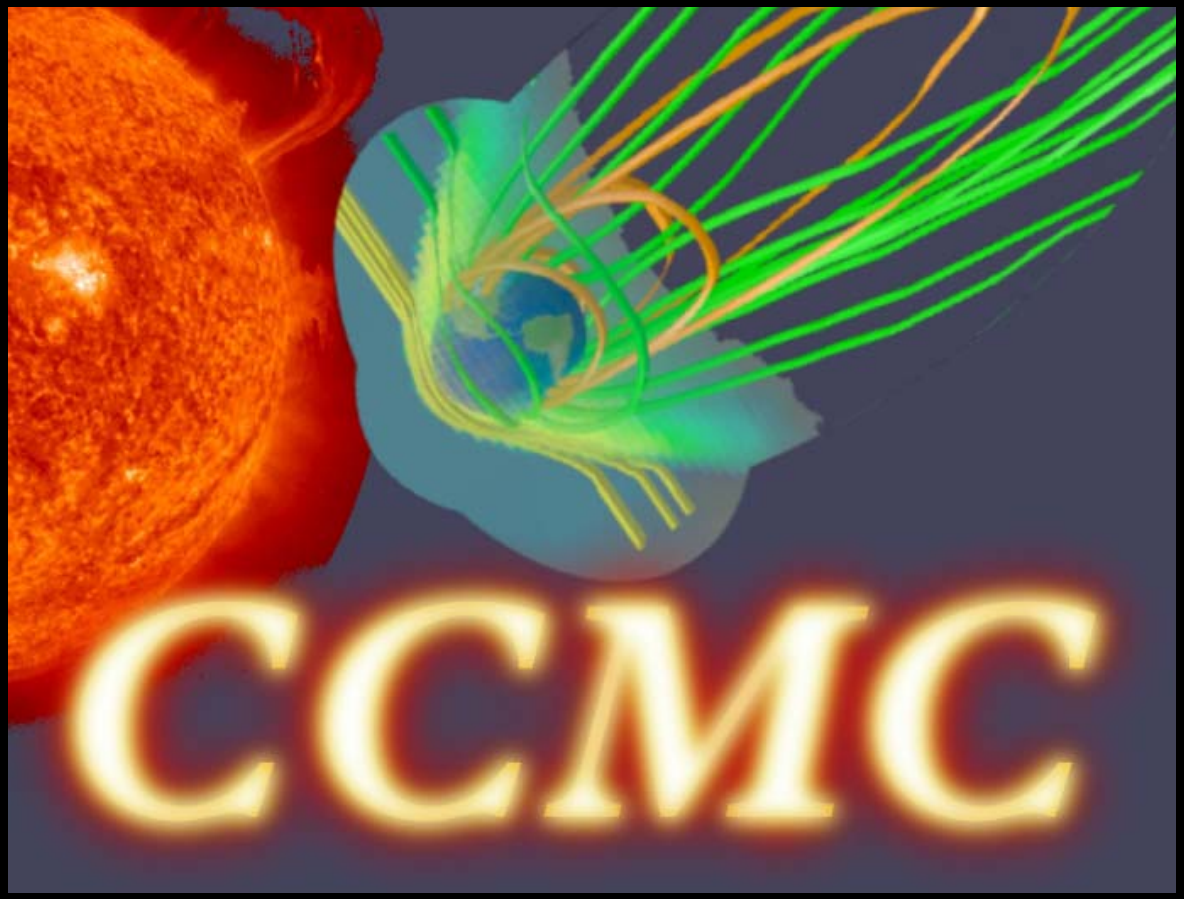
The Community Coordinated Modeling Center
- Status -



Michael Hesse

LWS MOWG, 6/20/2003

COMMUNITY COORDINATED MODELING CENTER

NASA

NSF

AFRL

AF/XOW - AFWA

"A US multi-agency partnership to enable, support, and perform the research and development for next generation space science and space weather models"

