

Some Comments on Educational Use of CCMC

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Present at the CCMC Workshop
Key Largo, Florida
January 20, 2012

Simulations and Lower Division Education

- Last quarter I taught a freshman course on the "Perils of Space".
- The students are mostly freshmen with no mathematics background.
- CCMC now has a large archive of runs which in principle can be useful in education.
- Simulations can be useful for
 - Demonstrating basic ideas
 - Visualizing complex systems
 - Showing time dependencies

Demonstrating a Basic Idea - Courtesy of Martin Connors

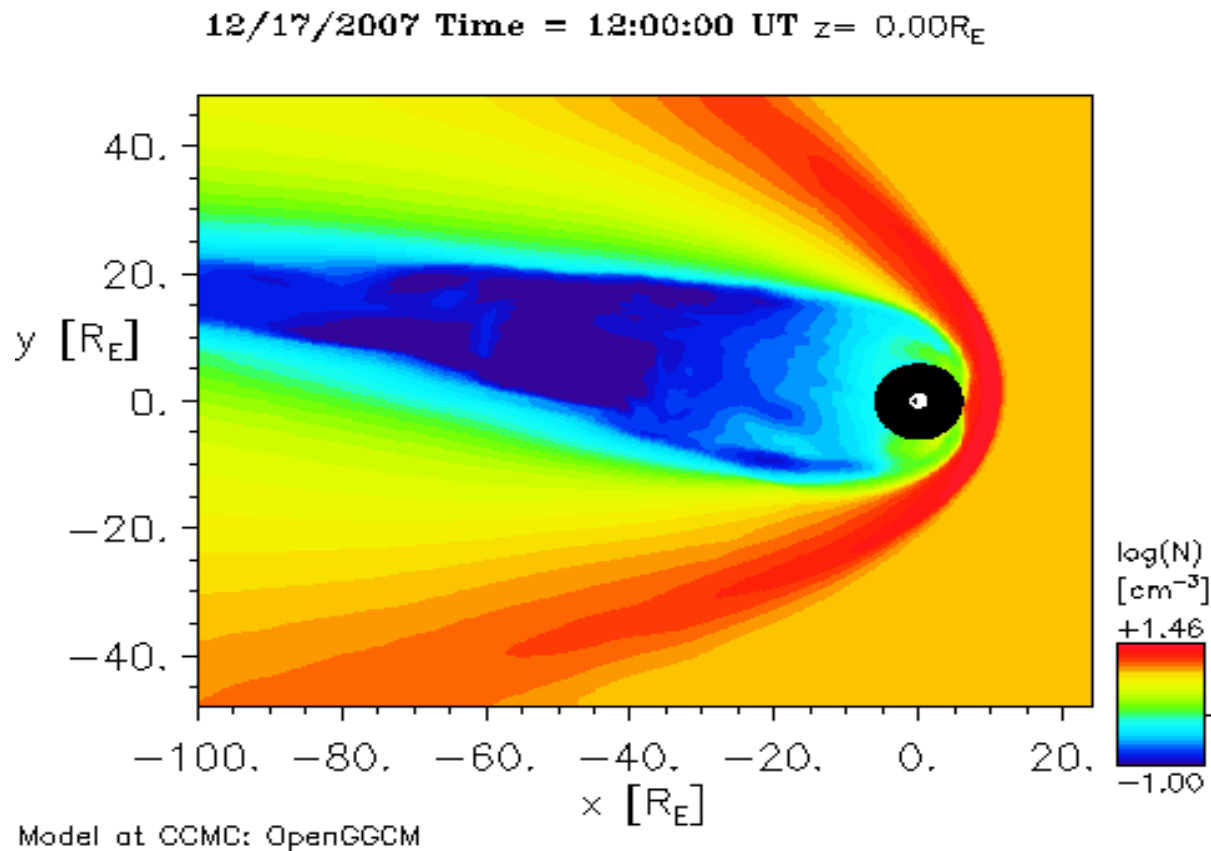
Compression at the Bow Shock

The supersonic
solar wind



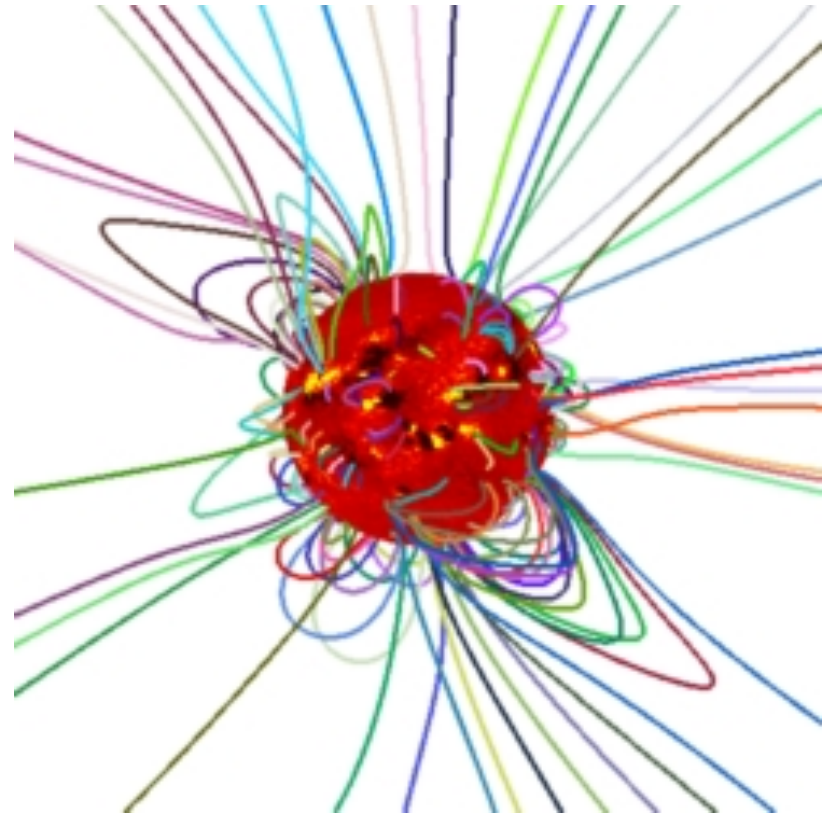
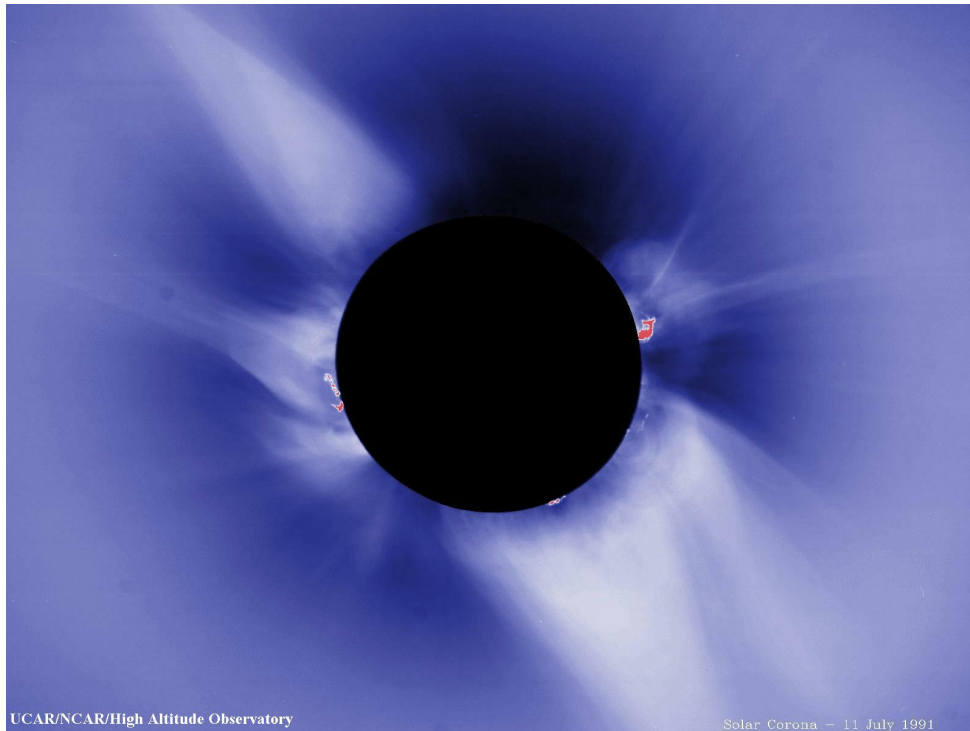
compresses the
front side of the
magnetosphere
and shocked
compressed solar
wind forms the
magnetosheath.

Inside the
magnetosphere,
the magnetic field
dominates and
density is low.



Visualize Complex Structures

- Space is intrinsically three dimensional.
- Difficult to visualize unless you are a very good artist.

