What is GEM?

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June 26, 2011

Purpose of GEM: Geospace Environment Modeling

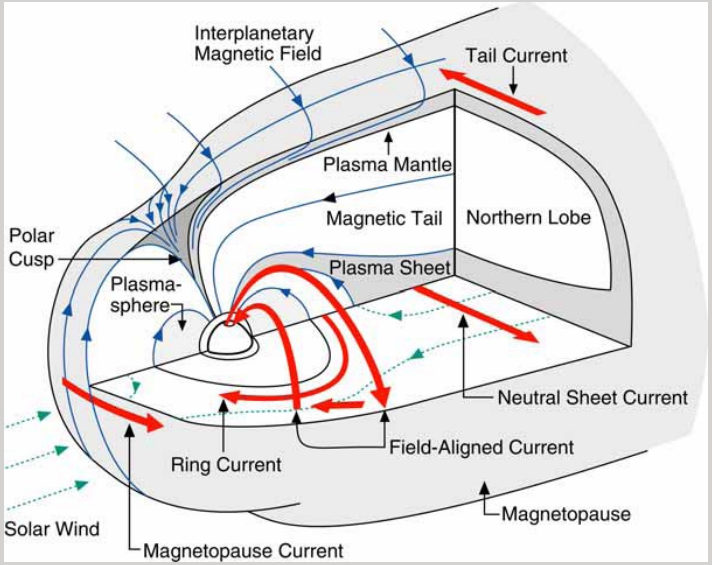
- NSF Division of Atmospheric and Geospace Sciences
- Broad and community-initiated
- Concentration: Earth's magnetosphere
  - Coupling to atmosphere and solar wind
  - Dynamical and structural properties of geospace
- Global Geospace General Circulation (GGCM) model with predictive capability
- Strategy: series of campaigns and focus groups
  - Both theoretical and observational
  - Focusing on particular aspects of the geospace environment

History of GEM

- Global Change Program was a mid-80's multidisciplinary, multiagency response to concerns about threats to the environment from anthropogenic activities
- GEM was the magnetospheric community's proposed contribution
- Proposed in a meeting with the NSF Director in September 1986
- Two options
  - narrowly focused on the contribution of solar irradiance to global change
  - thorough study of general circulation of the magnetosphere
- Physically distinct regions and processes would be studied in campaigns
- Campaigns were to be time limited (3 years) and three could run simultaneously
- A campaign could consist of multiple working groups
- The product of a campaign would be a module for a magnetospheric general circulation model

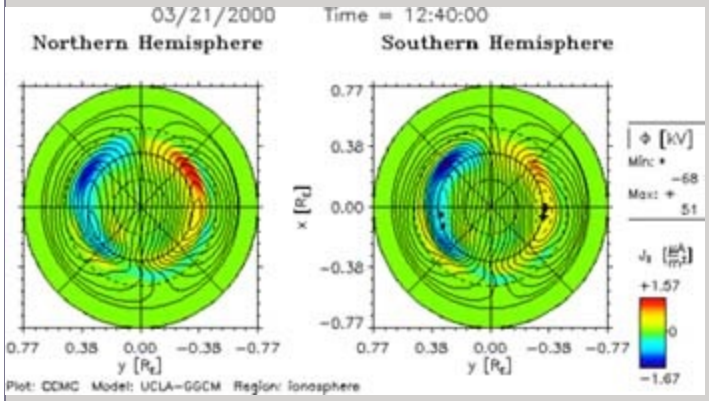
"Crown" of GEM: Research Areas

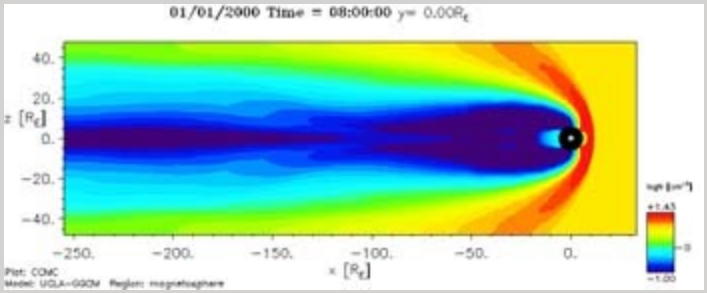
1. Dayside, including boundary layers and plasma/energy entry.
2. Inner magnetosphere and storms.
3. Tail, including plasma sheet and substorms.
4. Magnetosphere - ionosphere coupling, aurora.
5. Global General Circulation Modeling (GGCM).