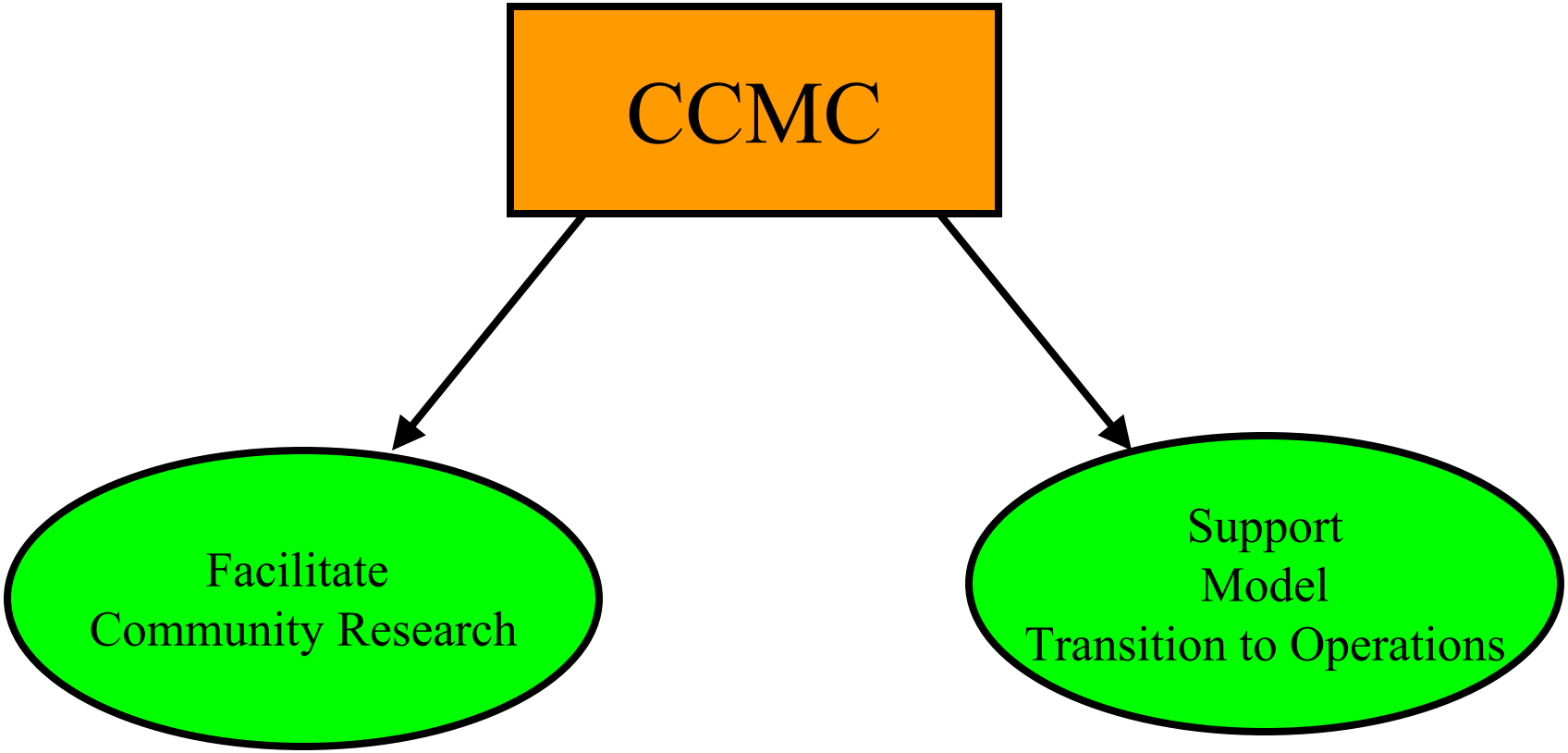
NOAA/SEC

AF SMC/CI

AFOSR

ONR

CCMC Goals


CCMC
Facilitate
Community Research
Support
Model
Transition to Operations

CCMC Goals/Cont'd

- Employ scientific research models to address National Space Weather needs, including LWS
- Generate, with the research community, a flexible model chain, which addresses solar atmosphere to Earth's upper atmosphere
- Serve the research community through access to scientific model results ("open model policy")
- Perform broad-based testing and metrics-based evaluation of research models
- Make available science- and metrics-tested models to operational National Space Weather Agencies

COMMUNITY COORDINATED MODELING CENTER

CCMC

Decision Flow

US National Space Weather Program Council

US Committee for Space Weather

Research Community

recommendations, needs

Operations Community

needs, requirements

CCMC steering committee

directs

informs

CCMC center

at GSFC

CCMC Steering Committee

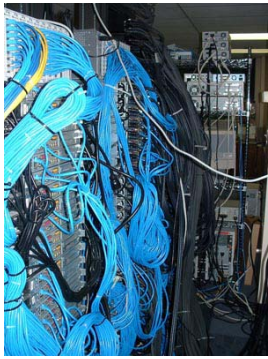
AF/XOW	Maj. Bill Olson (Co-chair)
AFOSR	Maj. Paul Bellaire
AFRL	Dr. Michael Heinemann
NASA/GSFC	Dr. Michael Hesse
NASA Headquarters	Dr. Madhulika Guhathakurta
NOAA	Dr. Terry Onsager
NSF	Dr. Kile Baker (Co-chair)
ONR	Dr. Bob McCoy
SMC/CI	Mr. Kevin Scro (Facilitator)

CCMC Staff

Mr. Sarabjit Bakshi/Sysadmin.
Dr. John Dorelli/NRC postdoc - Raeder code
Ms. Ayris Falasca/Model coupling, WWW
Ms. Mary Goldfarb/WWW management
Dr. Michael Hesse/Director
Ms. Judy Johnson/Visualization
Dr. Kristi Keller/NRC postdoc - metrics
Dr. Masha Kuznetsova/Models, Deputy Director
Mr. Marlo Maddox/Visualization (from 6/03)
Dr. Lutz Rastaetter/Models, validation
Mr. Tom Vollmer/Sysadmin., comp. resources

