Heliospheric Physics Data and Computing Working Group

Report to the Heliospheric Physics Subcommittee of the NASA Advisory Council

Raymond J. Walker

July 7, 2006

HPDCWG

Andrew Davis – Cal Tech

Chuck Goodrich – Boston U.

Neal Hurlburt – Lockheed

Larry Paxton – APL

Aaron Ridley – University of Michigan

Aaron Roberts – GSFC

Dave Sibeck – GSFC

Ruth Skoug – LANL

Bob Strangeway – UCLA

Alan Sussman – University of Maryland

Ray Walker (Chair) – UCLA

Issues

- Locate and provide access to the widely distributed holdings of solar, heliospheric, magnetospheric and ITM data.
- Provide a path to archival quality data products.

The Heliophysics Data Environment

- Question: How does a NASA mission serve the data needs of the scientific community after the mission ends?
- Answer: Resident Archives
  - Keep mission data base active and serving community (at reduced funding) after the mission ends.
  - Prepare the data for archiving.
  - Frequent review (Resident Archives exist as long as their data are in high demand.)

The Heliophysics Data Environment

- Question: How do you help researchers locate and access data products in a highly distributed data environment?
- Heliophysics data products and services are highly distributed.
  - A survey limited to NASA active mission data found over 200 sources of data.
  - Data are found in mission data bases, investigator data bases, and individual researcher data bases.
- Different data sources have different data models.
- Data quality differs between data sources.

The Heliophysics Data Environment

- Answer: Virtual Observatories
  - Provide connectivity between Resident Archives and other distributed data sources.
  - Provide single but virtual source for data.
  - Organized by science discipline.
  - Apply common data model to all sources.
  - Work with Resident Archives to document data.
- Common Data Model -
  - VXO's are planning to start with the SPASE data model.
  - The SPASE consortium has developed a data dictionary for all of space physics.
  - SPASE was designed to be an "interlinqua" for connecting systems with different data dictionaries.
  - VXO's will work with the SPASE consortium to tailor the data model to discipline needs.

The Virtual Observatories

- Virtual Solar Observatory – Joe Gurman (GSFC)
- Virtual Heliospheric Observatory – Adam Szabo (GSFC)
- Virtual Radiation Belt Observatory – Robert Weigel (George Mason University)
- Virtual Ionosphere, Thermosphere, Mesosphere Observatory – Daniel Morrison (APL)
- Virtual Magnetospheric Observatory – Jan Merka (GSFC)

  Virtual Magnetospheric Observatory – Ray Walker (UCLA)

Initial meeting of the VXO's was held at the AGU meeting in Baltimore

Senior Review of NSSDC and the Heliophysics Data and Modeling Centers

Facilities were evaluated on relevance to Level 1 requirements of NASA's strategic research objectives, their proposals for meeting these requirements and their performance.

- Community Coordinated Modeling Center (CCMC)
- National Space Science Data Center (NSSDC)
- Solar Data Analysis Center (SDAC)
- Space Physics Data Facility (SPDF)

Community Coordinated Modeling Center (CCMC)

- CCMC has two main functions: Support space weather forecasting and support science research.
- CCMC provides access to state of the art models and simulations.
- CCMC is heavily used and makes good use of its steering committee.
- CCMC emphasizes model validation and robustness of the models.
- CCMC needs more models (ITM and solar physics).
- Highly laudatory review – recommended optimal budget.

National Space Science Data Center (NSSDC)

- NSSDC is important to NASA as the deep archive of space science data.
- Data comes into the archive too slowly.
- NSSDC needs archival standards (the archive information package is a good first step).
- NSSDC needs to place more emphasis on ingesting data and data quality control.
- NSSDC lags in using new technology.
- NSSDC praised for adopting SPASE.

Solar Data Analysis Center (SDAC)

- SDAC is cost effective and provides critical service of the community.
- SDAC combines data archiving with data analysis (solar soft)
- SDAC role in VSO praised especially inclusion of ground based data.
- SDAC needs to be more proactive.
- SDAC funding is critically important in the era of Solar-B, STEREO and SDO.

Space Physics Data Facility (SPDF)

- The panel praised the OMNI database.
- The panel also supported the inclusion of the tools from the Virtual Space Physics Observatory (VSPO).
- Overall the panel was critical of SPDF.
  - SPDF should stop the development of the CDAWeb follow on since it will duplicate services of VXOs and the VSPO software concept is better.
  - A “VXO center” concept has no benefit.
  - SPDF needs more community oversight and input.
  - Much of the data in SPDF is either duplicated elsewhere or of low quality.
  - The SPDF staff is primarily made up of technical people with a very small scientific staff.