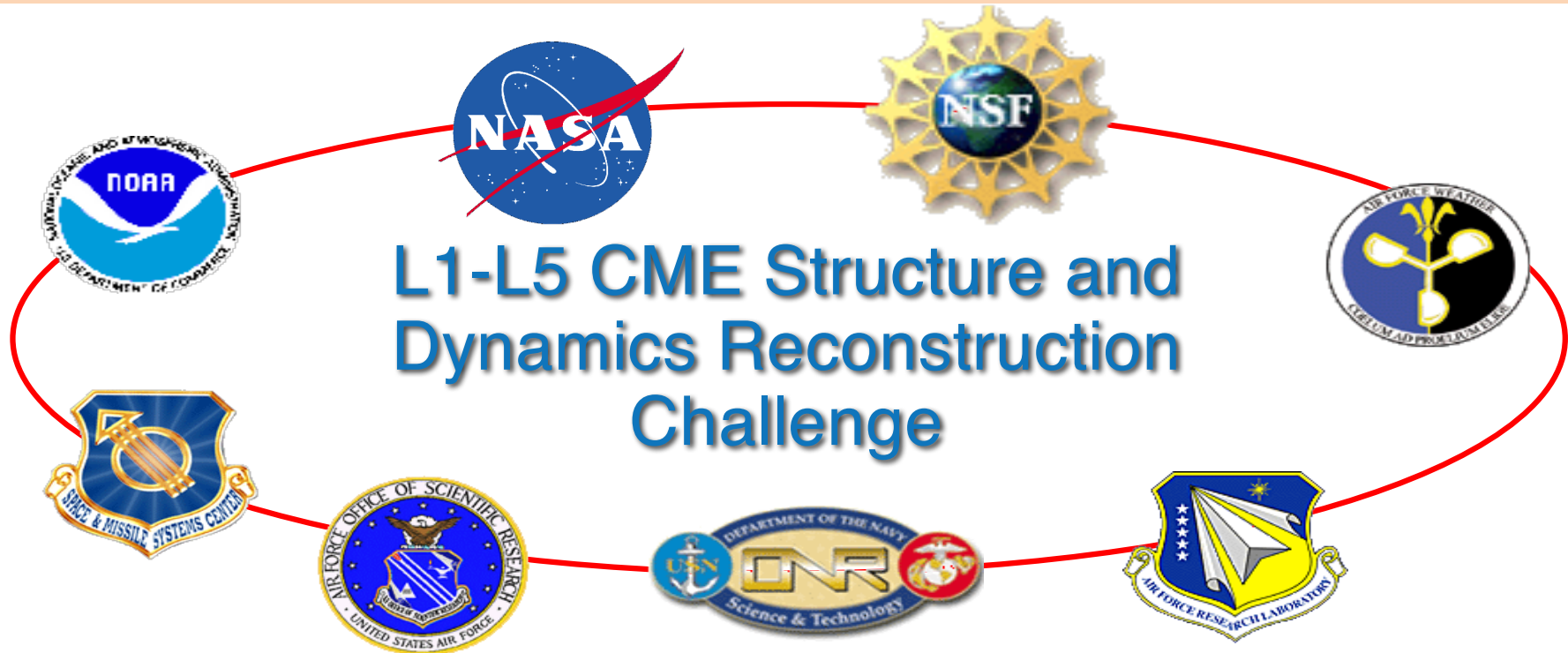
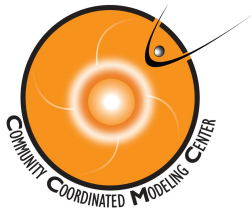


Community Coordinated Modeling Center



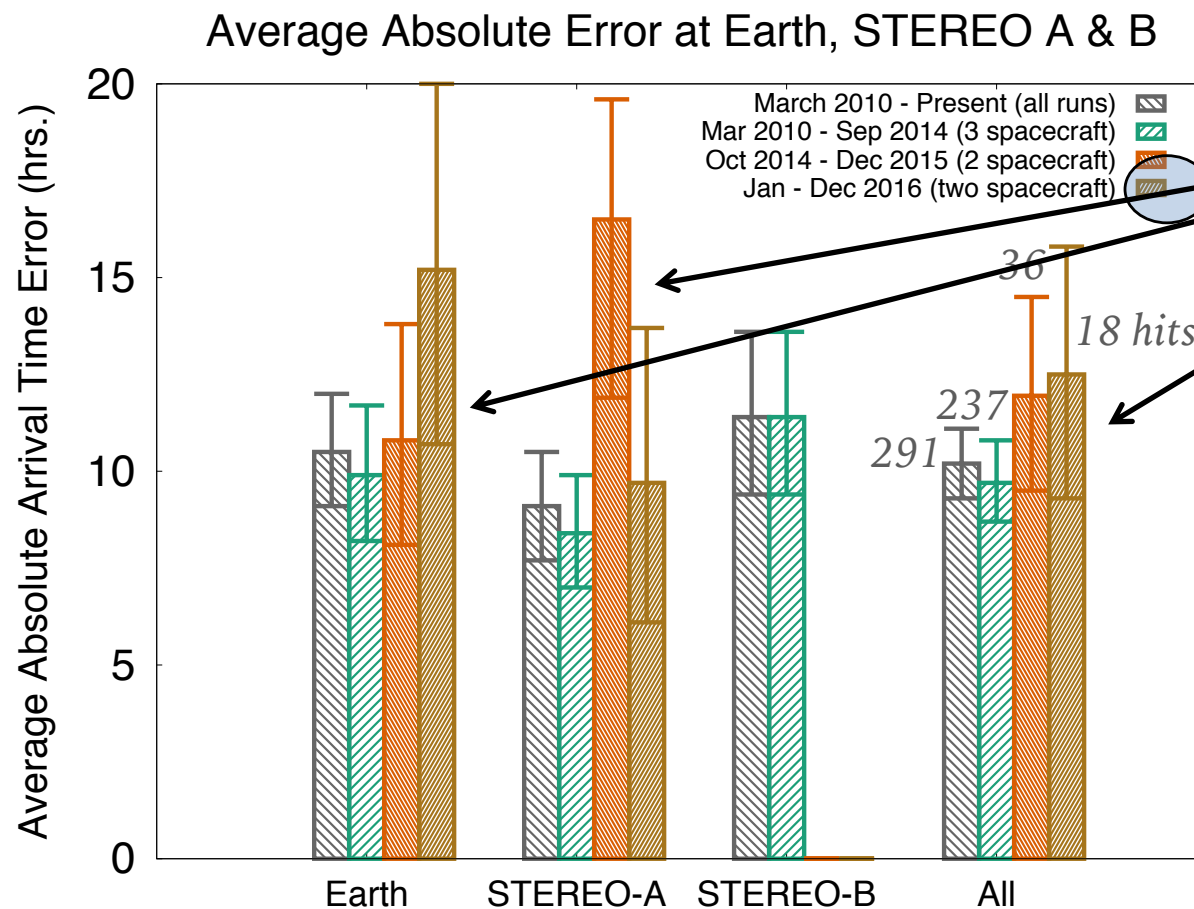
Masha Kuznetsova & CCMC Team

MODELS • DATA • TOOLS • DATABASES • SYSTEMS • SERVICES



Validation results of CME Arrival Prediction (Wold et al., 2016)


