

THE VIRTUAL MAGNETOSPHERIC OBSERVATORY VMO

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The Evolving Heliophysics Data Environment: VxO Kickoff

THE VMO TEAM

Jan Merka	UMBC	<i>PI</i>
Jeremy Faden	Cottagesystems	<i>PAPCO</i>
Homa Karimabadi	SciberQuest Inc.	<i>Data mining</i>
Guan Le	NASA/GSFC	<i>ST-5</i>
Jonathan Niehof	Boston University	<i>SCATHA</i>
William Paterson	Hampton University	<i>Geotail CPI</i>
Tim Quinn	Univ. of California Berkeley	<i>THEMIS</i>
Aaron Roberts	NASA/GSFC	<i>ViSBARD</i>
David Sibeck	NASA/GSFC	<i>Science Lead</i>
Eric Kihn	NOAA/NGDC	<i>GOES</i>
Daniel Morrison	JHU/APL	<i>VITMO</i>
Tom Narock	L-3 Com. GSI	<i>Middleware</i>
William Peterson	University of Colorado	<i>Polar TIMAS</i>
Adam Szabo	NASA/GSFC	<i>VHO</i>

SCIENCE FOCUS

The initial data sets and VMO design will facilitate

- Data discovery
 - What kind of data is available (e.g., spacecraft, instrument)?
- Smart content search
 - Complex queries to quickly find subsets of data
- Multispacecraft correlative studies
 - Dayside magnetospheric interactions
 - Substorms
 - Magnetic reconnection

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COMMUNITY INVOLVEMENT AND FEEDBACK I

VMO's MISSION

Help the community to find and use magnetospheric data.

Thus, a wide consensus and acceptance is crucial for VMO success. To ensure community participation the following measures will be taken:

- VMO user interface and API
 - Feedback on usability and features
 - Collect usage/access statistics
- VMO design
 - Reuse successful features and components of current VxOs
 - Closely collaborate with other VxOs

To be continued...

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COMMUNITY INVOLVEMENT AND FEEDBACK II

Continued...

- Standard data description (*metadata*)
 - SPASE+ terms (collaborate with the SPASE group)
 - Broad data provider participation
- Add-on services
 - Monitor which services are desired
 - Assist service providers with interfacing the VMO
 - Encourage submission of new proposal to enhance VMO data and service capabilities
- Issue SPA newsletter announcements
 - Advertise new services
 - Requests for comments

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FEEDBACK METHODS

- Annual meetings at conferences (especially at AGU)
- Directly contacting any VMO team member
- On-line at <http://vmo.nasa.gov>
 - E-mail
 - Comment submission through a web interface
- Statistical information about the VMO usage
 - <http://vmo.nasa.gov/awstats/awstats.pl?config=vmo>

USAGE INFORMATION EXAMPLE

Requested instrument data

Instrument	Hits	Last visit
Mars Global Surveyor Solar Wind Proxy Data	12	27 Mar 2006 - 16:33
WIND SWE KP Data	8	27 Mar 2006 - 16:20
WIND 3DP Electron Data	1	27 Mar 2006 - 16:59
SOHO Cielas Proton Monitor Data	1	24 Mar 2006 - 22:05
Average	5.5	
Total	22	

Requested data files

Data file URL	Hits	Last visit
ftp://zathras.gsfc.nasa.gov/pub/data5/swe/wi_k0_swe_20040319_v01.cdf	8	27 Mar 2006 - 16:20
http://vho.nasa.gov/data/mgs_proxy/swp_mgs_2004.dat	4	17 Mar 2006 - 11:02
http://vho.nasa.gov/data/mgs_proxy/swp_mgs_1999.dat	3	27 Mar 2006 - 16:33
http://vho.nasa.gov/data/mgs_proxy/swp_mgs_2001.dat	2	16 Mar 2006 - 16:28
http://vho.nasa.gov/data/mgs_proxy/swp_mgs_2002.dat	2	17 Mar 2006 - 11:04
http://vho.nasa.gov/data/cielas_pm/2006_001_0101.pm	1	24 Mar 2006 - 22:05
http://sprg.ssl.berkeley.edu/wind3dp/data/wi/3dp/elpd/1999/wi_elpd_3dp_19990101_v02.cdf	1	27 Mar 2006 - 16:59
http://vho.nasa.gov/data/mgs_proxy/swp_mgs_2000.dat	1	16 Mar 2006 - 16:26
Average	2.75	
Total	22	

USAGE INFORMATION EXAMPLE

Requested instrument data

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WIND SWE KP Data
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ftp://zathras.gsfc.nasa.gov/pub/data5/swe/wi_k0_swe_20040319_v01.cdf

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http://vho.nasa.gov/data/mgs_proxy/swp_mgs_1999.dat