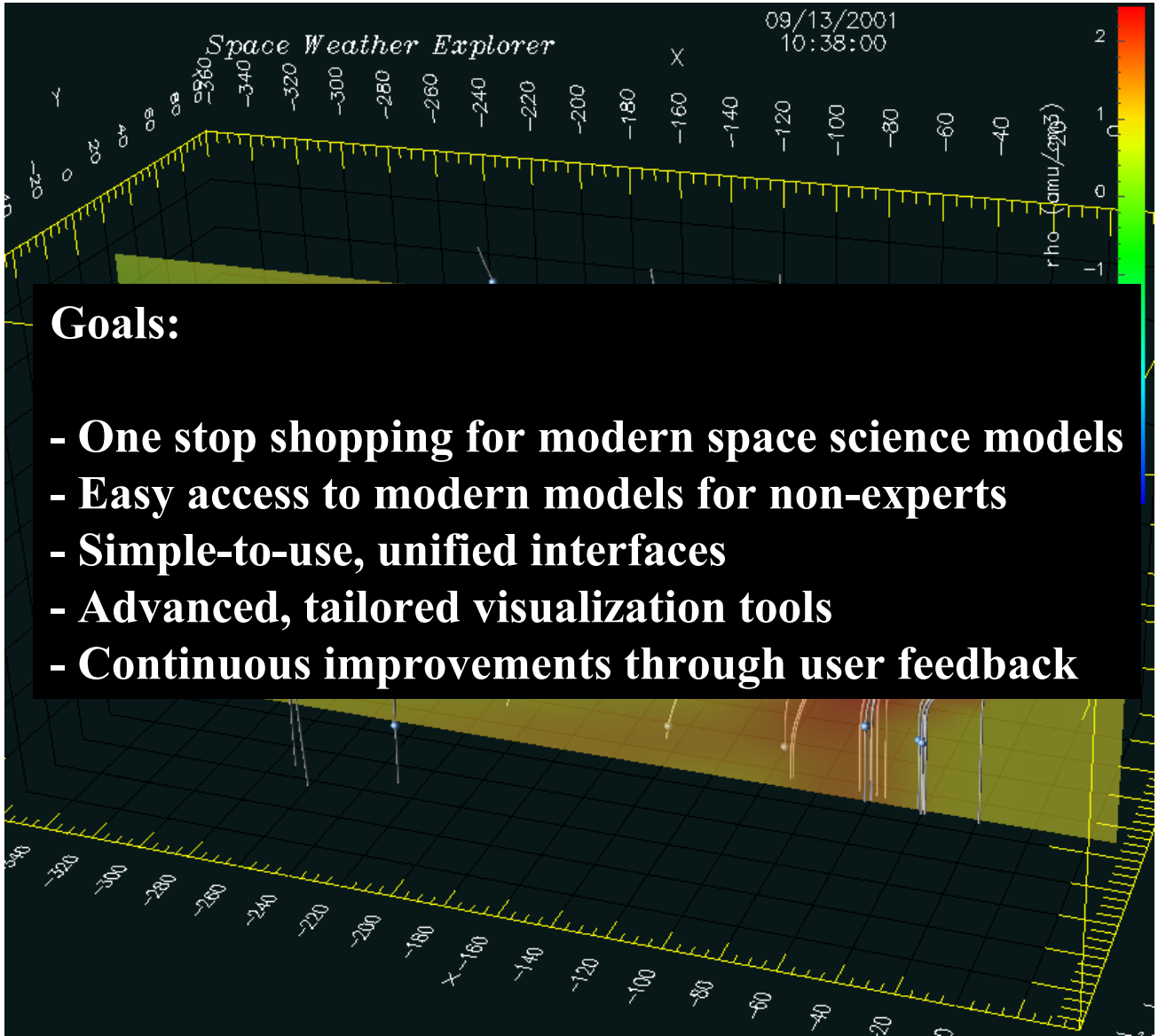
Resource Sharing - Multi-Agency Partnership

AF/XOW:	Computing, Beowulf system
AFOSR:	Computing, Manpower
AFRL:	Computing
NASA:	Facility, Manpower
NOAA/SEC:	Transition to Operations
NSF:	IT Equipment, Manpower
ONR:	Model development
SMC:	Transition to Operations



~200 node Beowulf system,
sponsored by **AF/XOW, NSF, AFOSR**
S. Bakshi, T. Vollmer

CCMC Functions: Research Support



Goals:

- One stop shopping for modern space science models
- Easy access to modern models for non-experts
- Simple-to-use, unified interfaces
- Advanced, tailored visualization tools
- Continuous improvements through user feedback

COMMUNITY COORDINATED MODELING CENTER

Service

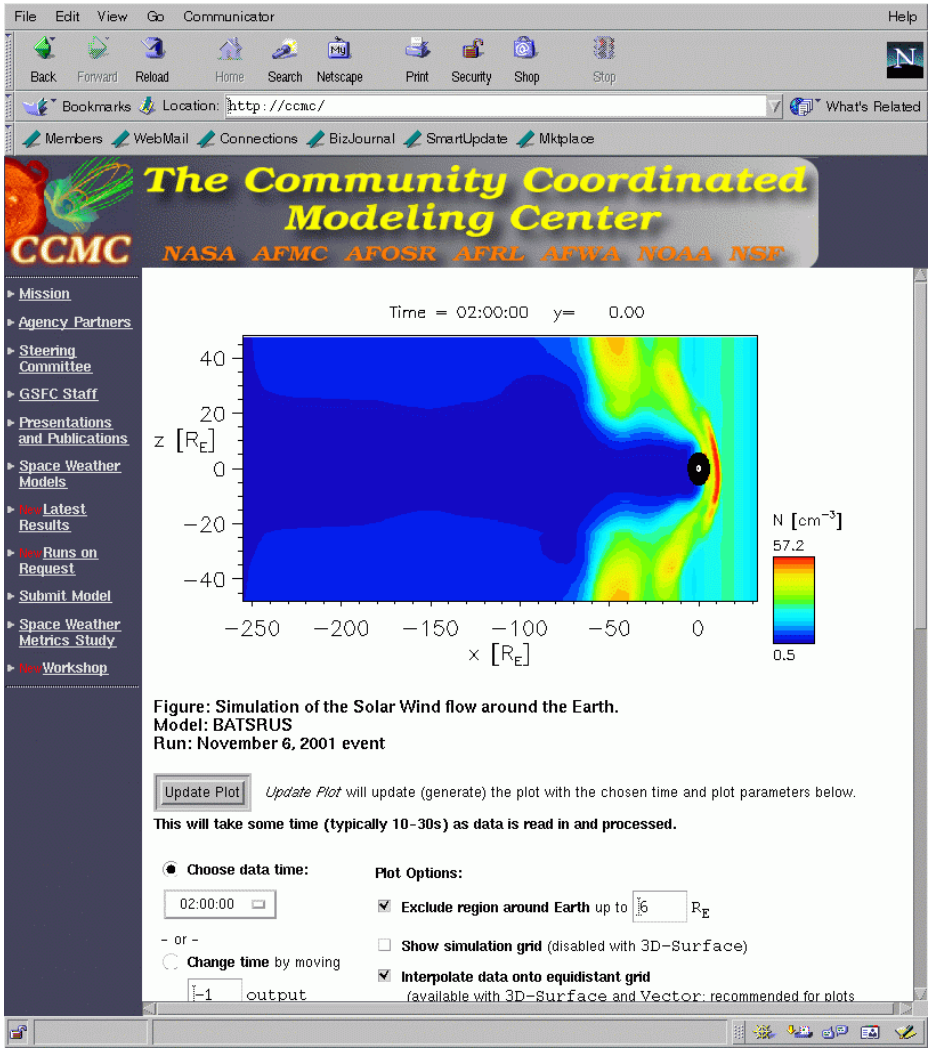
- Through www-accessible run results
- Through runs on request (>120 now)

