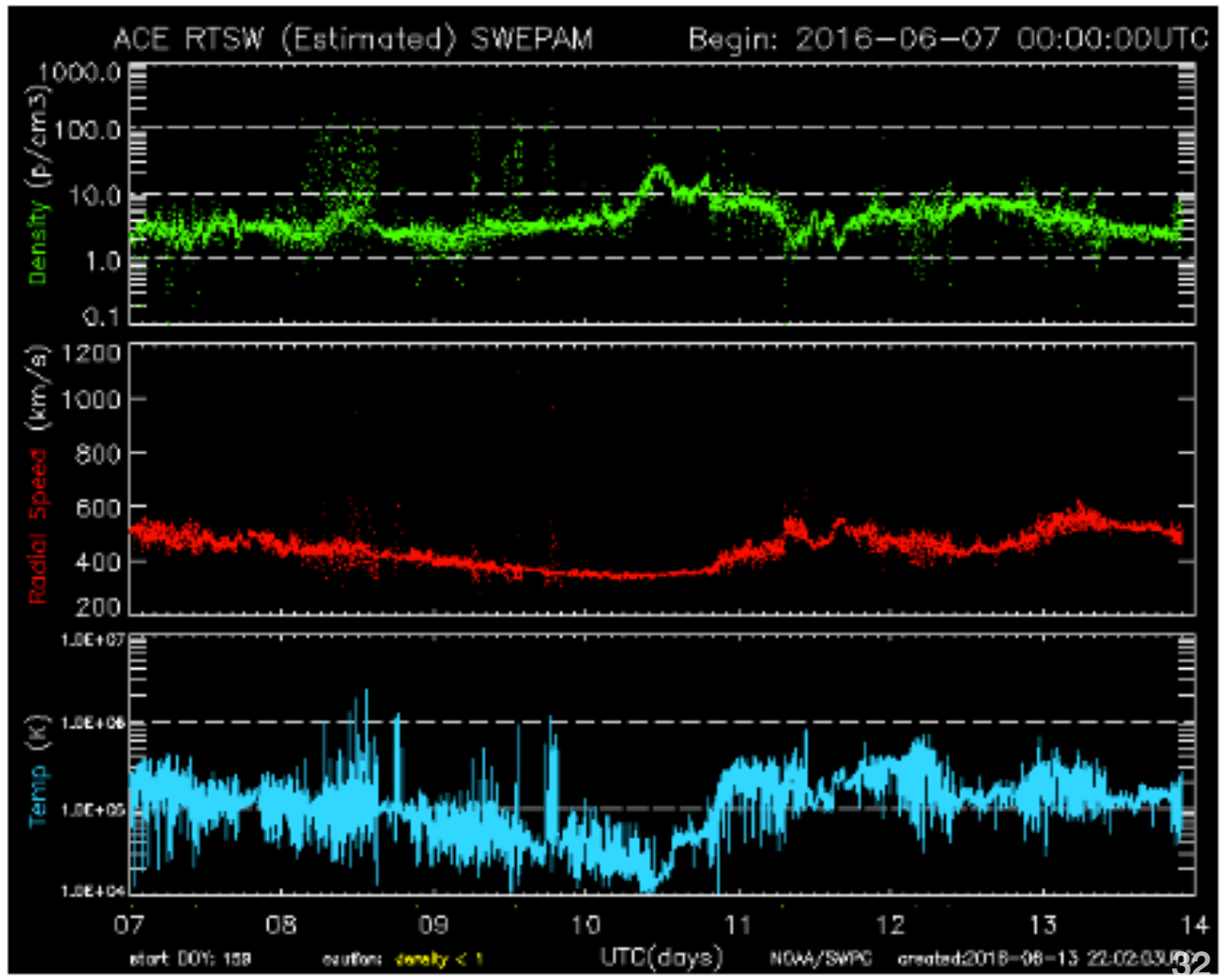
LASCO C3



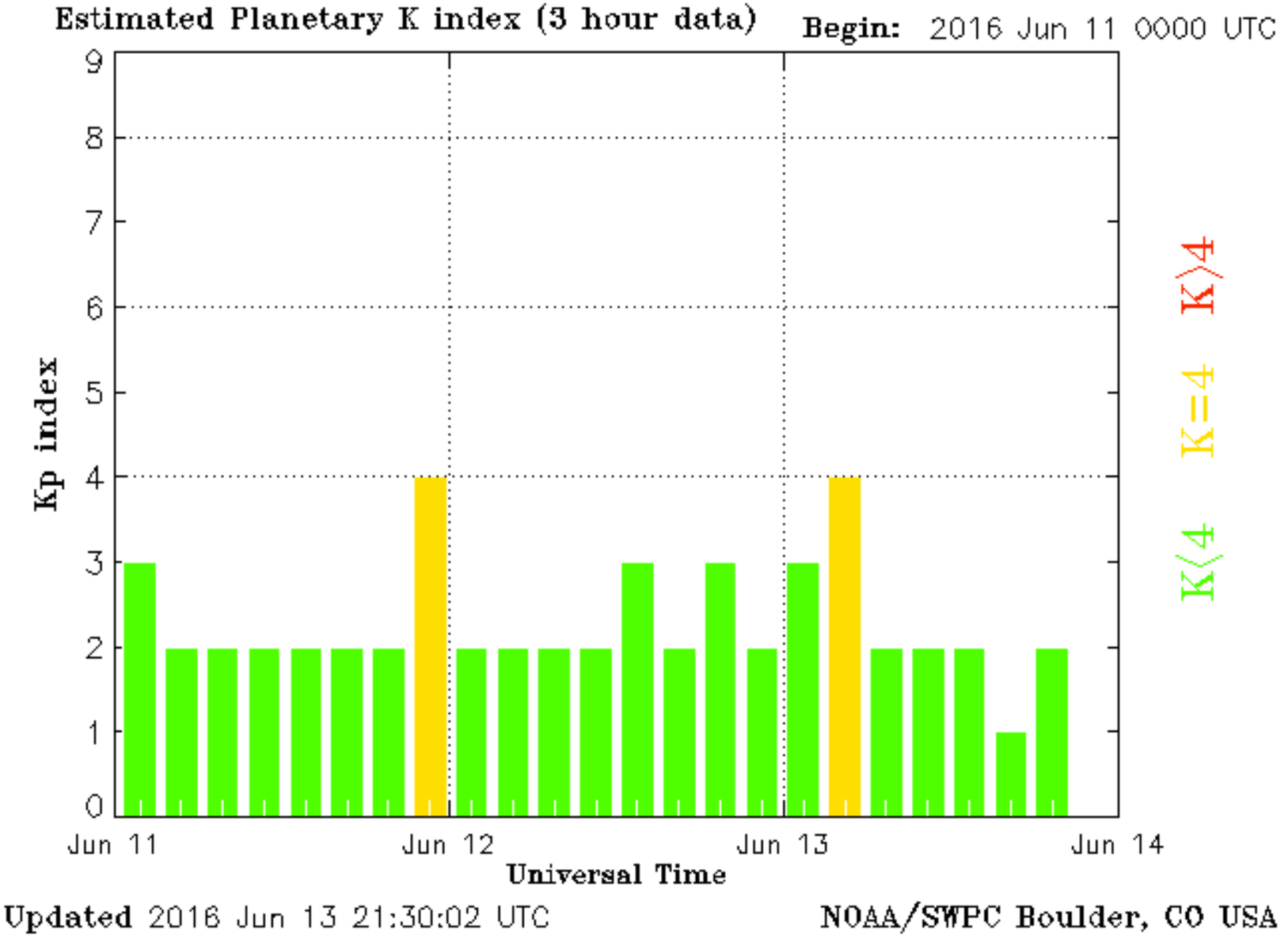
ACE REAL-TIME SOLAR WIND



ACE REAL-TIME SOLAR WIND



PLANETARY K-INDEX



Thank you!

- Community Coordinated Modeling Center (CCMC)
  - http://ccmc.gsfc.nasa.gov/
- Coordinated Data Analysis Web (CDAWeb)
  - http://cdaweb.gsfc.nasa.gov/
- Space Weather Prediction Center (SWPC) Tools
  - http://www.swpc.noaa.gov/products-and-data