http://vho.nasa.gov/data/mgs_proxy/swp_mgs_2001.dat

http://vho.nasa.gov/data/mgs_proxy/swp_mgs_2002.dat

http://vho.nasa.gov/data/celias_pm/2006_001_0101.pm

http://sprg.ssl.berkeley.edu/wind3dp/data/wi/3dp/elpd/1999/wi_elpd_3dp_1999.dat

http://vho.nasa.gov/data/mgs_proxy/swp_mgs_2000.dat

Average

Total

INITIAL VMO DATASETS

<i>Mission</i>	<i>Data Type (Instrument)</i>	<i>Data Set Location</i>	<i>Coverage</i>
AMPTE/CCE	Magnetic field	NASA/GSFC, JHU/APL	1984–1988
	Energetic particles (MEPA)	JHU/APL	
AMPTE/IRM	Magnetic field, Plasma KP	NASA/GSFC	1984–1986
AMPTE/UKS	Magnetic field, Plasma KP	NASA/GSFC	1984–1985
GOES 5–12	Magnetic field	NOAA/NGDC	1983–now
Geotail	Magnetic field	CDAWeb	1992–now
	Plasma key parameters (CPI)	Hampton University	
	Energetic particles (EPIC)	JHU/APL	
IMP 8	Magnetic field	NASA/GSFC	1973–2000
	Plasma key parameters		1973–now
ISEE-1/2	Magnetic field	NASA/GSFC	1983–1987
	Energetic particles (WAPS)	JHU/APL	
Polar	Magnetic field, Plasma par. (TIMAS)	CDAWeb	1996–now
Prognoz-10	Magnetic field, Ion flux	NASA/GSFC	1985
SCATHA	Magnetic field, Plasma parameters	Boston University	1979–1986
ST-5	Magnetic field	NASA/GSFC	2006
THEMIS	Magnetic & electric fields	UC Berkeley	[2006–...]
	Plasma parameters		
WIND	Magnetic field (MFI), Plasma KP (SWE)	NASA/GSFC	1995–now

SERVICES

DEFINITION

A service is a web or local application that uses VMO's API.

- Core services
 - Locate and deliver data pointers from a set of data sources based on user provided query.
- Added value services
 - Modular, community-need driven, interact with VMO's API
 - We focus on defining the API and to provide example services:
 - **Data Mining** to achieve smarter search capability
 - **PAPCO** for data visualization and analysis
 - **ViSBARD** for 3-D data display along spacecraft orbits
 - **Software Library** to provide data handling tools to the community and/or to facilitate community development of software tools

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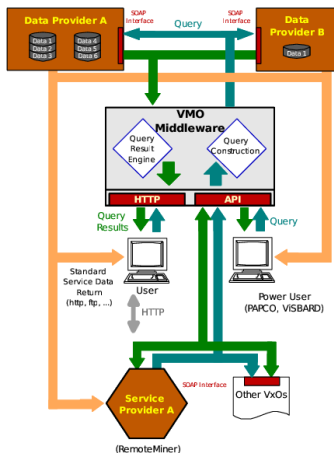
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ARCHITECTURE OF THE VMO ENVIRONMENT



Main components:

- ① VMO Middleware
- ② Data products
- ③ Services
- ④ Other VxOs

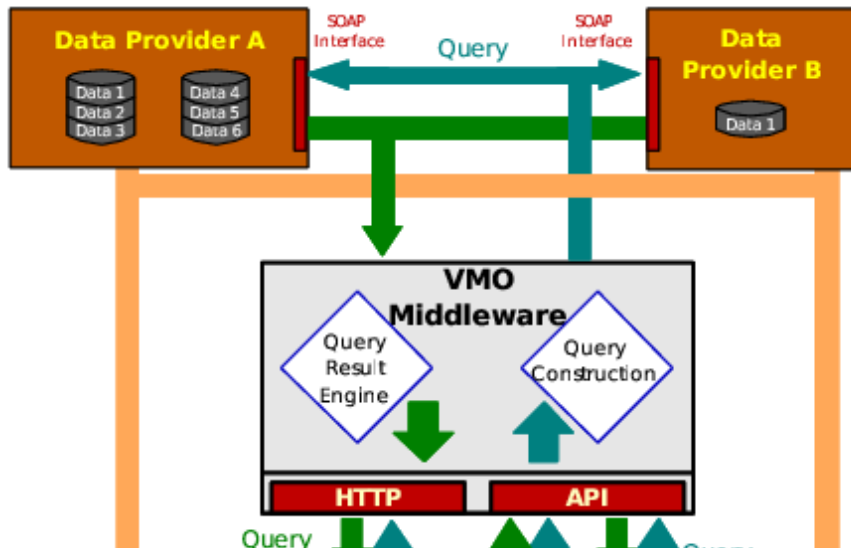
Key technologies:

- SOAP, WSDL, XML, rsync

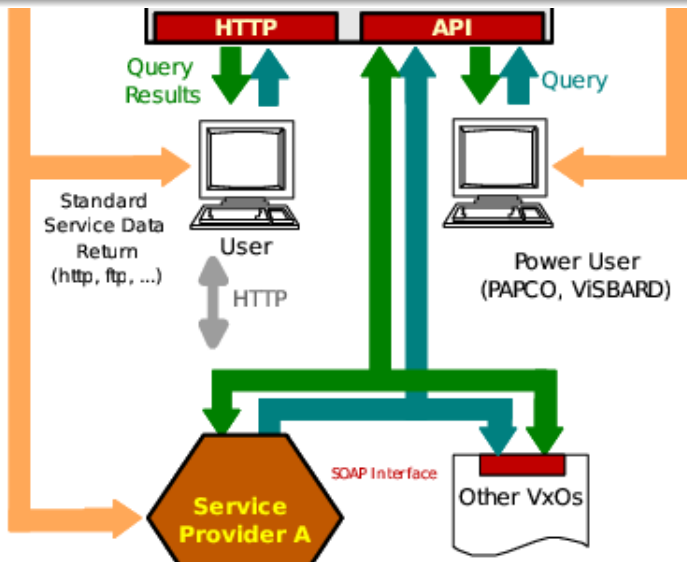
Data model:

- SPASE+

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SPASE+ DATA MODEL

- SPASE+ will be based on the SPASE data model
<http://www.igpp.ucla.edu/spase>
 - Developed by a broad consortium of space physics community members
 - Already used by other VxOs (e.g., VSO, VHO)
 - However, not detailed enough for VMO needs
- Develop SPASE+ in coordination with other VxOs and the SPASE committee (A. Roberts is a member of both the VMO team and SPASE committee)
- SPASE+ extensions will be submitted to the SPASE consortium for a possible inclusion in the next version of the SPASE model

PROJECT TIMELINE