  Now available for

  - 3 magnetospheric models (UCLA-GGCM, BATSRUS, Fok-RC)
  - 3 ionospheric models (Weimer, SAMI-2, CTIP)

  (addition of solar and helio models underway)

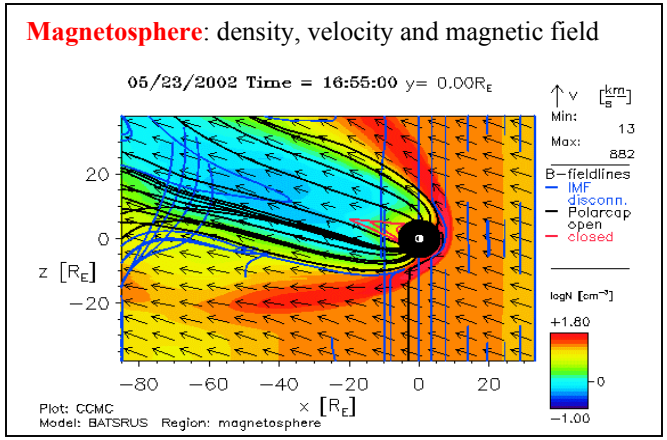
- Real-time magnetospheric models (based on current ACE data)



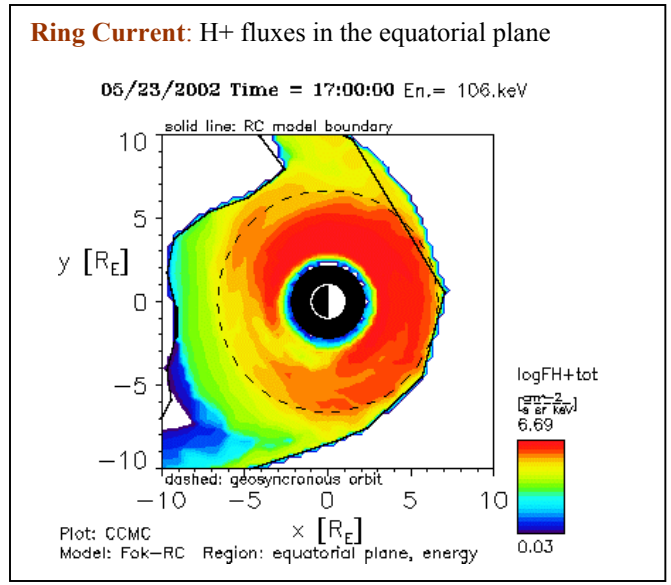
L. Rastaetter, M. Kuznetsova

http://ccmc.gsfc.nasa.gov

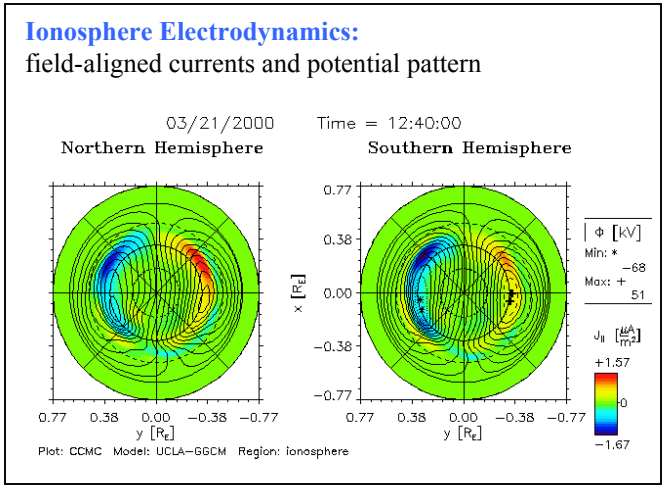
