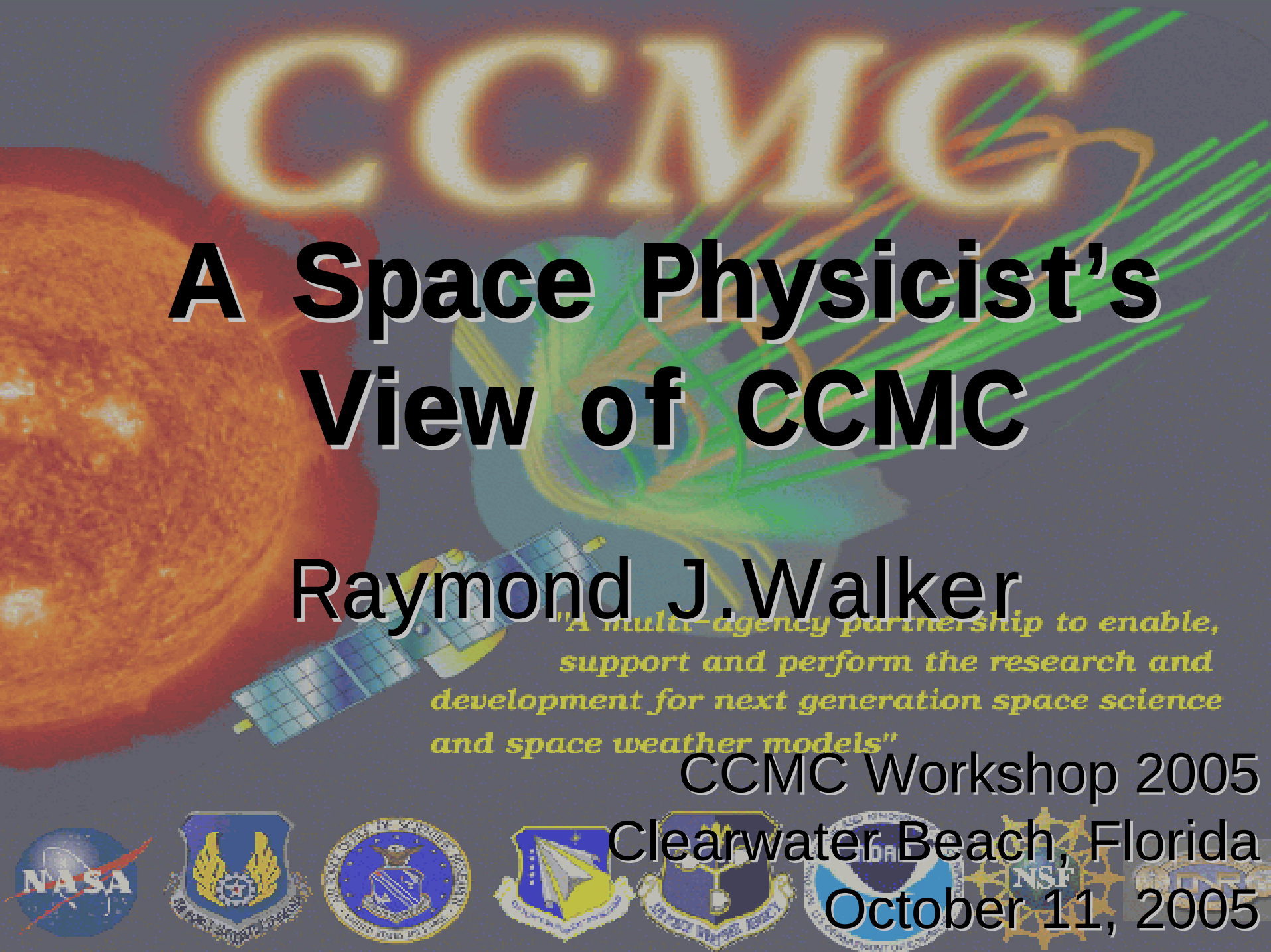

CCMC
A Space Physicist's View of CCMC
Raymond J. Walker
"A multi-agency partnership to enable, support and perform the research and development for next generation space science and space weather models"
CCMC Workshop 2005
Clearwater Beach, Florida
October 11, 2005

CCMC's View of CCMC: Science

- Adopts state of the art space weather models that are developed by outside researchers into the CCMC. Model treatment at the CCMC is governed by the Rules of the Road document.
- Executes simulation runs with these models at no cost to scientists interested in event or case studies.
- Dedicated model runs can be requested online. Results will become publicly available on the CCMC website.
- Offers a variety of visualization and output analysis tools to aid the user in interpretation of simulation results.
- Provides access to coupled models and existing model frameworks.
- Invites members of the community to provide feedback on models and services offered by the CCMC, both through online comment submission and during biennial community workshops.

