CCMC –Summary of workshop results

Chaired by Jan J. Sojka

with the Session Chairs and Discussion Leaders.

Final Words

What we heard about

Monday

Director's Report, Agencies' View and Keynote Presentations
CCMC Support for an Evolving LWS Program
R. Robinson and S.Antiochos ---- panel/discussion leader S. Antiochos

Tuesday

Models at CCMC, Model Developers, updates for LWS programs,
And Preparation for LWS deliverables
I. Roussev and R.Walker ---- panel/discussion leaders J. Linker, L. Mays

Wednesday

Mission Science Support, Inner Magnetosphere Models
Research and Education
J. Raeder and T. Moretto ---- panel/discussion leader M. Maddox

Thursday

Space Weather: Applications, Prototyping, Services, Metrics, Validation.
T. Gombosi and J. Harris ---- panel/discussion leader J. Minow, K. Shelton-Mur

Friday

Partnership with research, education and operational institutions
world-wide
I. Mccrea ----- panel/discussion M.Kuznetsova, I. Mccrea

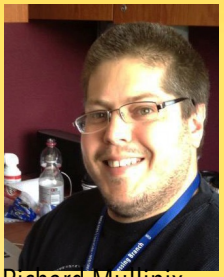
Loud and clear message: congratulations


Sarabjit Bakshi


Anna Chulaki


Michael Hesse


Leila Mays


Richard Mullinix


Masha Kuznetsova


Marlo Maddox


Peter Macneice

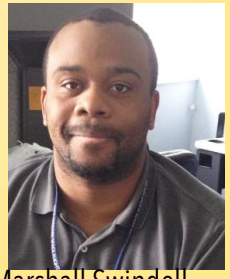

Michelle Mendoza


Kiran Patel


Antti Pulkkinen


Lutz Rastaetter


Ja Soon Shim

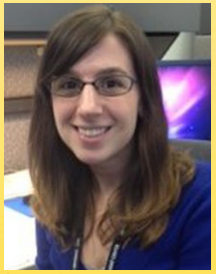

Marshall Swindell


Aleksandre Taktakishvili

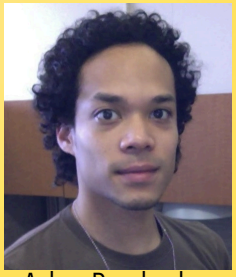

Chiu Wiegand


Yihua Zheng

Postdocs:

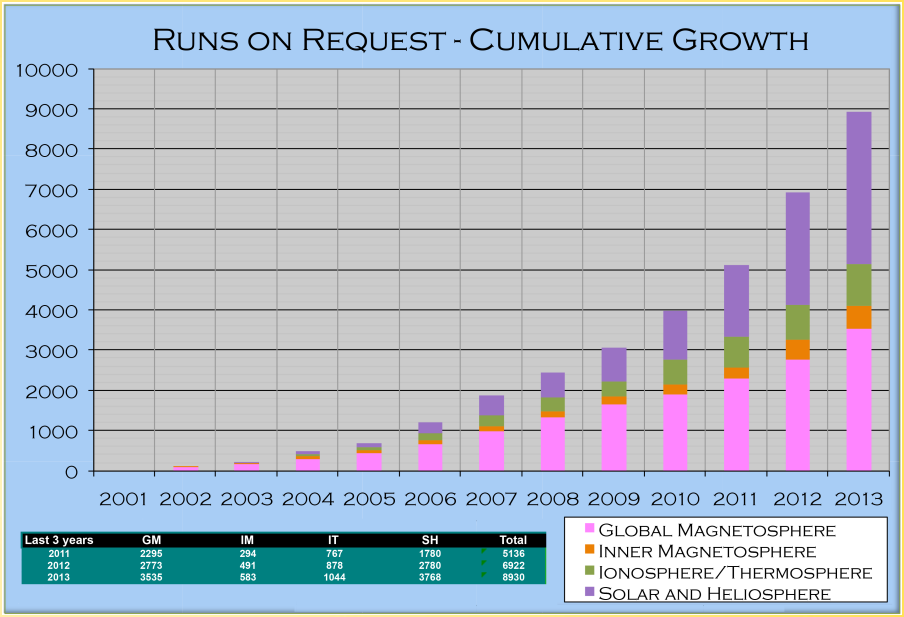

Rebekah Evans


Chigomezyo Ngwira


Asher Pembroke

And what about the CCMC

This graph could be used to represent any of the CCMC Activities:



Last 3 years	GM	IM	IT	SH	Total
2011	2295	294	767	1780	5136
2012	2773	491	878	2780	6922
2013	3535	583	1044	3768	8930

Availability of models
Number of models
Archive of runs
Upgrading models
Research interface to models
Education interface to models
SWRC
Support of NASA missions
Model validation for SW users
International leader in Heliophysics model support
Model Input Observation Archive

First Day Raised the Following for Consideration

The growth of CCMC is viewed by all its stake-holders as excellent.