CME ARRIVAL TIME PREDICTION ERRORS



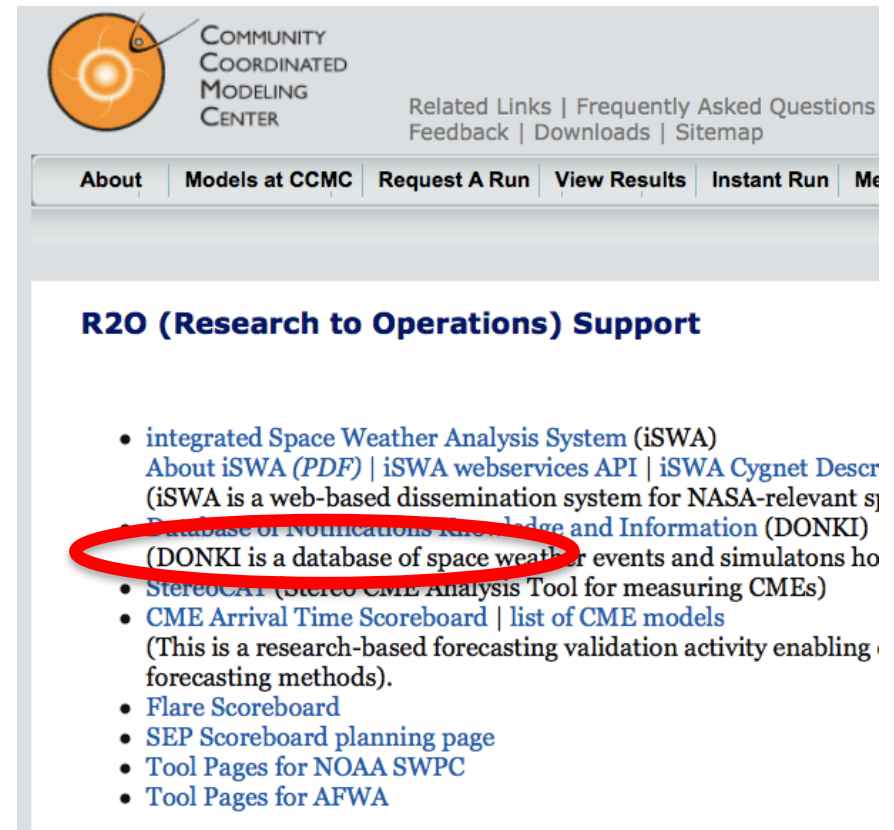
Error is larger with only two spacecraft instead of three

During the period post Sept 2014 (without STEREOB and reduced STEREO A coverage) a reduction in skill of **2.3 hours**

Database Of Notifications, Knowledge, Information (DONKI)

- Online tool for dissemination of forecasts, notifications
- Catalog of space weather phenomena
- Knowledgebase of interpretations, simulation results, and forecasting analysis
- Linked to CME arrival ScoreBoard 
- Comprehensive database search functionality.

[CCMC/SWRC team provides real-time feeds to the DONKI.](#)



COMMUNITY COORDINATED MODELING CENTER

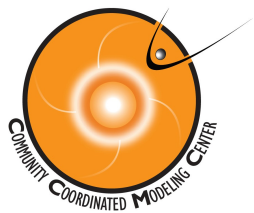
Related Links | Frequently Asked Questions
Feedback | Downloads | Sitemap

About | Models at CCMC | Request A Run | View Results | Instant Run | Me

R2O (Research to Operations) Support

- [Integrated Space Weather Analysis System \(iSWA\)](#)
[About iSWA \(PDF\)](#) | [iSWA webservice API](#) | [iSWA Cygnet Descr](#)
(iSWA is a web-based dissemination system for NASA-relevant s)
[Database of Notifications, Knowledge and Information \(DONKI\)](#)
(DONKI is a database of space weather events and simulations ho)
- [StereocAT](#) (Stereo CME Analysis Tool for measuring CMEs)
- [CME Arrival Time Scoreboard](#) | [list of CME models](#)
(This is a research-based forecasting validation activity enabling forecasting methods).
- [Flare Scoreboard](#)
- [SEP Scoreboard planning page](#)
- [Tool Pages for NOAA SWPC](#)
- [Tool Pages for AFWA](#)





Database Of Notifications, Knowledge, Information (DONKI)



Search Space Weather Activity

Space Weather Event Type :

Optional start date in format (e.g. 2013-01-31) :

Optional end date in format (e.g. 2013-06-30) :

search

WSA-ENLIL+Cone Model

--- ALL ---

Solar Flare

Solar Energetic Particle

Coronal Mass Ejection

Interplanetary Shock

Magnetopause Compression

Geomagnetic Storm

Radiation Belt Enhancement

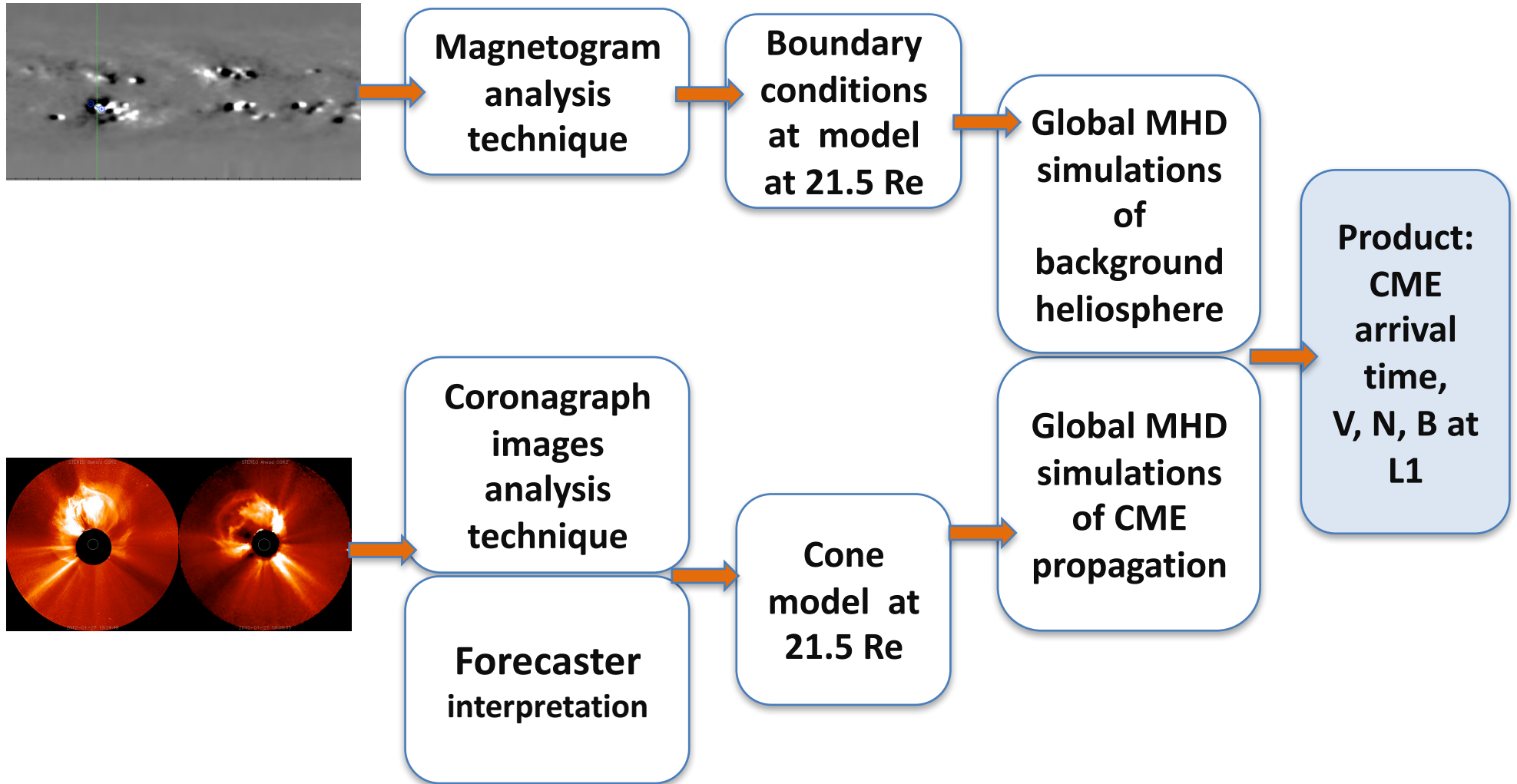
High Speed Stream

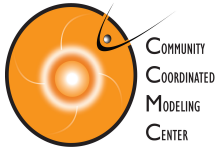
WSA-ENLIL+Cone Model

Event Type	Activity ID	Associated Instrument	Submit Date	Submitted By
Solar Energetic Particle	2013-03-16T19:05:00-S	GOES13: SEM/EPS >10 MeV	2013-07-15T15:20:17	Dan Comberiate