COMMUNITY COORDINATED MODELING CENTER



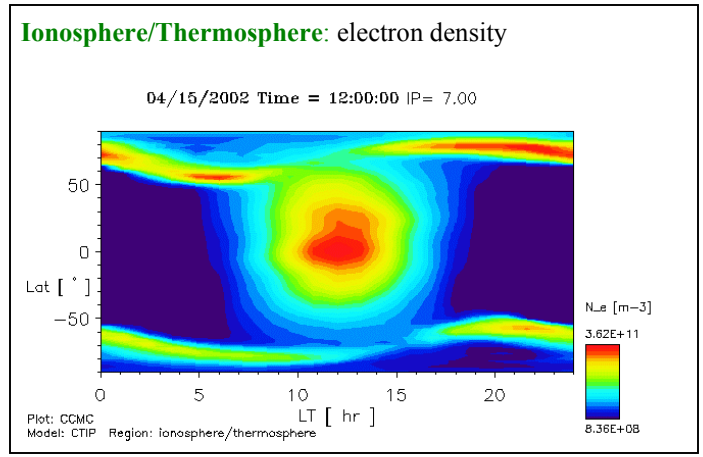
magnetosphere



ring current/radiation belt



high-latitude ionosphere



global ionosphere

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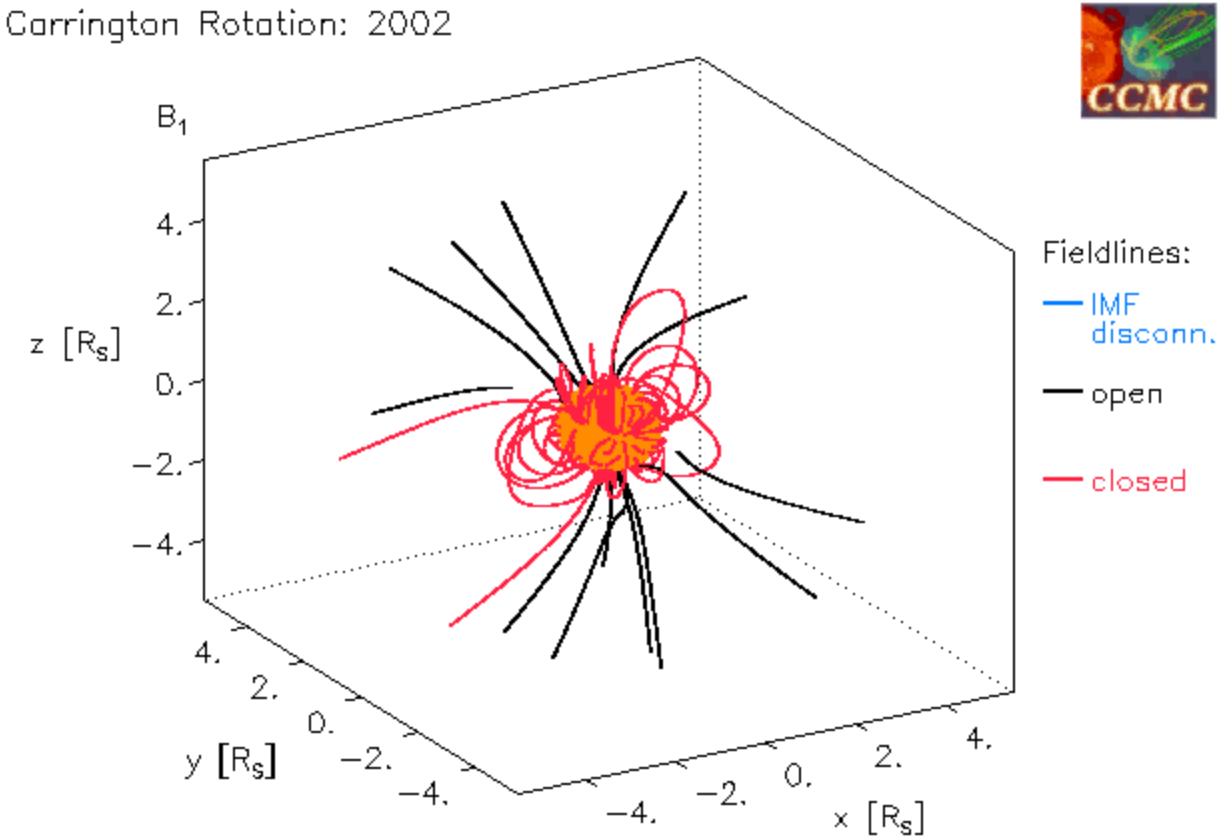
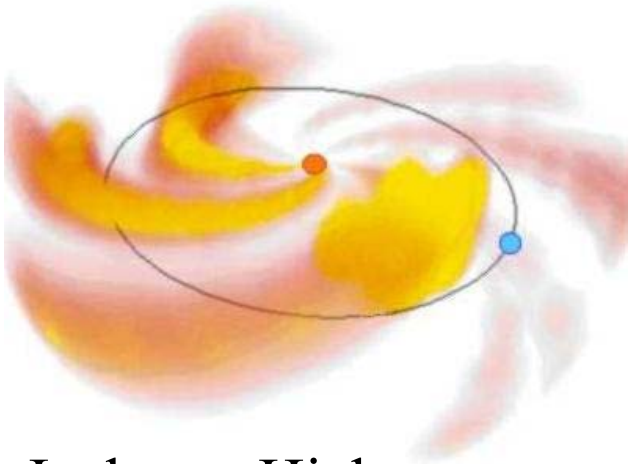


Solar Corona

Mikic, Linker, Riley

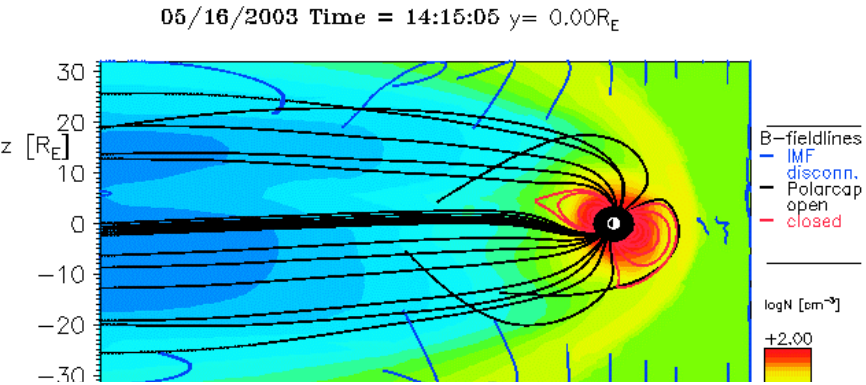


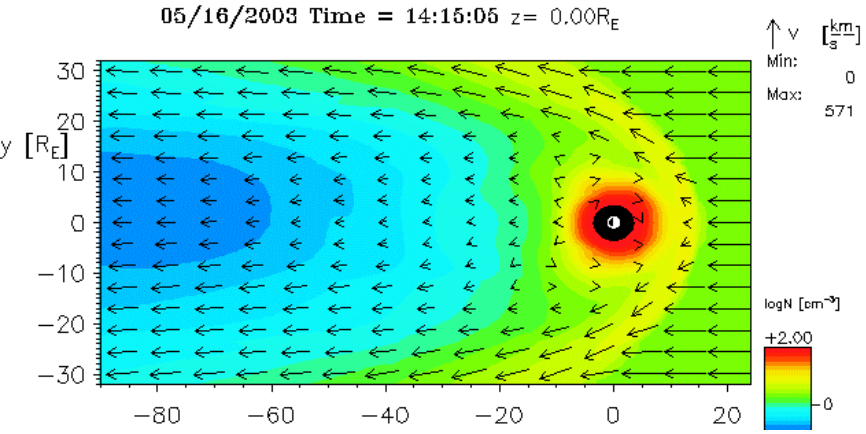
Heliosphere (CME)

