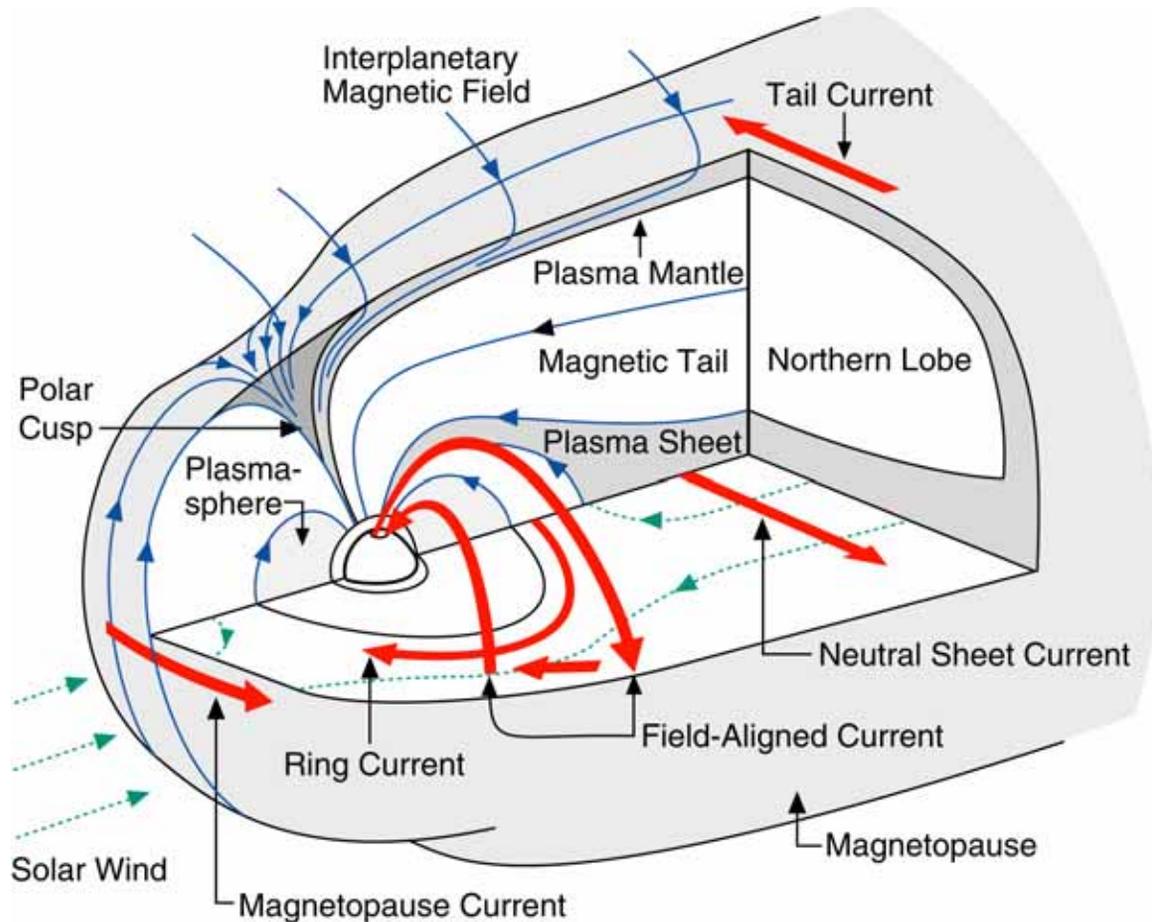


# Geospace Environment Modeling (GEM): Not Business as Usual C. T. Russell



# The Conception 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 to the GCP
- Proposed by J. G. Roederer with the help of S. M. Krimigis, L.J. Lanzerotti and G.C. Reid to NSF in a meeting with the NSF Director (E. Block) in September 1986
- A proposal to hold a workshop was funded and in August 1987 a 3-day workshop was held at Univ. Washington to develop a focus GCP/STP program
- Two options
  - narrowly focused on the contribution of solar irradiance to global change
  - thorough study of general circulation of the magnetosphere
- The 1988 report proposed a thorough attack on “Geospace”

# GEM : A New Way of Doing Business

- Physically distinct regions and processes would be subject to 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

# GEM : The Incubation Period

- The blueprints for the campaigns were laid down in three workshops in 1989 and 1990
  - Workshop on Magnetopause and Boundary Layer Physics
  - Workshop on Ionospheric Signature of Cusp, Magnetopause and Boundary Layer Processes
  - Workshop on Intercalibrating Cusp Signatures
- Proposals for participation were solicited and selection occurred in summer 1991
- First GEM Meeting occurred at UCLA on September 23 - 25, 1991

# GEM : Plan versus Reality

- Plans
  - Each campaign was to be funded at between \$500 K and \$1000 K annually
  - Three campaigns could run simultaneously
  - Campaigns would run 3 years
  - Money would come from Global Change Program
- Reality
  - \$300 K of new money was found
  - Support gradually increased to about \$500 K annually
  - Few awardees
  - Necessary to leverage other programs, agencies
  - Campaigns had to last longer (~ 6 years)
- Response
  - Dec AGU mini workshops
  - Summer GEM meetings (Snowmass usually)