Event Type	Activity ID	CME Start Time	Associated Instrument	All Detecting Instruments	CME Analysis	Submit Date	Submitted By
Coronal Mass Ejection	2013-03-17T18:23:00-CME-001	2013-03-17T18:23Z	STEREO B: SECCHI/COR2	STEREO B: SECCHI/COR2 SOHO: LASCO/C2 SOHO: LASCO/C3	CME Analysis: Lon.=-30.0, Lat.=-15.0, Speed=450.0, HalfAngle=25.0, Time21.5=2013-03-17T23:47Z	2013-08-07T13:53:31	Dhanesh Krishnarao
Coronal Mass Ejection	2013-03-17T16:00:00-CME-001	2013-03-17T16:00Z	SOHO: LASCO/C2	SOHO: LASCO/C2 SOHO: LASCO/C3 STEREO A: SECCHI/COR2 STEREO B: SECCHI/COR2	CME Analysis: Lon.=9.0, Lat.=33.0, Speed=520.0, HalfAngle=35.0, Time21.5=2013-03-17T23:37Z	2013-08-07T13:53:31	Dhanesh Krishnarao
Coronal Mass Ejection	2013-03-16T14:39:00-CME-001	2013-03-16T14:39Z	STEREO A: SECCHI/COR2	STEREO A: SECCHI/COR2 SOHO: LASCO/C2 SOHO: LASCO/C3	CME Analysis: Lon.=57.0, Lat.=30.0, Speed=873.0, HalfAngle=32.0, Time21.5=2013-03-16T23:37Z	2013-08-07T13:50:31	Dhanesh Krishnarao

A chain from observations to SW predictions (sources of uncertainty)

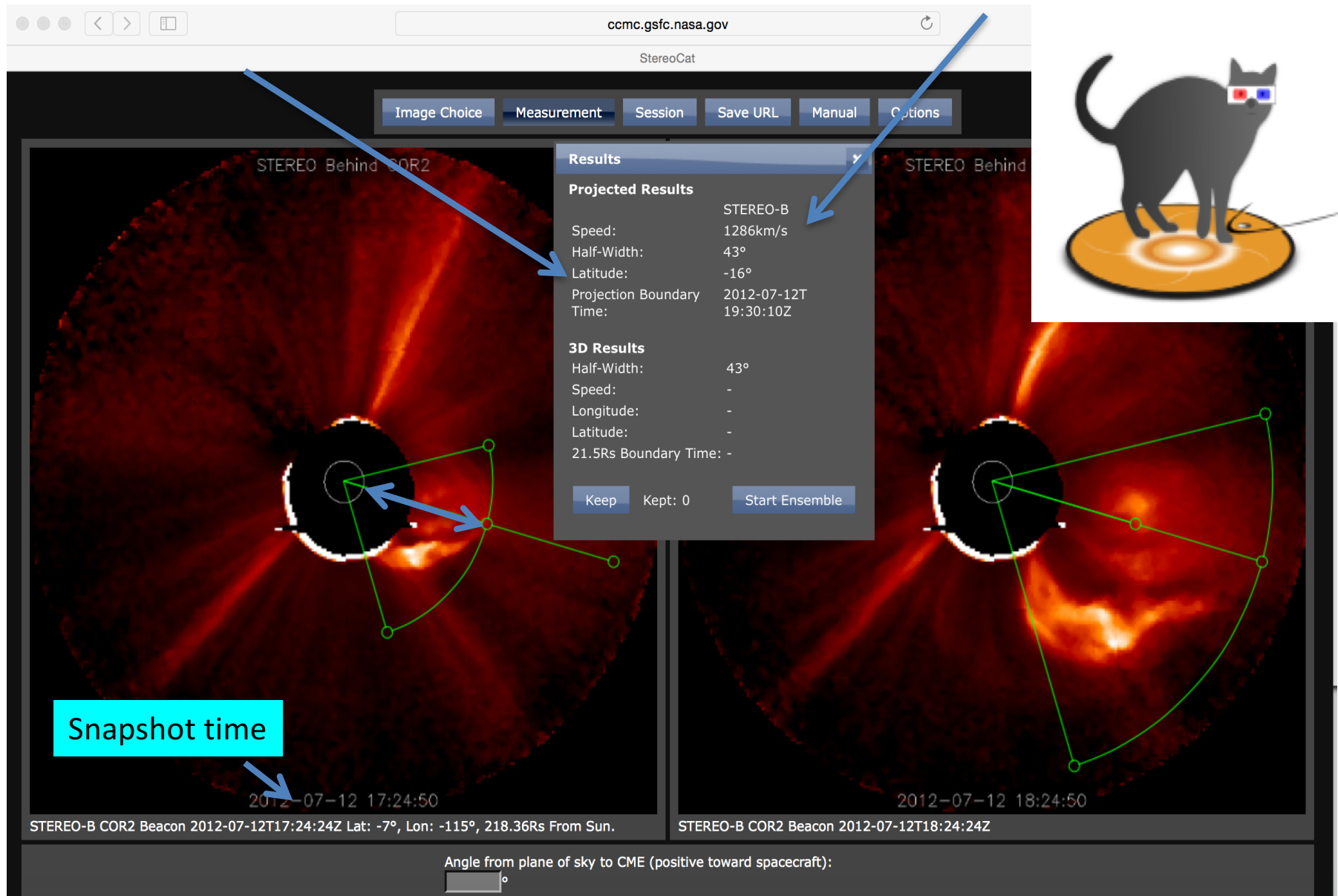




STEREO_CAT

(<http://ccmc.gsfc.nasa.gov/analysis/stereo>)

By tracing the CME front, we find CME speed, estimate CME start time, & source location



Expanding Community of Models at CCMC: > 80

EEGGL+SWMF/AWSOM-R

PFSS.Petrie
PFSS.Macneice
PFSS.Luhmann
ANMHD
UMASEP
SRPM
MAG
4
ASAP
WSA
MAGIC
ASSA
SNB3GEO
NLFFF.Wiegelmann

ENLIL
Posner SEP
PREDICCS
EXO Solar Wind
EMMREM
CORHEL
Heltomo SMEI
ENLIL+Cone
Heltomo IPS
BRYNTRN
SWMF/SH

LFM-TING
LFM-MIX
OpenGGCM
SWMF+RCM+deltaB
SWMF+RCM
SWMF+RCM+RBE
SWMF+RCM+CRCM
LFM-MIX-TIEGCM
WINDMI
IGRF
Fok RBE
PS VP
AACGM
GUMICS
GIC
RCM
Fok.CIMI
Fok.RC
UPOS RB
AE-8/AP-8
AE-9/AP-9
VERB
TRIPL-DA
Weimer IE
Weimer-deltaB
JB2008
COSGROVE-PF

SAMI-2
SAMI-3
TIE-GCM
CTIPe
IRI
USU-GAIM
SWACI-TEC
ABBYNormal
MSIS
GITM
PBMOD
Weimer IE
Weimer-deltaB
JB2008
COSGROVE-PF

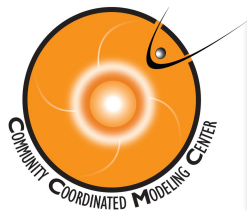
Corona

Heliosphere

Magnetosphere

Inner
Magnetosphere

Ionosphere/The
rmosphere



The First-Principles Model of CME Magnetic Structure and Evolution is Available to the World



StereoCAT CME Analysis Tool



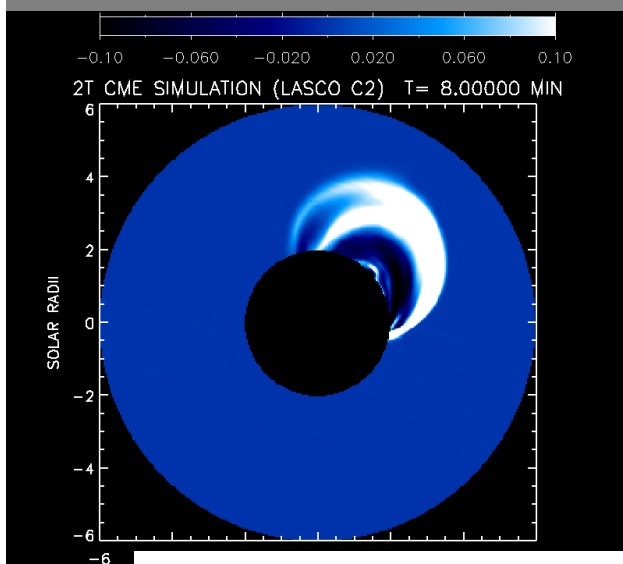
**EEGGL Eruption Event
Generator by Gibson & Low**