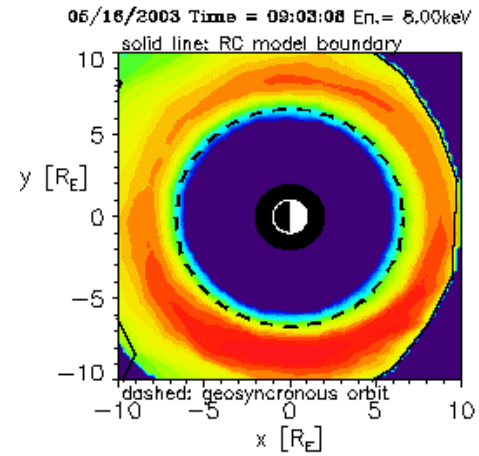
Jackson, Hick

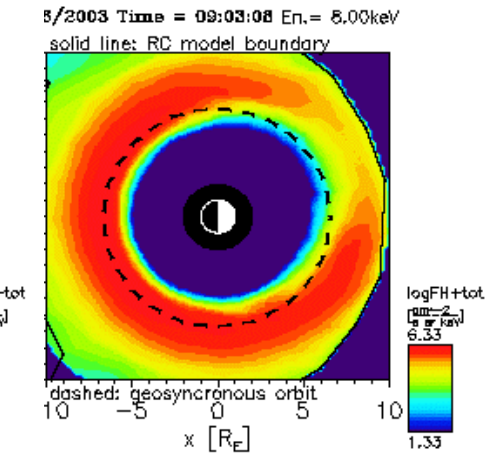
<u>In implementation…</u>

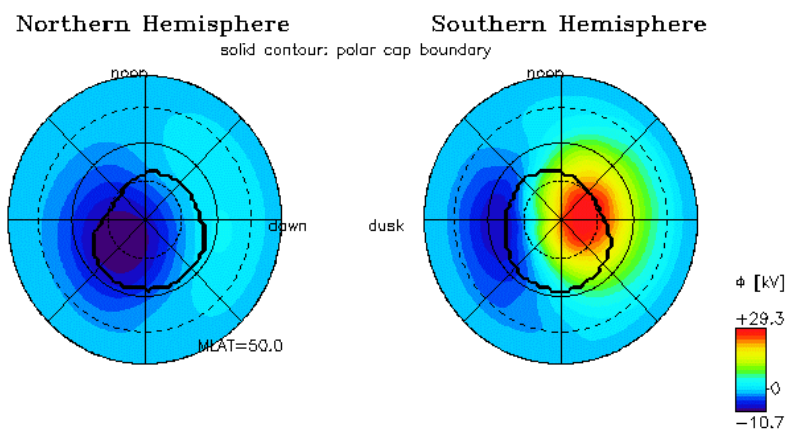
COMMUNITY COORDINATED MODELING CENTER

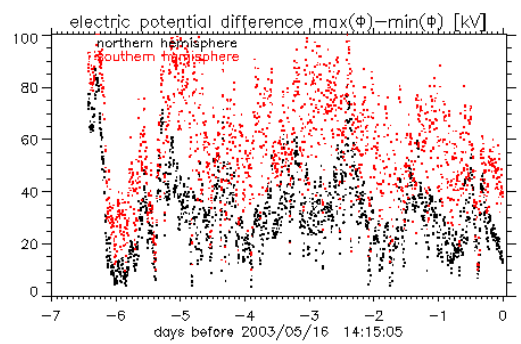


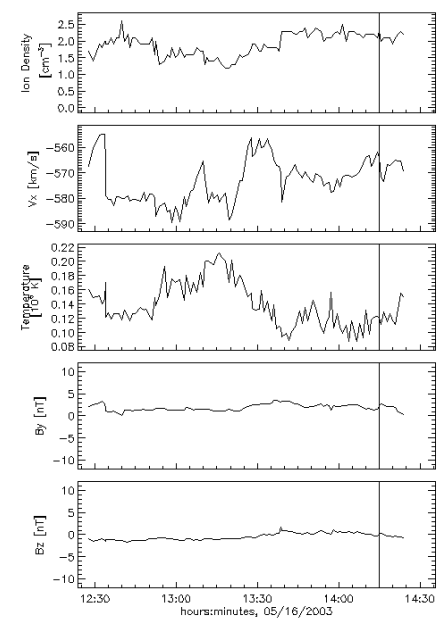






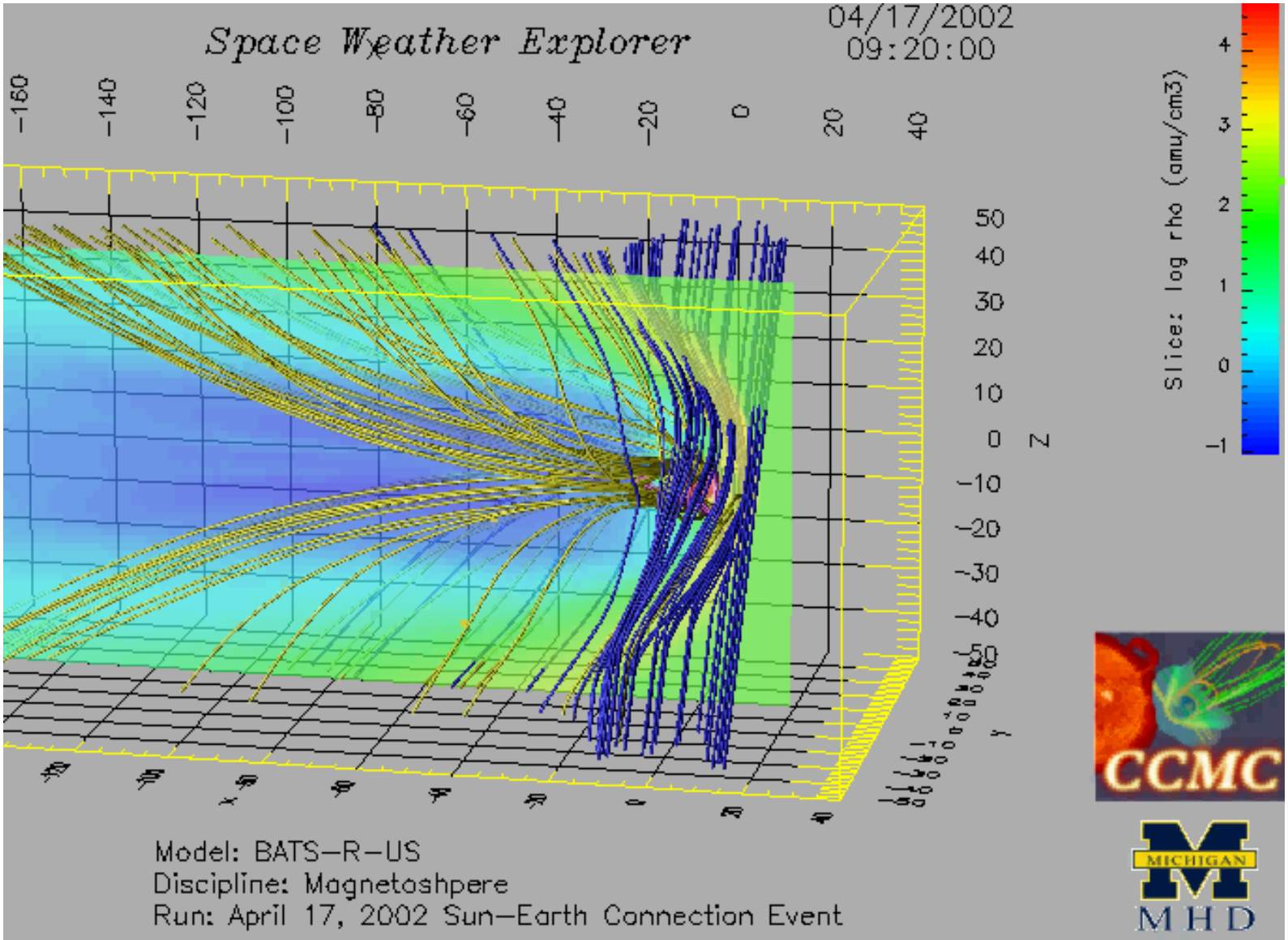