Space Weather Models

- Solar
  - MHD Model of the Solar Corona: J. Linker, Z. Mikic, R. Lionello, and P. Riley
  - Potential Field Surface Model: J. Luhmann et al.
- Heliospheric
  - ENLIL 3D MHD model of heliosphere: D. Odstrcil
  - Heliospheric Tomography Model: B. Jackson and P. Hick
  - Exospheric Solar Wind Model: H. Lamy and V. Pierrard
- Magnetosphere
  - BATS-R-US 3D MHD model: T. Gombosi et al.
  - Open GGCM 3D MHD model: J. Raeder and T. Fuller-Rowell
  - Fok Ring Current Model: M.-C. Fok
- Ionosphere
  - SAM12 evolution of low to mid-latitude ionosphere: J. Huba, G. Joyce and M. Swisdak
  - CTIP Coupled Thermosphere Ionosphere plasmasphere model: T. Fuller-Rowell
  - Weimer_2K statistical model for the high-latitude ionosphere: D. Weimer

CCMC's View of CCMC: Operations

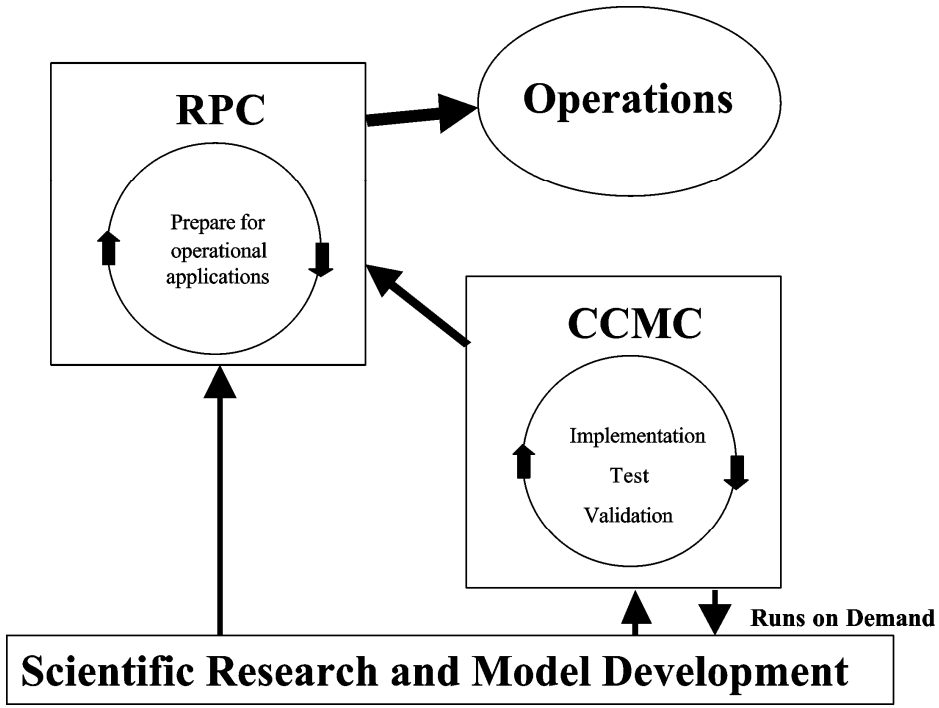
- Performs science-based validation and metrics-based evaluations of models for operations customers and decision makers.

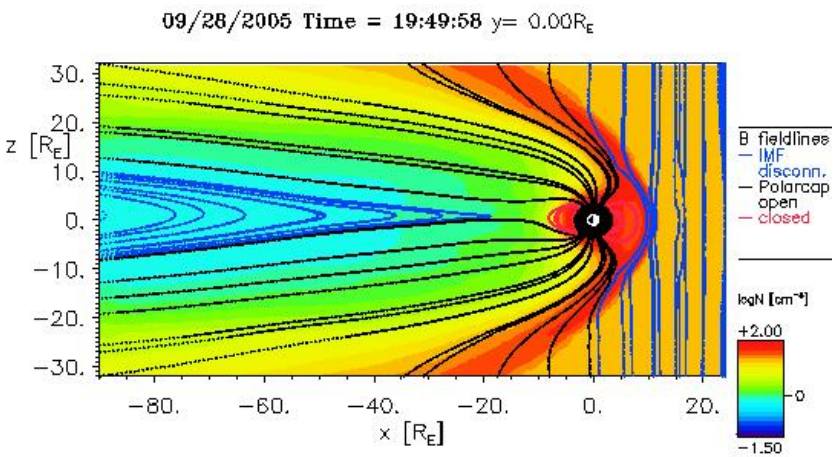
- Tests models, e.g. through real-time runs.