Each stake-holder can see excellent potential for growth in their arena.

Given that the necessary support for accelerated growth is limited, ie., one example we heard about was the lack of support for model teams to deliver the next generation model, a strategic look at CCMC growth may be prudent.

Perhaps this is the time for CCMC advisory committees to provide constructive advice.

Data Sources I-T-E Assimilation, is CCMC ready?

Table 1. Data Sources that our new Data Assimilation System will assimilate

Ionosphere	Electrodynamics	Thermosphere
Ground-Based GPS-TEC	Ground magnetometers	Satellite UV emissions
Satellite-Based GPS Occultation	DMSP cross-track velocities	In situ neutral densities and winds
Ionosonde and Digisonde	SuperDARN line-of-sight velocities	Satellite accelerometer and drag
In situ N_e	Iridium magnetometers	FPI winds
911Å, 1356Å, limb, disk (UV)	ACE IMF, Dst	ISR Neutral parameters
Solar UV, EUV	Solar UV, EUV	Solar UV, EUV

Black: Data sources already being assimilated; Red: New data sources to be assimilated

Jon Linker provided the following input

Magnetogram discussion:

One liner: "Magnetographs are not Magnetometers"

Magnetic maps (e.g., synoptic maps) are not a measurement. They are a product derived from measurements of polarized light. Their uncertainties go beyond measurement errors, but may involve both random and systematic errors that have not yet been fully quantified.

CCMC resource discussion:
One liner:
Resource provider asks "How much computer time do you need?"
Model developer replies "How much have you got?"

Resource requirements have to be framed around what the minimum acceptable resources are for calculations with different complexity, with the recognition that state-of-the-art calculations that a model developer can perform may not be possible at CCMC, or possible only infrequently. CCMC could consider hosting results from major calculations that have already been performed.

CORHEL Modeling Resource Requirements

Jon Linker, PSI, San Diego, CA

Thermodynamic MHD Runs on MHPCC (similar to NSF Stampede)
Relaxation time of 2 days

Run Name	Resolution	Millions of grid points	# of cores	Wall clock Time	Total CPU Hours
Low	151x101x182	2.8	192	9.4 hours	1800 hours
Medium	181x181x402	13.2	784	17.2 hours	13,500 hours
High	181x251x602	27.3	1680	26.5 hours	45,000 hours

Higher Resolution --> Less Magnetogram Filtering --> Higher Alfven Speed
--> More Difficult Solve

Would like to be able to offer low and medium runs at CCMC

/tmp/PreviewPasteboardItems/Linker_C/
CMC_resources (dragged).pdf

Oops! Masha sent me an excellent plot of cores versus CPU/wall clock for MAS, but in the hands of non-experts this is what happens.

Lt Col Harris provided the following input

One Liner:
Space WX model metrics must be relevant to the purposes of the model validation:

1) Readiness for transition to operations
2) Tracking model improvements (regression)
3) Aid improvements in applied research
4) Aid improvements in basic research or understanding physics.

Space WX model metrics must be included in funding efforts.

Summary: SEP add-ons to existing models

(splinter session 1, Tues 4/1 1:30 – 2:30 pm. M. L. Mays, J. Luhmann)

Description: Making SEP models available for CCMC research and operational users is one of CCMC's top priorities. Heliospheric model outputs are a necessary ingredient for SEP simulations. The CCMC is making steps towards offering a system to run SEP models driven by a variety of heliospheric models available at CCMC.

Discussion summary:

- Discussion on the role of particle loss due to cross field diffusion for SEP fluxes
- Importance of including multiple field lines near the observer
- Challenges in reliably detecting shocks in MHD models
- Agreement on the usefulness of having different SEP models that can be run interchangeably from global heliospheric model outputs.
- Importance of model validation
- CCMC will work with model developers to couple models in this way

Some session contributors included: Dusan Odstrcil, Nathan Schwadron , Igor Sokolov, Leila Mays (for Janet Luhmann)

Report on CCMC/ SWRC and Education Session on Wednesday Afternoon (T. Moretto)

This session illustrated the many facets of the CCMC/SWRC education activities:

1. Courses and classroom use (undergraduate and graduate level)
2. Contributing to summer and winter schools (undergraduate and graduate level)
3. Research projects and internships (high school, undergraduate and graduate level)
4. Student project competition (undergraduate and graduate level)
5. Public outreach (websites and collaboration with American Museum of Natural History on planetarium displays and public movies)
6. Training of spacecraft operators and other users (professionals at various technical levels)
7. Engaging students and scientists in space weather monitoring and in delivering experimental and educational forecast services

On 7: Recognized as a particularly successful way to attract and keep student interest and integrate education and scientific research with the societal need for the development of improved space weather services. Comments:

- Great opportunity for expanded participation nationally as well as internationally
- What is needed to make this happen? Make training easily available (More boot camps or other ways); spread the word (please help); streamlining processes and remote access (building on experiences being collected currently through the existing collaborations with Denmark and Korea)

It was noted that most of the educational activities target the high-end audiences (university).