(experimental) real time page

Visualization tools: IDL-based, OpenDx-based



CCMC Functions: Transition to Ops

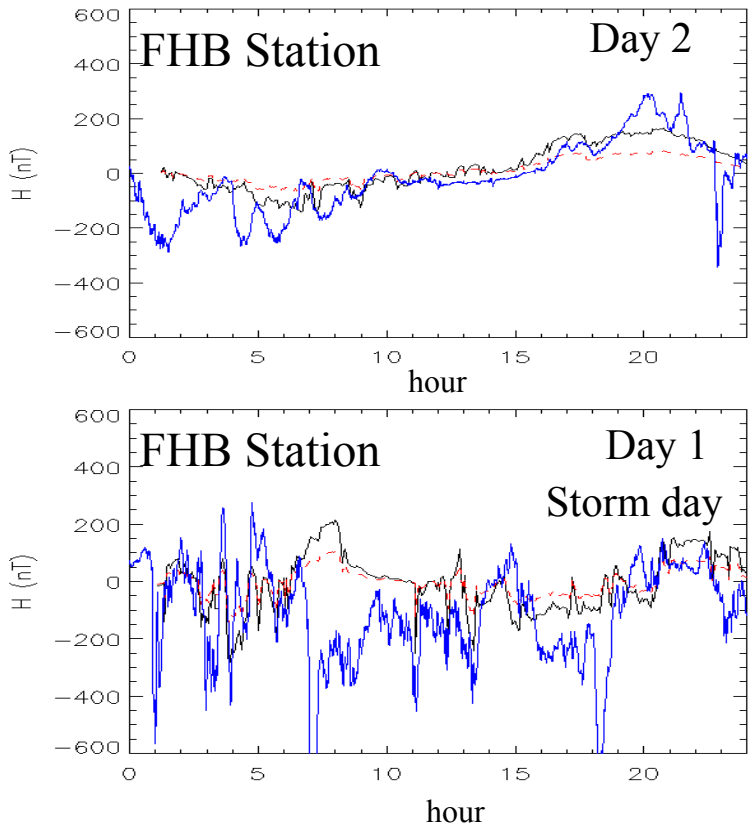
Decision makers and operational agencies need model evaluations

- Science-based validation: Compare model output to measurements for select events, detailed analysis