- Develops model installation kits for operational use and supports model installation at operational facilities providing space weather forecasts.

Transitioning Models to Operations

- Metrics- Web only had two brief examples. It isn't clear how metrics are being applied in general.
- Real Time Runs- Examined real time BATS-R-US run. Not clear how real time runs are used in transition to operations.

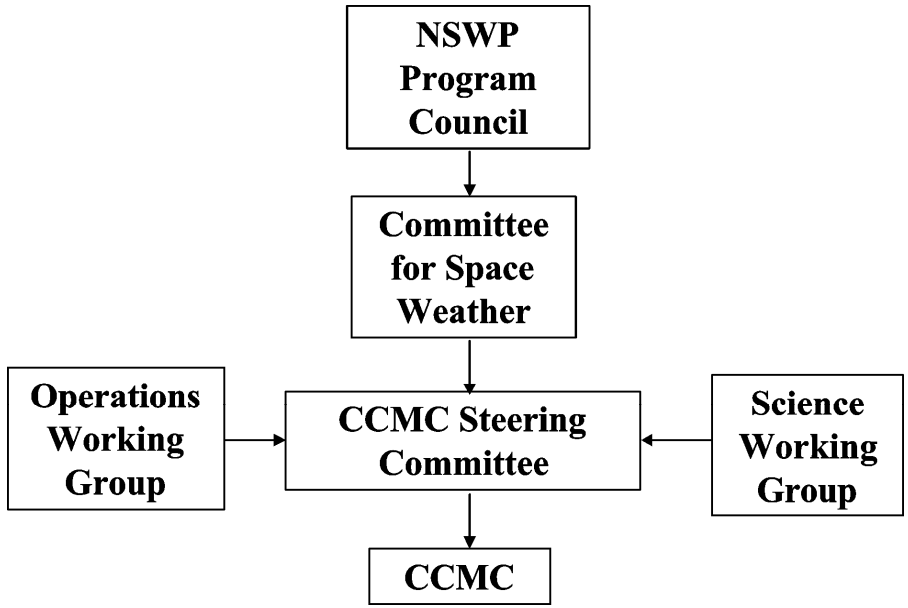




From Concept of Operations for the Community Coordinated Modeling Center [2002]

Governance

- Managed by an interagency Steering Committee.
- The Science Working Group provides advice to the Steering Committee about models with potential operational benefits.
- The Operations Working Group provides advice on operational requirements and products. They also advise on models with future operational applications.



Selecting and Handling Models

- Models are selected by CCMC Steering Committee on recommendation of the Science and Operations Working Groups.
- Selection of models is made on the “basis of their potential to contribute to space weather operational forecasting as well as their scientific merit”.
- CCMC is not a “clearinghouse” for space weather models.
- Submission of a model to CCMC constitutes explicit permission for public access.
- Model results will be made routinely available to the scientific and operational communities.
- CCMC staff will modify codes to run on CCMC hardware and will output and input formats to CCMC specific formats.
- CCMC will not disseminate source code.

Services

- Runs on request
  - Requests can either be made through the web site or by personal contact with CCMC staff.
  - Results will be made publicly available.

- Visualization
  - Tools for plotting model and simulation results.
  - Access to results is through a web page which produces plots.
  - CCMC staff will make tools available to users.
  - Visualization routines are implemented in IDL or OpenDX.