SWMF AWSoM-R

**Global MHD simulations of
CME plasma and magnetic structure
eruption and propagation through space**

NSO/GONG Magnetogram - processed for SWMF input



**Simulated synthetic
images as seen from
SOHO or STEREO**

Recommended Parameters

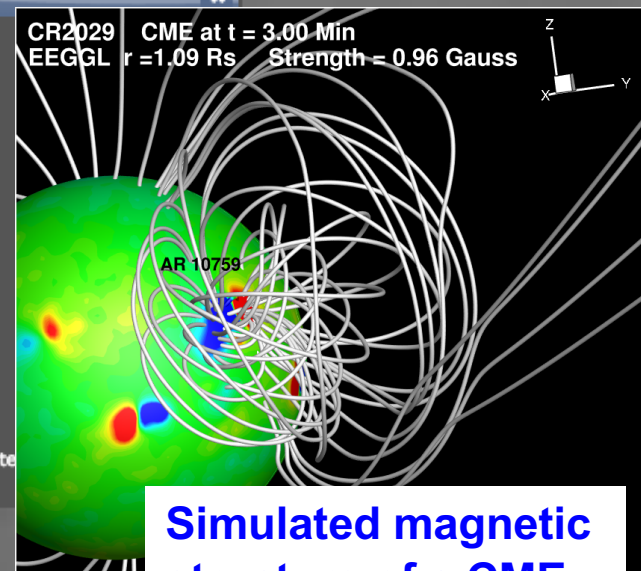
GL Flux Rope Parameters

Longitude: 130.50°
Latitude: 14.50°
Orientation: 358.72°
Radius[Rs]: 1.58
Bstrength[Gs]: -0.02

Grid Refinement Parameters

R_Start[Rs]: 1.15
Longitude_Start: 67.30°
Latitude_Start: -17.10°
R_End[Rs]: 22.00
Longitude_End: 193.70°
Latitude_End: 46.10°

Request SWMF Run Using Parameters



**Simulated magnetic
structure of a CME**

The First-Principles Model of CME Magnetic Structure and Evolution is Available to the World

NASA press release: Jan 27 2017

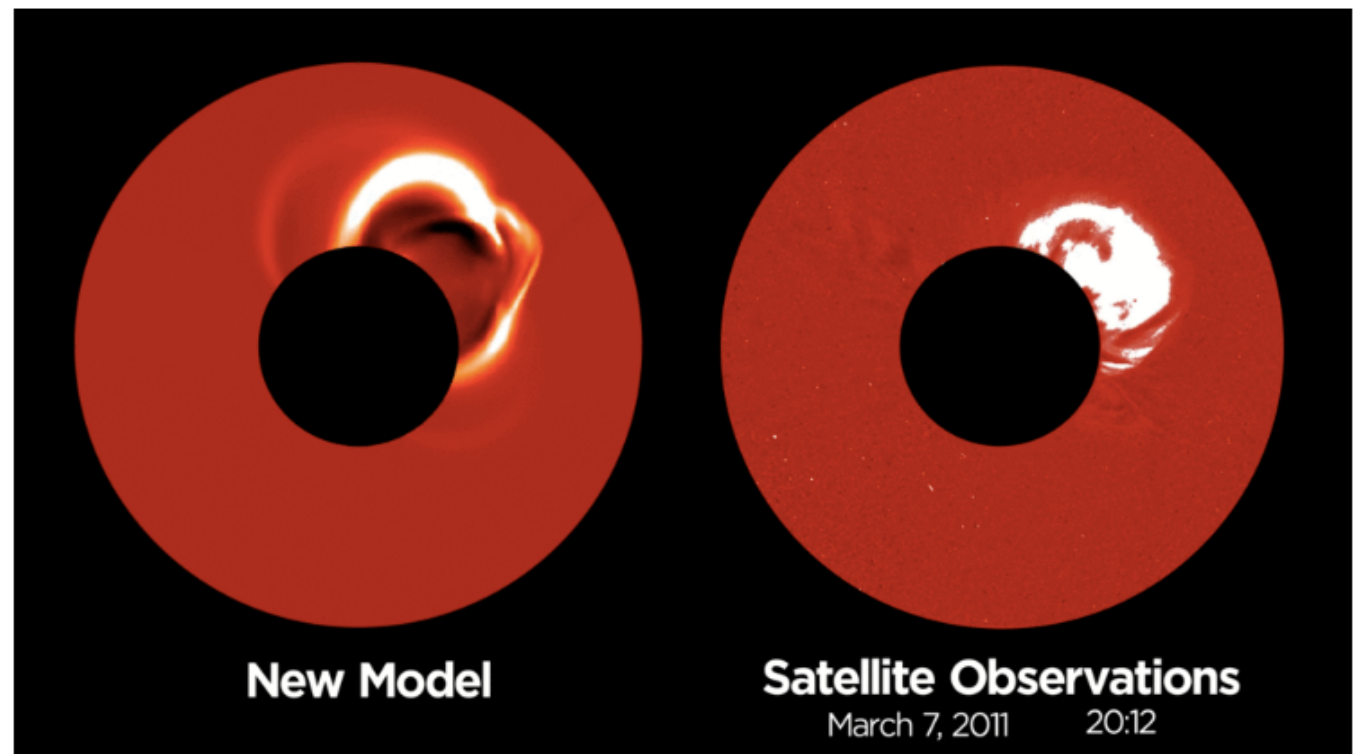
<https://www.nasa.gov/feature/goddard/2017/new-space-weather-model-helps-simulate-magnetic-structure-of-solar-storms>

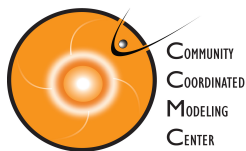
A new model is mapping out the path of coronal mass ejections as they travel from the sun to Earth, where these storms can interact with our planet's magnetic fields and cause a variety of space weather effects.

Space Weather

Jan. 26, 2017

New Space Weather Model Helps Simulate Magnetic Structure of Solar Storms





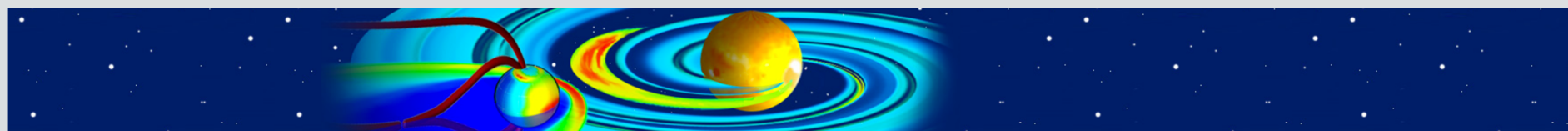
AWSOM-R/EEGGL/CME model at CCMC

Available for Runs-on-Request October, 2016



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](#) | [ISWA](#) | [DONKI](#)



Community Coordinated Modeling Center 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.

International Forum for SW Capabilities Assessment

Take part in the [International Forum for Space Weather Capabilities Assessment](#) by joining a [working team](#). The forum aims to address the challenges in model-data comparisons and evaluate the current state of space environment predictive capabilities. International [CCMC-LWS Working Meeting](#) is part of the unfolding activities of this forum, however attendance in the meeting is NOT necessary for all who wish to participate in the forum. >>[Forum info](#) | [Forum SIGN UP](#) | [Forum teams](#)

International CCMC-LWS Working Meeting

The [Working Meeting](#): "Assessing Space Weather Applications and Understanding" to be held on April 3-7, 2017 in Cape Canaveral, FL, will address the need to quantify and track progress in the field of space weather over time and to establish internationally recognized metrics meaningful to end-users and developers. >>[find out more](#)

Space Weather REDI Bootcamp 2017



Summer SW REDI Bootcamp will be held on **June 6-16, 2017** at NASA GSFC. You can attend one week of the bootcamp, two full weeks or individual days. The first week of bootcamp will acquaint you with the basics of space weather and forecasting. The second week offers demos of CCMC tools and discussions with GSFC scientists about your research. Learn more [about the Bootcamp](#) and find out more about the [SW REDI initiative](#).

CCMC student contest 2017

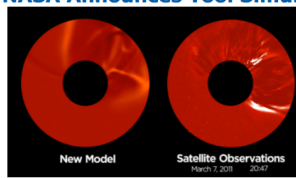
The CCMC invites students who have used CCMC tools and services in a research project or as a part of coursework to participate in its [fifth student research contest](#). Contest categories include Solar, Magnetosphere, Ionosphere and Space Weather. Application deadlines are **March 26, 2017** for Space Weather category, and **May 1, 2017** for the other categories.

