GGCM Model Metrics Challenge

- Summary of Challenge Status.
  Introduction of CCMC Metrics Tools.
  (Masha Kuznetsova – 10 min, Anna Chulaki – poster)
- Challenge Results Update – 1 hour
  - Antti Pulkkinen
  - Lutz Rastaetter
  - Joe Borovsky
- Publication Plans (Discussion) – 10 min
- NOAA SWPC Needs (Howard Singer) – 10 min
- Future Plans, New Ideas – 15 min
Modeling Challenge Goals

- Address the differences between various modeling approaches
- Evaluate the *current* state of the space physics modeling
- Demonstrate effects of model coupling, grid resolution
- Encourage collaborations.
- Facilitate further model improvements.
Events and Physical Parameters
Selected at GEM 2008 Summer Workshop

Event 1: Oct 29, 2003 06:00 UT - Oct 30, 06:00 UT
Event 2: Dec 14, 2006 12:00 UT - Dec 16, 00:00 UT
Event 3: Aug 31, 2001 00:00 UT - Sep 01, 00:00 UT
Event 4: Aug 31, 2005 10:00 UT - Sep 01, 12:00 UT

Metric Study 1: Magnetic field at geosynchronous orbit
Metric Study 2: Magnetopause crossings by geosynch. satellite
Metric Study 3: Plasma density/temperature at geosynch. orbit
Metric Study 4: Ground magnetic perturbations*

*(added on request from NOAA SWPC represented by Terry Onsager)
Need for Web-Based Metrics Tools
To Allow Broader Community Participation

• Need an automated system that allow to repeat the exercise on regular basis (annually or semi-annually)

• Need a web-accessible database to keep track of challenge results and monitor progress over time.
CCMC On-Line Metrics Tool Suite

- Simulation results submission interface
  Accepts time series derived from simulation results obtained outside the CCMC. Interactive file format check.

- Database of model settings
  Model setting (model/combination of models, version, number of grid cell, max resolution..) as a main database entry.

- On-line time series plotting tool.
  Observations and simulation output for different model settings at the same plot (for selected event, physical parameter, event, instrument)

- Configurable table of metric results
  Pick metric parameter, metric (skill score) type(s), event(s). Get a table of model setting descriptions with skill scores

See Poster by Anna Chulak for Demo & Feedback
Challenge Status Summary

- **Study 1**: Magnetic field at geosynchronous orbit
  - Study 4: Ground magnetic perturbations*
    - Sufficient number of external submissions and CCMC runs.
    - Reports are ready (Antti Pulkinnen, Lutz Rastaetter). Ready for publication.
    - *Suggested for the Operational Metrics by NOAA SWPC (Howard Singer)

- **Study 3**: Plasma parameters at geosynchronous orbit
  - Use pressure vs. density for comparison (Michelle Thomsen)
  - On-line tool for LANL MPA data and model output comparison is ready (Lutz)
  - MPA plasma sheet temperature/pressure should be corrected (Joe Borovsky)

- **Study 2**: Magnetopause crossings by geosynchronous satellite
  - LANL magnetopause in/out time series are ready (Michelle Thomsen).
  - Few submissions. Need agreement on metric (skill score) type(s).
## Model Setting Definitions

<table>
<thead>
<tr>
<th>Model Setting ID</th>
<th>Model Name/Version</th>
<th>Max. Resolution</th>
</tr>
</thead>
<tbody>
<tr>
<td>1_CMIT</td>
<td>CMIT2.0 LFM + TIEGCM</td>
<td>LFM (53x24x32 grid) + TIEGCM (5x5 deg)</td>
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<tr>
<td>1_LFM</td>
<td>LFM</td>
<td><strong>0.3 Re</strong> (53x64x48 cells)</td>
</tr>
<tr>
<td>1_OPENGGCM</td>
<td>OpenGGCM v3.1 OpenGGCM + CTIM</td>
<td><strong>0.3 Re</strong> 3M cells</td>
</tr>
<tr>
<td>1_SWMF</td>
<td>SWMF v2.0 BATSRS v.7.73</td>
<td><strong>0.25 Re</strong> 2M cells</td>
</tr>
<tr>
<td>1_WEIMER</td>
<td>Weimer 2005</td>
<td></td>
</tr>
<tr>
<td>2_OPENGGCM</td>
<td>OpenGGCM v3.1 OpenGGCM + CTIM</td>
<td><strong>0.25 Re</strong> 6.5M cells</td>
</tr>
<tr>
<td>2_SWMF</td>
<td>SWMF v2.0 BATSRS v.7.73</td>
<td><strong>0.25 Re</strong> 700K cells</td>
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<tr>
<td>3_SWMF</td>
<td>SWMF v2.3 BATSRS v.8.01 + RCM2</td>
<td><strong>0.25 Re</strong> 2M cells</td>
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<tr>
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<td><strong>0.125 Re</strong> 3M cells</td>
</tr>
<tr>
<td>5_SWMF</td>
<td>SWMF v2.3 BATSRS v8.01+ RCM2</td>
<td><strong>0.125 Re</strong> 3M cells</td>
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<tr>
<td>6_SWMF</td>
<td>SWMF V.20090403, BATSRS + RCM2</td>
<td><strong>0.25 Re</strong> 900K cells</td>
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