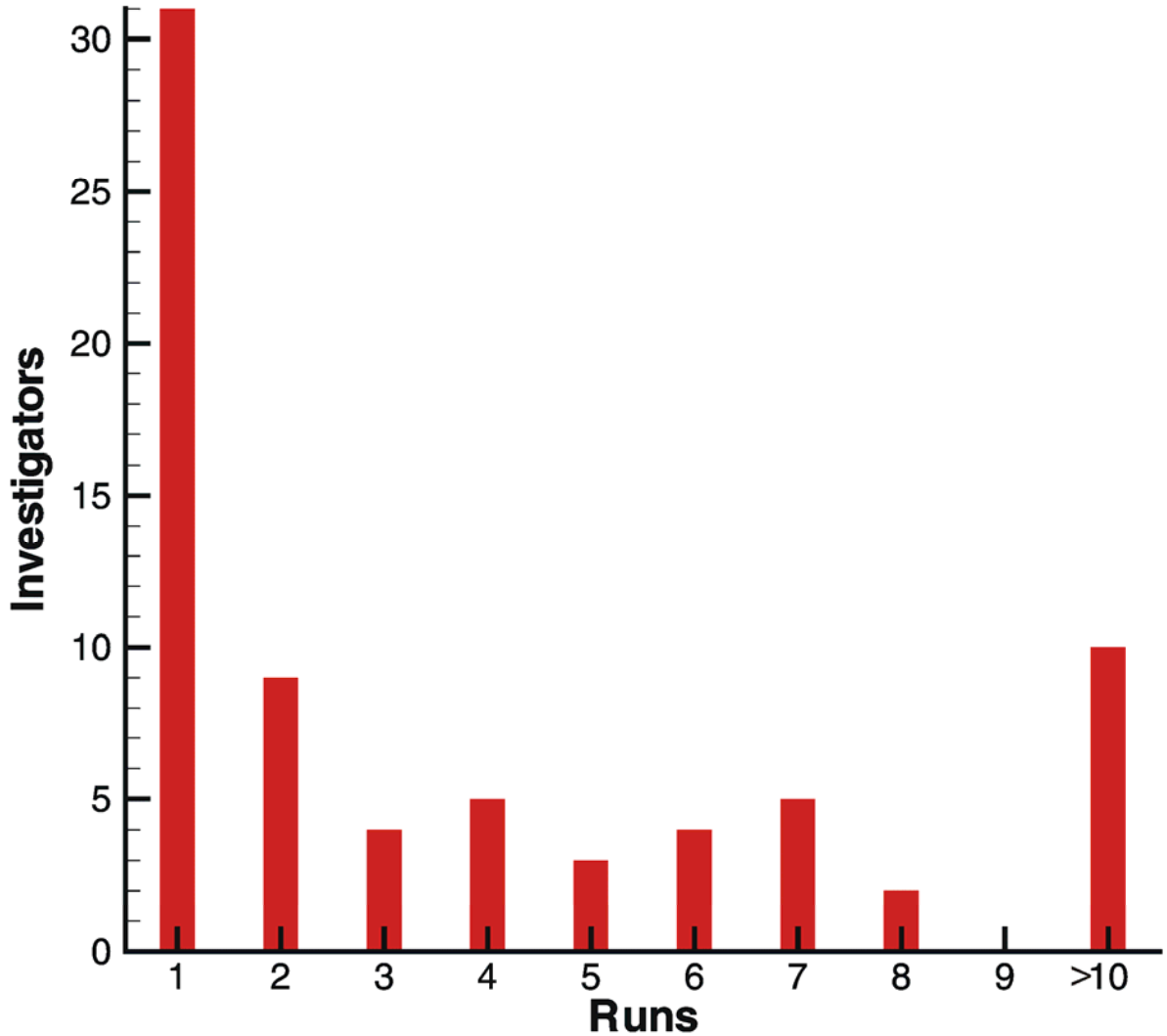
An Unscientific Poll

- I asked 16 magnetospheric physicists to identify CCMC and tell me its purpose.
- 15 responded.
- 4 had not heard of CCMC.
- 11 said that CCMC was a service to allow non-simulators to work with simulations.
- 2 knew that CCMC had interagency support.
- 1 knew that CCMC had a role in providing operational codes.

Science Use of CCMC

Discipline	Users	Runs	Ratio
Solar	12	42	3.5
Heliosphere	5	8	1.6
Magnetosphere	75	367	4.9
Ionosphere/ Thermosphere	11	56	5.1