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



NASA Announces Tool Simulating Solar Storms



CCMC is hosting EEGGL, a new tool which helps map out the paths of a Coronal Mass Ejection (CME) and determine magnetic configuration it will have when it arrives at Earth. EEGGL is part of a much larger [new model](#) of the corona and interplanetary space developed by a team at the University of Michigan ([Igor Sokolov](#), [Bart van der Holst](#), [Meng Jin](#), [Ward Manchester](#), [Gabor Toth](#) and [Tamas Gombosi](#)). Visualization of the CME modeling includes native SWMF visualization of the CME propagation in the solar corona as [synthetic coronagraph images](#) correspondent to SOHO LASCO C2 and C3 instruments. >>[Read NASA](#)

[press release](#) | [EEGGL Tool](#) | [About SWMF AWSOM_R model](#)

New CCMC service: DONKI webservice API

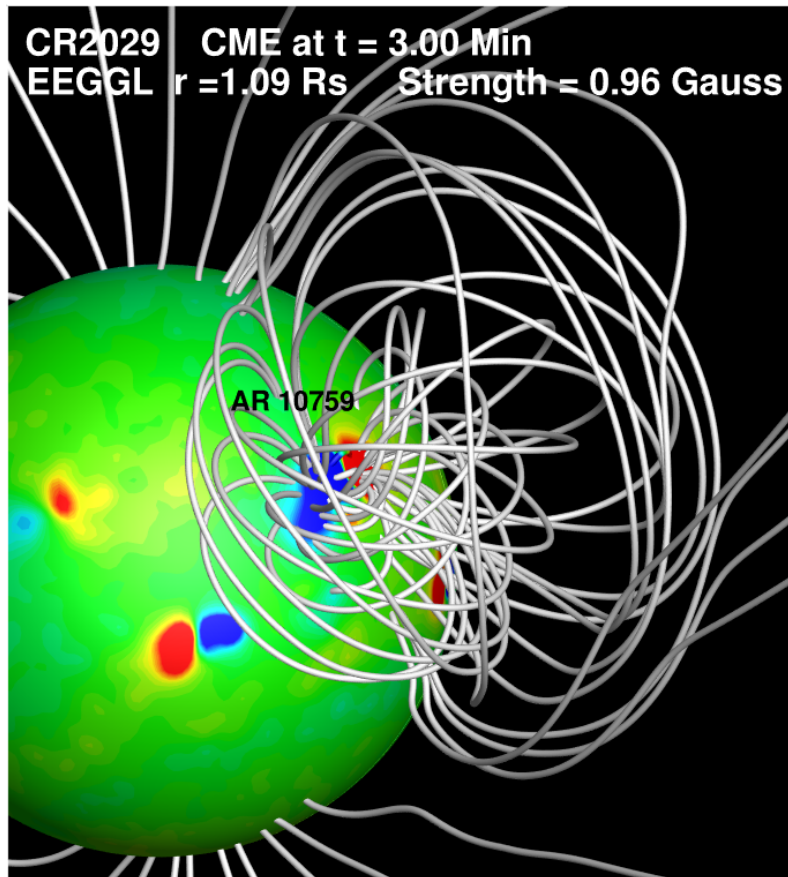
New DONKI webservice API is now available for anyone who wants to obtain space weather events info stored in our database! Space Weather Database Of Notification, Knowledge, Information ([DONKI](#)) is an on-line tool for space weather forecasters, scientists, and the general space weather community. >>[About Space Weather Database](#) | [DONKI webservice API](#) | [ISWA webservice API](#)

SEP Scoreboard

CCMC is in the planning phase of a community "SEP scoreboard" together with BIRA-IASB and the UK Met Office. The scoreboard will show SEP forecasts from different types of models side-by-side. Click [here to learn more](#) or to [join the planning](#).

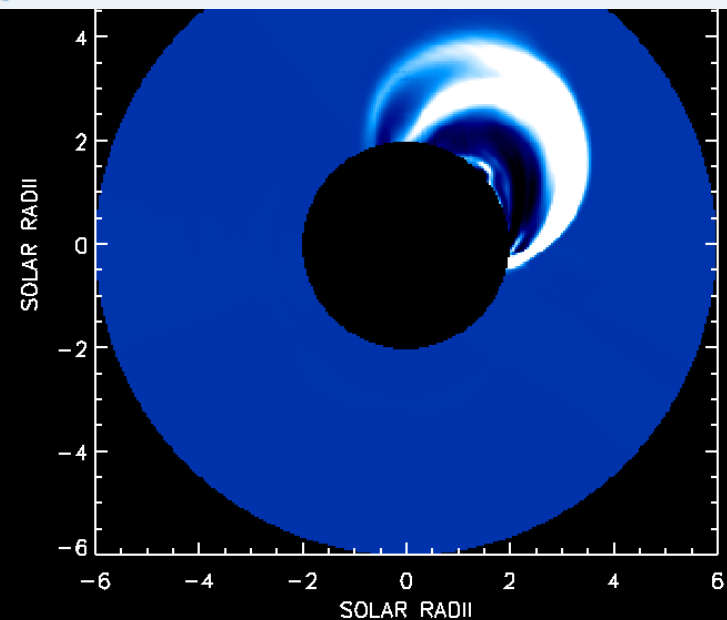
Flare Scoreboard

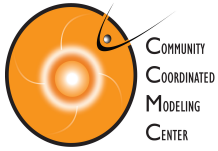
Ambient+SWMF/AWSoM-R + StereoCAT+EEGGL+ + CME + Synthetic Images +



- ☐ AIA on board of SDO, XRT on HINODE
- ☐ EIT on board of SOHO
- ☒ C2 LASCO coronagraph on SOHO
- ☐ C3 LASCO coronagraph on SOHO
- ☐ eclipse as viewed from Earth at full solar eclipse