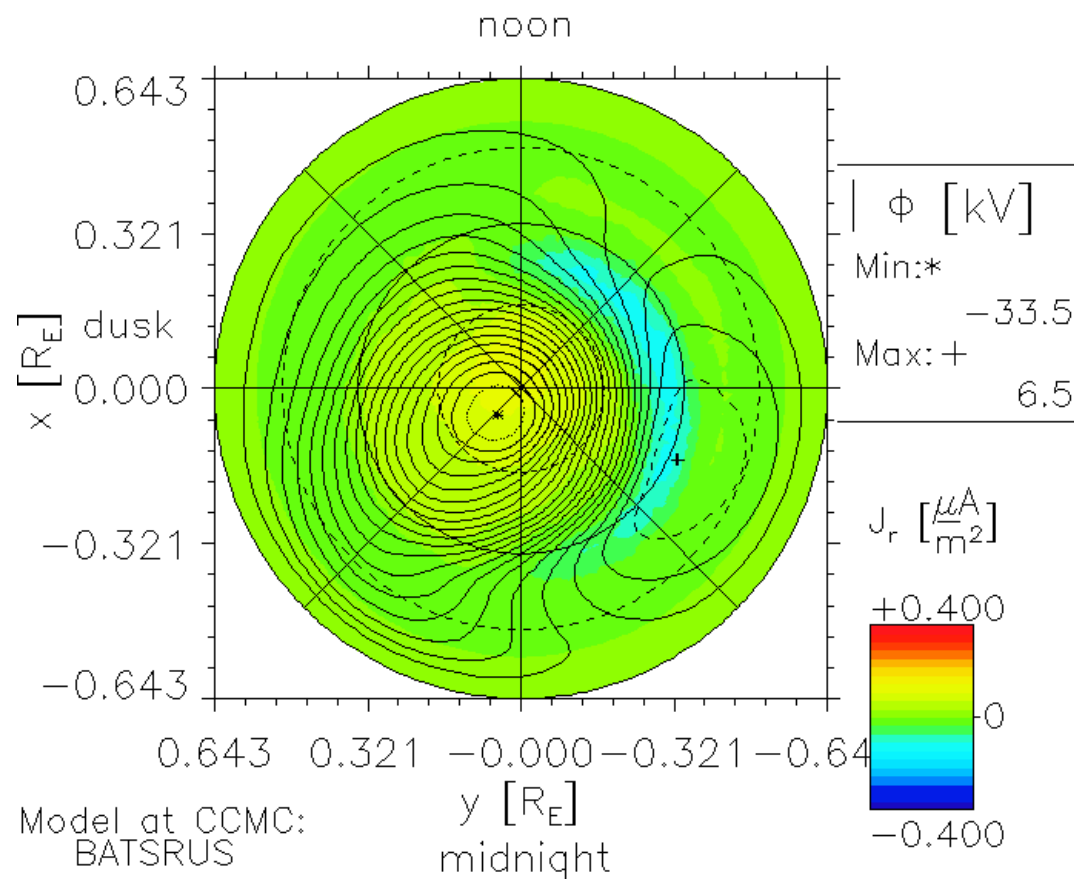


Understand Time Dependencies

- Space physics systems are intrinsically time dependent.

03/23/2007 Time = 08:01:00

Southern Hemisphere



Using the *CCMC* Archive to find good Examples

- The *CCMC* archive of runs is not easy to use if you are looking for good examples for teaching.
- I had a difficult time finding good examples but I think they are there.
- I tried to build some myself by using runs on request results and the 3D graphics package but it was not obvious how to proceed.

A Challenge

- Examples work.
- Assemble a collection of examples and build graphics to clearly show features.
 - 3D configuration showing boundaries.
 - 3D configuration showing magnetic structure.
 - Time dependent evolution of structures.
- Provide a “few clicks” path to the archive of examples.

A Simulation Course for Data Analysts

- **Course goal is to make students into critical simulation users.**
- I am not trying to teach students to become simulators although some simulation students have taken the classes.
- It is not a course in simulation techniques although we discuss them.
- We want students to have a feeling for both the strengths and limitations of simulations.
- Course is based on a current space physics problem that is being addressed by using simulations.
- We study the science problem and the simulations that are being used to address the problem.
- The course covers a lot of material and is fairly intensive.

Graduate Education

- Ability to run more realistic event studies – nice for classes and necessary for research
- Improved ability to display results.
- Improved ability to “download” results – if the simulations are too big consider data bricks.