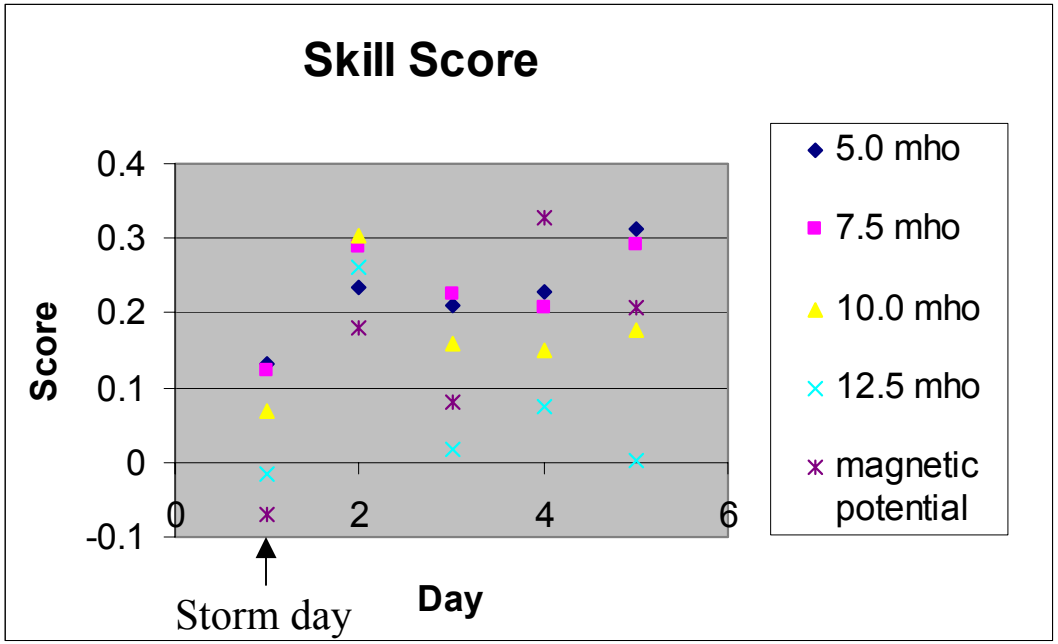
- Metrics studies: Repeatable comparison between model output and measurements, “one number”

Need to be blind studies, performed by independent agent, not model originators

CCMC Functions: Model evaluations - Metrics



Results Averaged Over 10 Stations
(THL SVS UPN GDH STF GHB FHB NAQ NRD SLO)

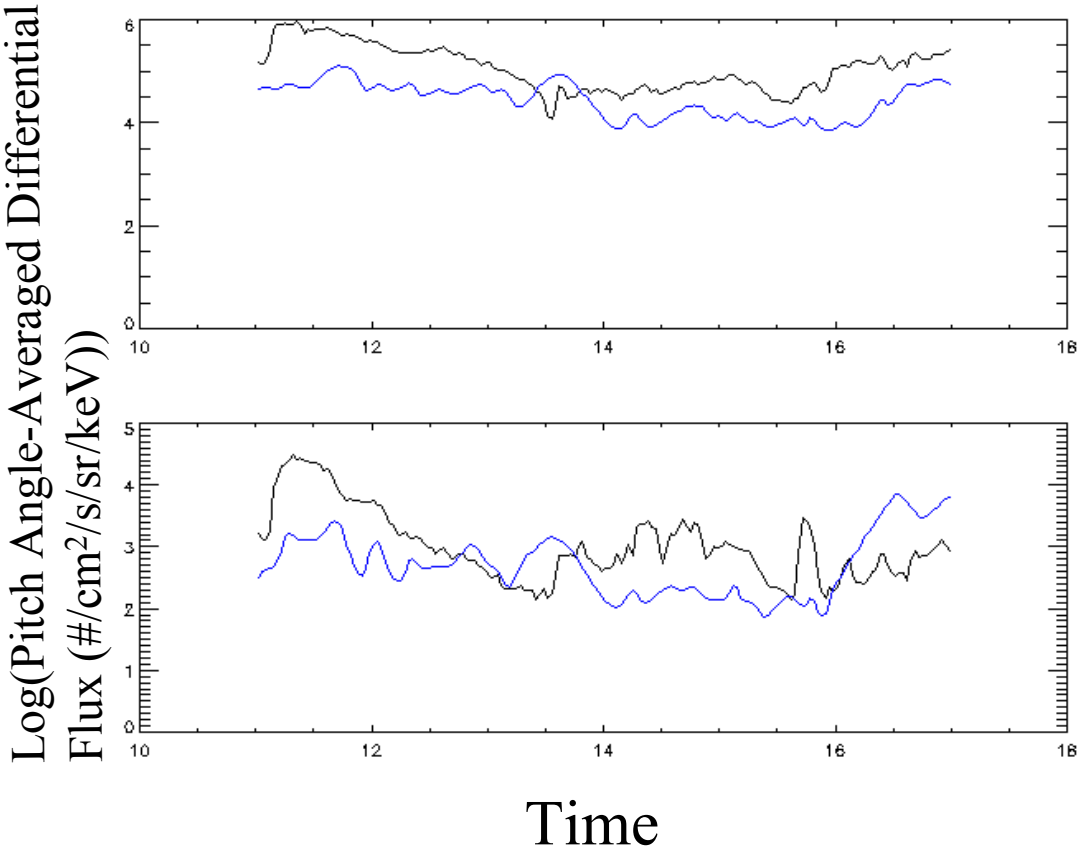


ground magnetic measurements
magnetic perturbations from model (10 mho)
magnetic perturbations from model (5 mho)

...establish absolute measure of model performance

K. Keller

Sample of Ring Current Metric



RMSE Skill Score	Cross Correlation
0.07	.59
-0.01	0.07

Black is LANL data. Blue is the model results.

Geosynchronous proton flux data was provided by the Energetic Particle team at Los Alamos National Laboratory, Richard Belian (PI).

CCMC Successes

- Broad-based access to large suite of modern space science models
- Established run-on-request system (130 runs now)
- Developed www-based visualization and dissemination system for model output
- Real-time web page with magnetospheric models
- Performed metrics evaluations, routine and community-wide
- Transferred 2 models to AF Rapid Prototyping Center, 1 model to NOAA
- Housing USAF Academy summer student
- Interacted closely with research and operational communities

Successful NASA element of interagency partnership

Future Plans

- Support Living With a Star, NSWP, DoD Space Weather Transition Plan
  - Support and undertake the R&D for advanced space weather prediction models
- Collaborate with related activities (CISM, ESA SW program…)
- Provide expanded, independent model evaluations
- Expand strong service to (international) research community
  - Execute runs-on-request using modern space environment models
  - Provide ready access to model output with enhanced tools
- Cover entire SEC domain ("Sun-to-Mud"), multiple models
- Continue and expand model transfer to operational agencies