☐ REQUEST 3D MODEL OUTPUT

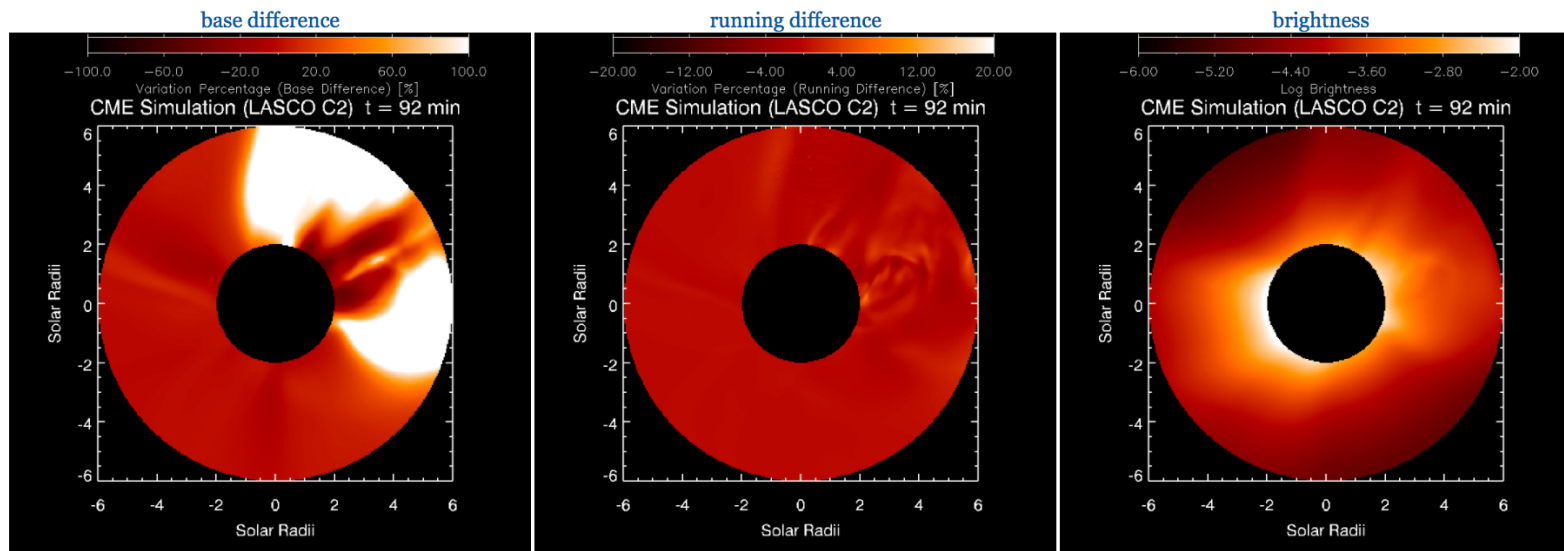




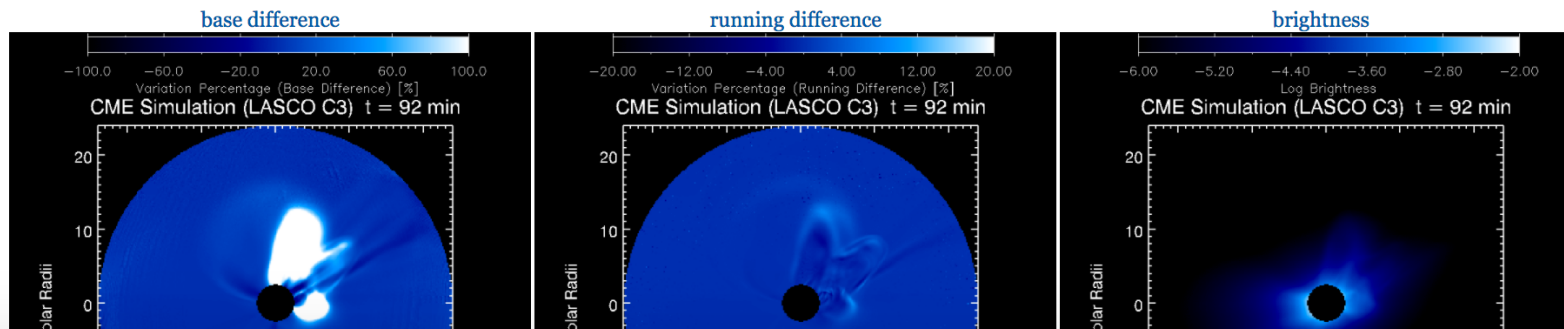
The results page

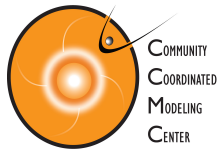
- Synthetic LASCO C2 coronagraph images - base difference
- Synthetic LASCO C2 coronagraph images - running difference
- Synthetic LASCO C2 coronagraph images - brightness
- Synthetic LASCO C3 coronagraph images - base difference
- Synthetic LASCO C3 coronagraph images - running difference
- Synthetic LASCO C3 coronagraph images - brightness

Synthetic LASCO C2 coronagraph movies:

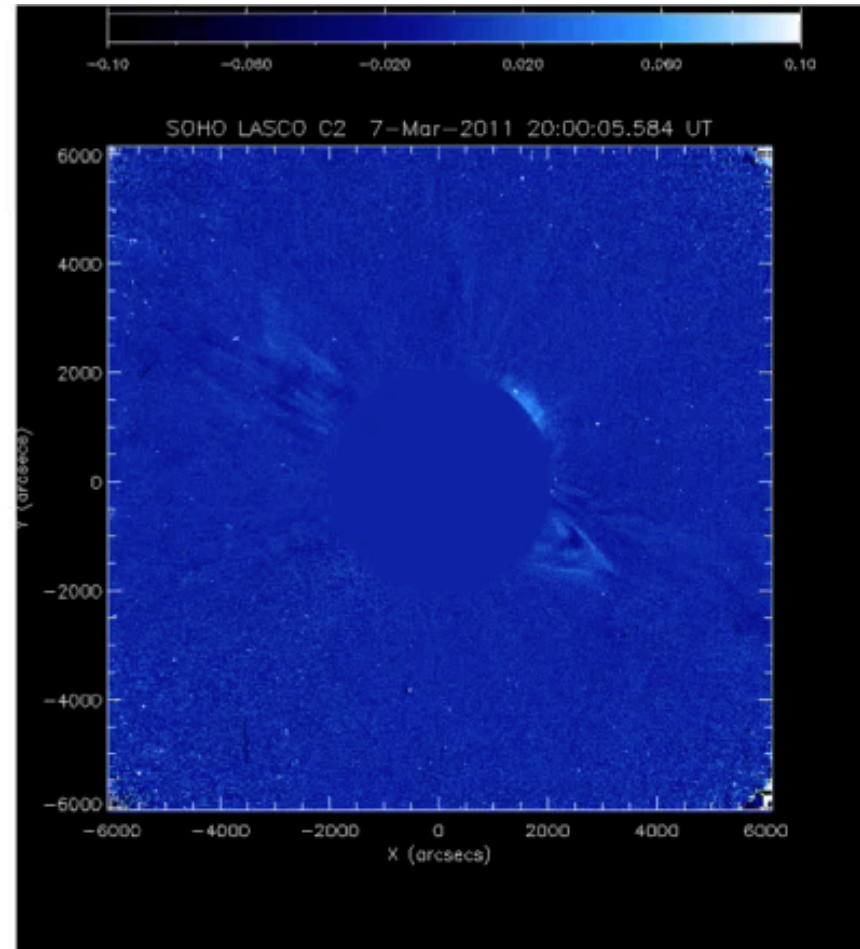
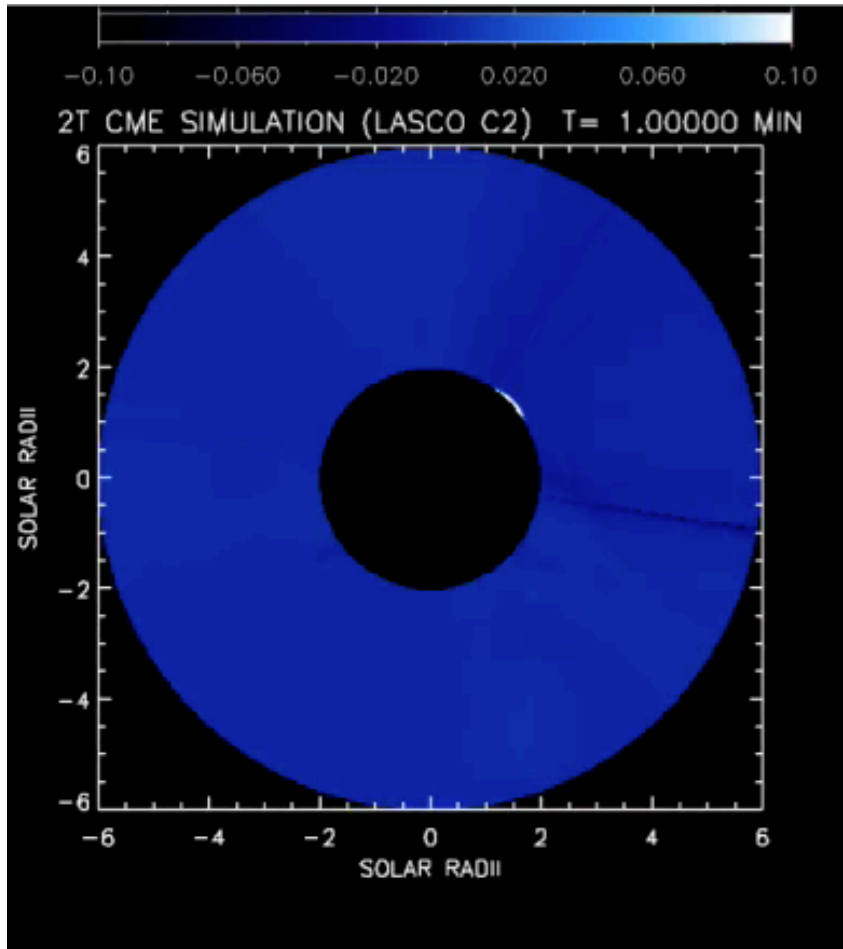


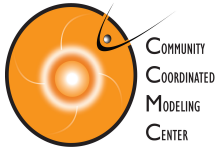
Synthetic LASCO C3 coronagraph movies:



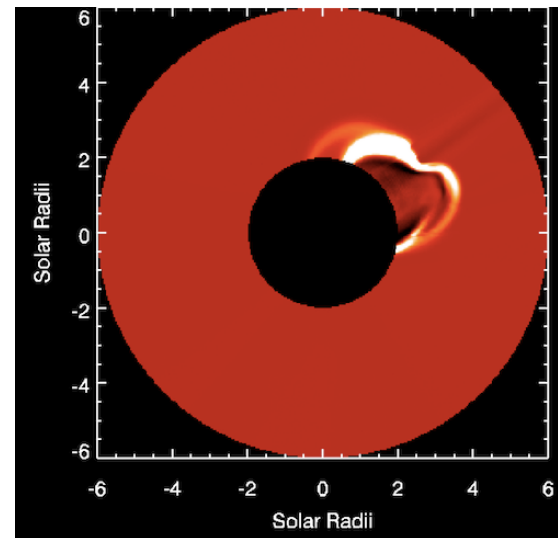
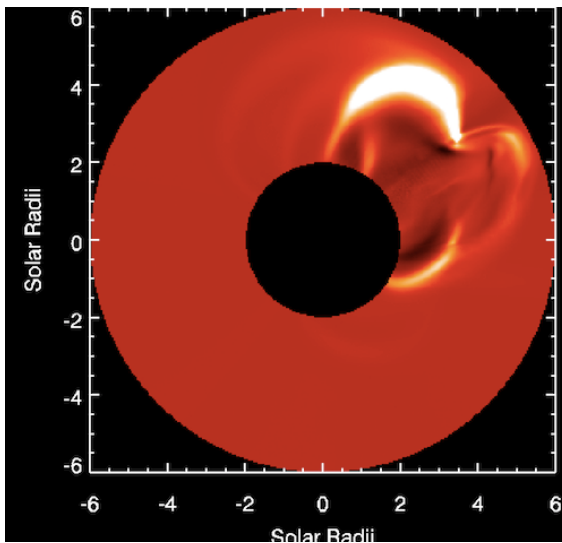
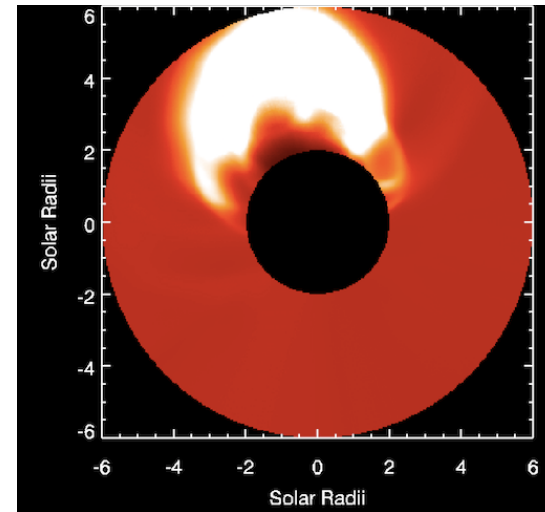
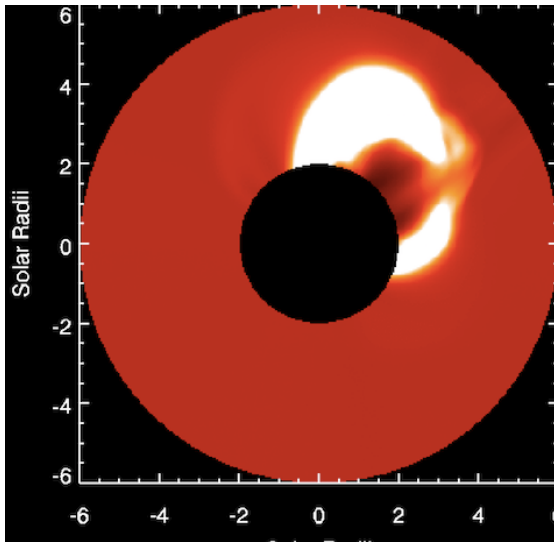


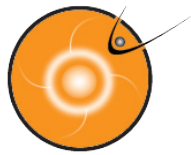
Example of Synthetic Coronagraph Movie + Observations





Example of Synthetic Coronagraph Images





Opportunity to use SWMF as a testbed for planning new missions

- Use AWSoM-R (or other global models) to simulate 3D CME eruption (at solar surface), evolution (in the corona) and propagation.
- Simulate different shapes, forms, dynamics.
- Generate synthetic (2D) coronagraph observations from L1 and L5 view points.
- Simulated synthetic observations are then used as an input to different reconstruction techniques that will attempt to “build back” the 3D event
- 3D output of simulations are used as a “ground truth”.
- Implement different scatter functions, etc. to simulate different aspects of planned instruments. Polarizing coronagraph synthetic images?
- Goal: Get ready to implement new experimental observations.

CCMC-International <http://ccmc.gsfc.nasa.gov/ccmci>

CCMC-I is a self-organizing **forum for facilitating global initiatives** on space weather research, development, forecasting & education

Approach: Forming dynamic international Working Teams

Keys to success: Creating flexible environments and engaging motivated groups and individuals committed to active participation

OVERVIEW

VISION &
GOALS

PARTICIPANTS

MEETINGS

INITIATIVES

International Forum on Space Weather Capabilities Assessment

International Research, Education & Development Initiative
(IREDI)
under construction

Building towards a global network of distributed web-based resources for space weather research & development.

The Forum brings together space environment experts, models developers, data providers, forecasters and end-users to

- establish **internationally recognized metrics** that are meaningful and informative to end-users, developers, and decision makers;
- evaluate the **current state** of space environment models, applications and forecasting techniques;
- facilitate **communications** between forecasters and researchers;
- **address challenges** in data-model comparison
- **quantify and track progress** over time





Ongoing International Initiatives (example) Led by CCMC and European Expert Groups: Testing Predictive Capabilities Before Event Onset



- Collecting and displaying event forecasts from multiple models in **Forecasting Methods Scoreboards**
- Generate experimental international community-wide ensemble forecasts.
- Demonstrate operational potential to users.



CME Scoreboard

Leads: **CCMC** (L. Mays)



Flare Scoreboard

Leads: **ROB** (J. Adries)
Trinity College Dublin (S. Murray)

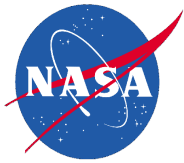


SEP Scoreboard

Leads: **BIRA-IASB** (M. Dierckxsens, N. Crosby)
UK Met Office (M. Marsh)

> 20 participating
models /
expert groups
world-wide





International CCMC – LWS Workshop



Assessing of Space Weather Understanding & Applications

When: April 3-7, 2017

Where: Cape Canaveral, FL

Define internationally recognized metrics that are meaningful and informative to end-users & developers.

Evaluate current state and develop a procedure to trace progress over time.

A part of the unfolding activities of the International Forum for Space Weather Capabilities Assessment

Assemble dynamic international teams for each focused evaluation topic.

Hands-on working sessions. Discussions. Deliverables.

SUPERTOPIC: QUANTIFYING SCIENTIFIC PROGRESS

CCMC facilitator: Barbara Thompson

- **Assessment of Understanding and Quantifying Progress Toward Science Understanding and Operational Readiness**
(Leads: A. Halford, Steven Morley, Adam Kellerman, B. Thompson)

SOLAR

CCMC facilitator: P. Macneice

- **Solar Flare Prediction** (Scoreboard Lead: S. Murray) SSA-0, SSA-6
- **Coronal Structure** (Lead: P. Macneice) SSA-?
- **3D CME kinematics and topology** (Leads: B. Thompson, C. Moestl TBC) SSA-?
- **Solar Indices** (Leads: P. Chamberlin, K. Muglach) SSA-0
- **Coronal hole identification and boundaries** (Leads TBD)

GEOSPACE: Geomagnetic Environment

CCMC facilitators: L. Rastaetter

- **Ground Magnetic Perturbations: dBdt, delta-B, GICs, FACs** SSA-1
(Leads: D. Welling, H. Opgenoorth, C. Ngwira)
- **Geomagnetic Indices** (Leads: M. Liemohn) SSA-1
- **Magnetic perturbations at geosynch. orbit** (Leads TBD) SSA-1
- **Magnetopause location and geosync. orbit crossing** SSA-1
(Leads: Y. Collado-Vega, M. Kuznetsova)

HELIOSPHERE

CCMC facilitators: M.L. Mays, A. Taktakishvili, P. Macneice

- **Solar Wind Structure** (Leads: P. Macneice) SSA-?
- **Ambient Solar Wind** L1, STA, STB, Ulysses, other SC; SIRs SSA-?
(Leads: L. Jian, P. Macneice)
- **CME Arrival Time** (Leads: M.L. Mays, A. Taktakishvili, C. Verbeke) SSA-1
- **IMF Bz at L1** (Leads: N. Savani, P. Riley) SSA-1
- **SEPs** (Leads: M. Marsh, M.L. Mays; Scoreboard Lead: M. Dierckxens) SSA-3, SSA-6