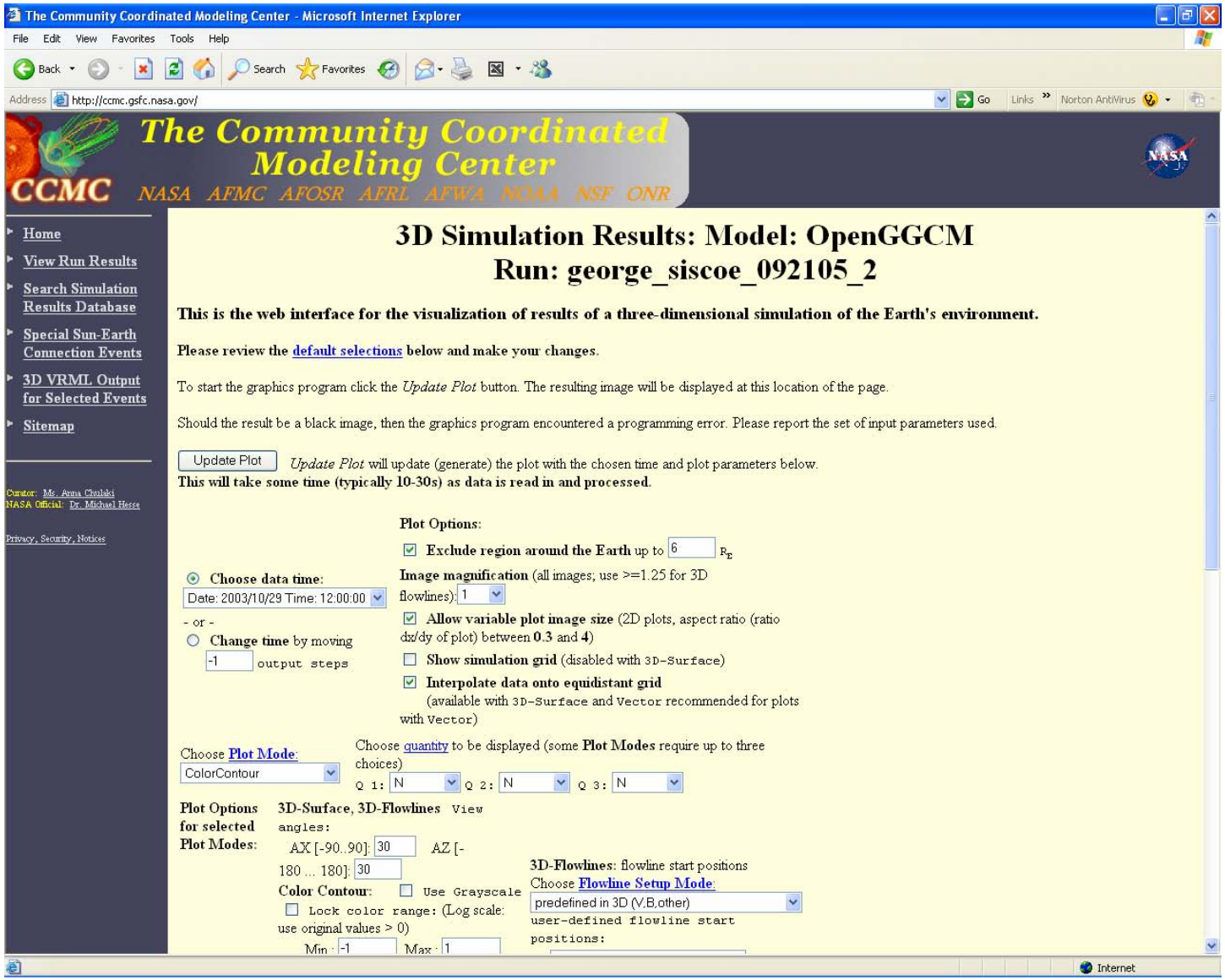
Number of Simulation Runs Per Investigator: Magnetospheric Models



How Hard is CCMC to Use?

- Last quarter I taught a course that had a segment on computational physics.
- I gave the students homework problems to run global MHD simulations at CCMC and analyze the results.
- The students worked with the CCMC staff to run the simulations and used CCMC provided tools to analyze the results.
- The system worked well.
  - The staff were very helpful.
  - The students got results on time.
  - They were able to use the visualization tools to analyze the results.
  - They would have liked to have done more. In particular they found it difficult to make movies of the results easily. This is very important for analyzing MHD results.

Graphics Interface to Global MHD Simulations



What I Learned and Some Recommendations

- CCMC is generally looked on as a useful resource to help non-simulators carry out research.
- The operations support by CCMC is not well understood.
- My personal experience was very positive.
  - The system encourages graphic output.
  - I would have preferred being able to down load simulations and documentation.
- It appears that CCMC is being used to support research but better metrics would help us pin that down.
  - Acknowledgement in papers would help.
  - Citation in papers would be even better.
- I am somewhat concerned that there were only agency members on the CCMC Steering Committee. Since the Steering Committee has final word on models I think it should have science membership.

More on What I Learned and My Recommendations

- There is relatively little discussion in the Concept of Operations and web pages about the relationship between CCMC and the simulation community.

- Simulators have a number of common problems – e.g. securing adequate computing resources. CCMC can be a forum for simulators to make their needs known to the agencies.