Joule Heating/Poynting Flux/Model/Data Comparison.  
Very Preliminary Results

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http://ccmc.gsfc.nasa.gov
CCMC 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.

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

Latest Additions to the CCMC
GEM-CEDAR Challenge

Challenge Workshop status
Both CEDAR and GEM communities have recognized that due to the maturity and increasing complexity of state-of-the-art space weather models, there is a great need for a systematic and quantitative evaluation of different modeling approaches.  

GEM-CEDAR Metrics Suite

Simulation results submission interface:

- Prior to submission of your simulation results please review:
  Selected events | Physical parameters | Available measurements/stations/locations: for Ionosphere, for Magnetosphere | Model output file format

- Submit your simulation results >>

Simulation results analysis tools:

- Time series plotting tool (ionosphere/thermosphere)
- Time series plotting tool (magnetosphere)
- Runs for metric studies performed at the CCMC (ionosphere)
### GEM-CEDAR Metrics (magnetosphere) results

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<th>Event</th>
<th>Magn. field at geosync. orbit</th>
<th>Ground magn. perturb's</th>
<th>DST</th>
<th>Auroral oval</th>
<th>Poynting flux</th>
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Time Series Plotting Tool

Several orbits of DMSP during 2005.243 (Event 4 of GEM 2008)

Modeled Joule Heating

Poynting Flux $Sz$ from DMSP

$[\text{mW/cm}^2]$
half-orbits

Weimer and SWMF often line up better with strongest fluxes.

CTIPe shows correct magnitude.

Weimer and SWMF often line up better with strongest fluxes.
More half-orbits

JH

Sz

[mW/m²]

JH

Sz

[mW/m²]
Analysis of a single half-orbit

**Skill scores:**
- Prediction Efficiency
- Log-Spectral Distance
- Prediction Yield
- Correlation

To be added:
- Timing Error (here for CTIPe)
CTIPe shows best average values
Weimer and SWMF very similar to each other
Conclusions

• First model results look promising
• Need to compute new skill scores:
  – Timing errors within each half-orbit
  – ...
• Need more model submissions.
• Compute Joule Heating from existing GEM-CEDAR runs.