GEOSPACE: Auroral Region

CCMC facilitator: M. Kuznetsova

- **Auroral boundaries and viewing locations** (Leads: B. Kosar TBC, Y. Zhang TBC)
- **Auroral precipitation and high latitude ionosphere electrodynamics** (Leads: TBD, R. Robinson TBC, J. Shim)

RADIATION

CCMC facilitator: Yihua Zheng, M. Kuznetsova

- **Surface Charging** keV electrons, plasma density SSA-6
(Leads: J. Minow, A. Gloer TBC)
- **Internal Charging** keV–MeV electrons SSA-6
(Leads: P. O'Brien, Y. Shprits)
- **Single Event Effects** MeV–GeV protons, ions SSA-3, SSA-6
(Leads: A. Varotsou TBC, M. Xapsos TBC, J. Mazur)
- **Total Dose** keV–MeV electrons, keV–GeV protons, GCR ions SSA-6
(Leads: M. Xapsos TBC, T. Guild, K. Tobiska TBC)
- **Radiation effects for aviation** SSA-6
(Leads: K. Tobiska TBC, M. Meier TBC)

IONOSPHERE

CCMC facilitators: J. S. Shim, M. Kuznetsova

- **Neutral Density and Orbit Determination at LEO** SSA-2
(Leads: S. Solomon, T. Fuller-Rowell, S. Bruinsma)
- **Global & Regional TEC** SSA-4
(Leads: L. Scherliess, R. Calfas)
- **Local Electron Density: NmF2/foF2, HmF2, TEC** SSA-5
(Leads: I. Tsagouri, M. Angling, J. Shim)
- **Ionosphere Scintillation and Plasma bubbles** SSA-5
(Leads TBD)

INFORMATION ARCHITECTURE

CCMC facilitator: Chiu Wiegand

- **Information Architecture for Interactive Archives (IAIA)** (Leads: C. Wiegand, D. Heynderickx, D. De Zeeuw, T. King)

SPASE metadata implementation

SUPERTOPIC: QUANTIFYING SCIENTIFIC PROGRESS

CCMC facilitator: Barbara Thompson

- Assessment of Understanding and Quantifying Progress Toward Science Understanding and Operational Readiness
(Leads: A. Halford, Steven Morley, Adam Kellerman, B. Thompson)

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- Geomagnetic Indices (Leads: M. Liemohn) SSA-1
- Magnetic perturbations at geosynch. orbit (Leads TBD) SSA-1
- Magnetopause location and geosynch. orbit crossing SSA-1
(Leads: Y. Collado-Vega, M. Kuznetsova)

HELIOSPHERE

CCMC facilitators: M.L. Mays, A. Taktakishvili, P. Macneice

- Solar Wind Structure (Leads: P. Macneice) SSA-?
- Ambient Solar Wind L1, STA, STB, Ulysses, other SC; SIRs SSA-?
(Leads: L. Jian, P. Macneice)
- CME Arrival Time (Leads: M.L. Mays, A. Taktakishvili, C. Verbeke) SSA-1
- IMF Bz at L1 (Leads: N. Savani, P. Riley) SSA-1
- SEPs (Leads: M. Mays, M.L. Mays, Scoreboard Lead: M. Dierckxens) SSA-3, SSA-6

GEOSPACE: Auroral Region

CCMC facilitator: M. Kuznetsova

- Auroral boundaries and viewing locations (Leads: B. Kosar TBC, Y. Zhang TBC)
- Auroral precipitation and high latitude ionosphere electrodynamics (Leads: TBD, R. Robinson TBC, J. Shim)

RADIATION

CCMC facilitator: Yihua Zheng, M. Kuznetsova

- Surface Charging keV electrons, plasma density SSA-6
(Leads: J. Minow, A. Gloer TBC)
- Internal Charging keV–MeV electrons SSA-6
(Leads: P. O'Brien, Y. Shprits)
- Single Event Effects MeV–GeV protons, ions SSA-3, SSA-6
(Leads: A. Varotsou TBC, M. Xapsos TBC, J. Mazur)
- Total Dose keV–MeV electrons, keV–GeV protons, GCR ions SSA-6
(Leads: M. Xapsos TBC, T. Guild, K. Tobiska TBC)
- Radiation effects for aviation SSA-6
(Leads: K. Tobiska TBC, M. Meier TBC)

IONOSPHERE

CCMC facilitators: J. S. Shim, M. Kuznetsova

- Neutral Density and Orbit Determination at LEO SSA-2
(Leads: S. Solomon, T. Fuller-Rowell, S. Bruinsma)
- Global & Regional TEC SSA-4
(Leads: L. Scherliess, R. Calfas)
- Local Electron Density: NmF2/foF2, HmF2, TEC SSA-5
(Leads: I. Tsagouri, M. Angling, J. Shim)
- Ionosphere Scintillation and Plasma bubbles SSA-5
(Leads TBD)

INFORMATION ARCHITECTURE

CCMC facilitator: Chiu Wiegand

- Information Architecture for Interactive Archives (IAIA) (Leads: C. Wiegand, D. Heynderickx, D. De Zeeuw, T. King)

SPASE metadata implementation

SUPERTOPIC: QUANTIFYING SCIENTIFIC PROGRESS

CCMC facilitator: Barbara Thompson

- **Assessment of Understanding and Quantifying Progress Toward Science Understanding and Operational Readiness**
(Leads: A. Halford, Steven Morley, Adam Kellerman, B. Thompson)

SOLAR

CCMC facilitator: P. Macneice

- **Solar Flare Prediction** (Scoreboard Lead: S. Murray) SSA-0, SSA-6
- **Coronal Structure** (Lead: P. Macneice) SSA-?
- **3D CME kinematics and topology** (Leads: B. Thompson, C. Moestl TBC) SSA-?
- **Solar Indices** (Leads: P. Chamberlin, K. Muglach) SSA-0
- **Coronal hole identification and boundaries** (Leads TBD)

GEOSPACE: Geomagnetic Environment

CCMC facilitators: L. Rastaetter

- **Ground Magnetic Perturbations: dBdt, delta-B, GICs, FACs** SSA-1
(Leads: D. Welling, H. Opgenoorth, C. Ngwira)
- **Geomagnetic Indices** (Leads: M. Liemohn) SSA-1
- **Magnetic perturbations at geosynch. orbit** (Leads TBD) SSA-1
- **Magnetopause location and geosynch. orbit crossing** SSA-1
(Leads: M. Kuznetsova)

HELIOSPHERE

CCMC facilitators: M.L. Mays, A. Taktaki

- **Solar Wind Structure**
- **Ambient Solar Wind**
(Leads: L. Jian, P. M.)
- **CME Arrival Time**
- **IMF Bz at L1** (L)
- **SEPs** (Leads: M.)

...TBC, Y. Zhang TBC)
...dynamics (Leads:

RADIATION

CCMC facilitator: Yihua Zheng, M.

- **Surface Charging** keV electrons
(Leads: J. Minow, A. Gloer TBC)
- **Internal Charging** keV–MeV electrons SSA-6
(Leads P. O'Brien, Y. Shprits)
- **Single Event Effects** MeV–GeV protons, ions SSA-3, SSA-6
(Leads: A. Varotsou TBC, M. Xapsos TBC, J. Mazur)
- **Total Dose** keV–MeV electrons, keV–GeV protons, GCR ions SSA-6
(Leads: M. Xapsos TBC, T. Guild, K. Tobiska TBC)
- **Radiation effects for aviation** SSA-6
(Leads: K. Tobiska TBC, M. Meier TBC)

- **Local Electron Density: NmF2/foF2, HmF2, TEC** SSA-5
(Leads: I. Tsagouri, M. Angling, J. Shim)
- **Ionosphere Scintillation and Plasma bubbles** SSA-5
(Leads TBD)

INFORMATION ARCHITECTURE

CCMC facilitator: Chiu Wiegand

- **Information Architecture for Interactive Archives (IAIA)** (Leads: C. Wiegand, D. Heynderickx, D. De Zeeuw, T. King)

SPASE metadata implementation

New!
L1-L5
CME Properties
Reconstruction
Focused Evaluation Topic