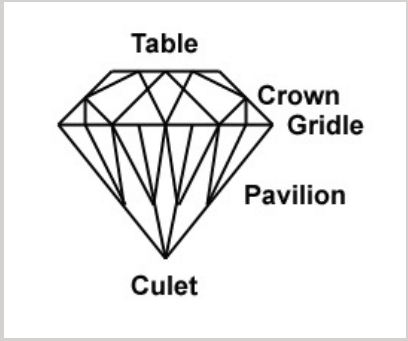


“Gridle” of GEM: GGCM

- Developing, validating, and comparing analytic, first-principles numerical, and data-based models of geospace environment
- Span more than one region
- Global description of the geospace
- Multiple and/or coupled models
- Modeling "challenges" from focus groups

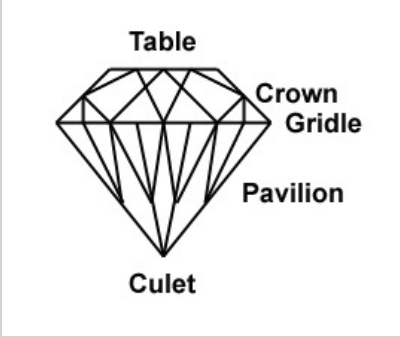






"Pavilion" of GEM: Focus Groups

- Focus Groups (FG) are at the heart of GEM
- Proposed by the community
- Must include deliverable
- Exist within a Research Area
- No more than 5 years
- Target number of active FGs: ~12
- ~2-3 new FGs selected every year

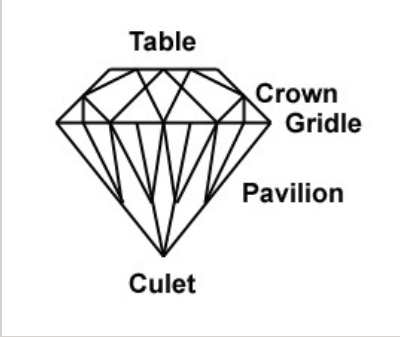


"Pavilion" of GEM: Focus Groups

#	Name	Years	RA
1	Plasma Entry and Transport into and within the Magnetotail	2006-2011	Tail
2	Near Earth Magnetosphere: plasma, fields, and coupling	2007-2012	IMS, Tail
3	Space Radiation Climatology	2006-2011	IMS
4	Diffuse Auroral Precipitation	2006-2011	MIC, IMS
5	Plasmasphere-Magnetosphere Interactions	2008-2013	IMS
6	Substorm Expansion Onset: The First 10 Minutes	2008-2013	Tail
7	Modes of Solar Wind-Magnetosphere Energy Transfer	2008-2013	Tail
8	Dayside FACs and Energy Deposition	2010-2012	Dayside
9	Radiation Belts and Wave Modeling	2010-2014	IMS
10	The Magnetosheath	2010-2014	Dayside
11	Metrics and Validation	2011-	GGCM
12	The Ionospheric Source of Magnetospheric Plasma—Measuring, Modeling, and Merging into the GEM GGCM	2011-	
13	Scientific Magnetic Mapping and Techniques	2011-	

"Table" of GEM: Annual Meeting

- First GEM Meeting: September 23-25, 1991 at UCLA
  - Happy 20th Anniversary!
- Annual week-long summer meeting (usually Snowmass, CO)
- Student tutorial workshop on Sunday
- Banquet on Wednesday (Monday this year)
- Poster sessions Tuesday and Thursday
- Daily activities:
  - Morning tutorials
  - 3 focus group session slots
  - 3-4 focus groups at a time
- Steering committee meets Friday afternoon



"Cutlet" of GEM: Between Meetings

- GEM Mini-workshop in December
  - Sunday before AGU
  - 2 hr working group meetings for FGs
  - Steering Committee discusses and votes on proposed FGs
- Communication
  - Messenger (electronic). Brief Notices to the GEM community.
    - Email Majordomo@igpp.ucla.edu with the message "subscribe gem"
    - http://heliophysics.blogspot.com/
  - GEMstone. Annual summary of GEM activity centering on the June meeting. Attempts to summarize activities of all working groups. GEM's most detailed historical archive
    - http://aten.igpp.ucla.edu/gemwiki/index.php/GEMstone