# GEM : Childhood Years : Boundary Layer Campaign

- Began in June 1992 and ran through June 1997
- Working groups on
  - Boundary Magnetic and Electric Fields
  - Particle Entry, Boundary Structure and Transport
  - Current Systems and Mapping
- Invented the GEM Grand Challenge
  - rigorous test of global models

# GEM : Teenage Years : Magnetotail and Substorm Campaign

- Began in June 1994 and ran through 2003
- Working groups on
  - Onset signatures
  - Quantitative Models
  - Phenomenological Models
  - Tail/Substorm Challenge
- Tried to reinvent itself mid campaign (June 1999)
  - Observations
  - Quantitative Models
  - Triggering
  - Steady Convection
- Was difficult to terminate so campaign ran overly long

# GEM : Young Adults : Inner Magnetosphere Storms Campaign

- Began in June 1997 and is terminating this year
- Working groups on
  - Plasmasphere and ring current
  - Injection and Recovery Mechanisms
  - Energetic Electron Variability
  - Radiation Belts (1998)
  - ULF Waves (2003)
- This third campaign also ran 9 years and was difficult to terminate

# GEM : Middle Age : Magnetosphere – Ionosphere Coupling Campaign

- Began in June 2001 and is now in middle of its cycle
- Working groups on
  - Mass exchange
  - Electrodynamics
  - Global M-I Coupling (2005)
- This campaign has been slow to ramp up

# GEM : Next Campaign : Global Interactions

- Began full campaign this year, 2005
- Working groups on
  - Reconnection Dynamics, Cusp and Low Latitude Boundary Layer
  - Plasma Acceleration and Transport within the Magnetotail
- Difficult to get this campaign underway because it brings a new community into GEM and is not just a new approach to earlier GEM themes

# GEM : General Geospace Circulation Model

- Original concept of GEM was to develop modules that would be assembled into one large model of the magnetosphere
- In the midst of this exercise it was realized that MHD models described much of what was sought in the GGCM
- Later work has centered on coupling models of different regions, recognizing the limitations of the MHD models
- GGCM development was originally managed by a Steering Committee. After several years the GGCM Steering Committee request Campaign status for the GGCM. They received it but it was soon appreciated that the GGCM development was not suited for campaign mode and the GGCM is now managed by a steering committee again

# A GEM Summer Meeting

Sunday	AM/PM Eve	Student Run Tutorials Reception
Monday	AM/PM Eve	Campaign A Working Groups Free
Tuesday	AM/PM Eve	Campaign A Working Groups Posters Campaign A
Wednesday	AM/PM Eve	GGCM/New Campaigns Banquet
Thursday	AM/PM Eve	Campaign B Working Groups Posters Campaign B
Friday	AM PM Eve	Campaign B Working Group Wrap up Steering committee

# Day in the Life of a GEM Meeting

- 0815 Tutorial one
- 0900 Tutorial two
- 0945 Announcements/Day's Sessions
- 1000 Break
- 1015 Working Group A  
Working Group B
- Noon Lunch
- 1330 Working Group C  
Working Group A
- 1515 Break
- 1530 Working Group B  
Working Group C
- 1715 Adjourn
- 1900 Poster Session

# GEM : Between Annual Meetings

- Communication

- Newsletters

- Messenger. Brief Notices to the GEM community when needed. Electronic only
    - 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

- Mini workshops

- Day prior to Fall AGU meeting is used for 2 hour working group meetings for those WGs that request a meeting. Maintains contact among WG members between the annual meetings

- Steering Committee Meetings

- Evening before Fall AGU is used to plan GEM activities for coming year
    - Last evening of June meeting is used to review GEM program over past year, activities of associated organizations and countries, plan any needed midcourse corrections

# Steering GEM

## Membership (3 year terms)

- Chair
- Regular members with staggered terms
- Student representative (1 year term)

## Others participating

- Liaisons with sister programs : CEDAR, SHINE
- Liaisons with other organizations e.g., NASA, NOAA
- Liaisons with other countries e.g., Canada, Mexico
- GEM Program director
- GEM Meetings coordinator
- GEM Communications coordinator

# GEM : Summary

- GEM Program is now holding its 14<sup>th</sup> annual meeting
- By faithfully following its campaign mode of doing business it has continued to renew itself
  - fresh communities
  - fresh topics
  - new ideas
- GEM has been under-funded since its inception
  - leveraged activities and funding from other programs and organizations
  - worked at a slower pace
- Has avoided being just another “AGU” meeting
  - split groups into manageable working groups
  - three or four groups meeting in parallel
  - report back to other WGs when conclusions drawn
- Ending Campaigns is difficult. Firm end date must be established and followed
- High level of satisfaction among GEM participants; attendance continues to grow