- There seems to be a great opportunity for CCMC/ SWRC to help fulfill the important (growing) need for broader public education on space weather. The weekly space weather/ solar reports by students and junior staff members that were done for a while are well-suited for this and could be a great resource if resurrected.
- The established collaboration with AMNH is a great starting point with the potential to grow nationally and internationally through established collaborations between planetaria.

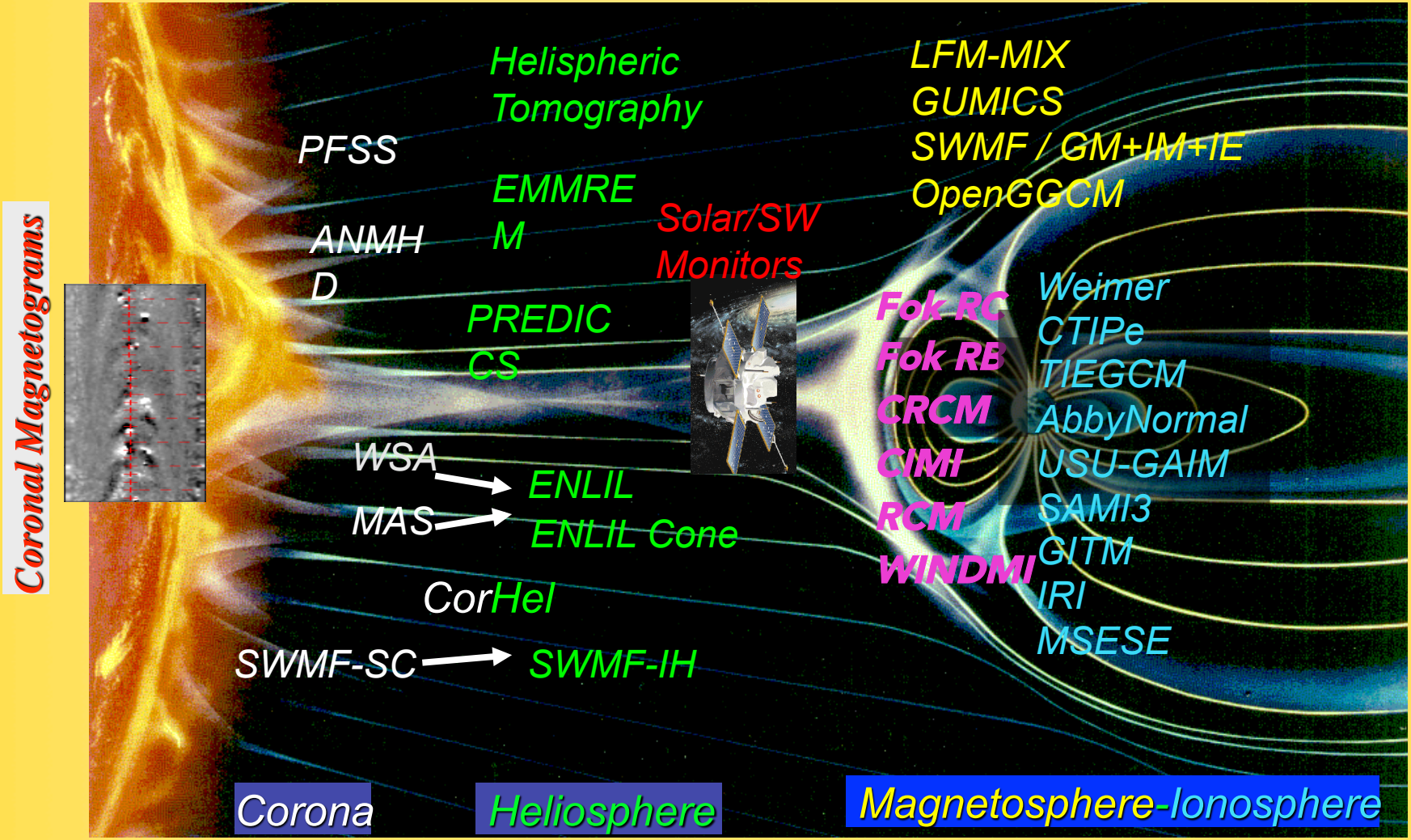
ISWA was not created for education but is becoming an important tool.

- This highlights the need for improved descriptions, documentation, and explanations as part of the iswa system.
- Suggestion for improved search tools to be developed for cygnets, including most used, most popular (include a rating system), last used, etc.
- Recognized need for regular cleaning up and weeding out of obsolete products/ cygnets.

Thank You

Thank You

CCMC today



> 60, from Sun to Earth and beyond