Developments and projects of the CDPP in the VO perspectives:
AMDA, THEMIS, HELIO, EUROPLANET

Topics

- Using SPASE: the CDPP registry experiment

- National and European projects:
  -Heliophysics(⇒obious need of VOs) : VHM, HELIO
  -Planetology: EUROPLANET

- AMDA, Time-Tables

- Application example:
  The magnetospheric observatory at CDPP/CESR
  (for THEMIS-CLUSTER-GEOTAIL-TC1, …)

CDPP registry

http://pc-225.cesr.fr:8080/CDPPRegistry5/index.html

Contact: gangloff@cesr.fr

- SPASE 1.2.0 descriptors for INTERBALL
- Implemented with the SPASE Registry « Harvester »
- Provides a basic search service (web form)
- Response in XML

Next:

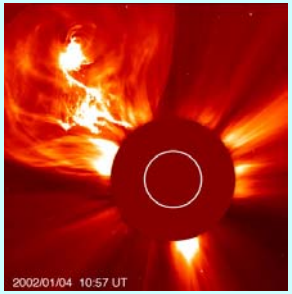
➢SPASE description of the CDPP standardised data and feeding the registry

➢Progressively, SPASE description of the full CDPP archive and feeding the registry

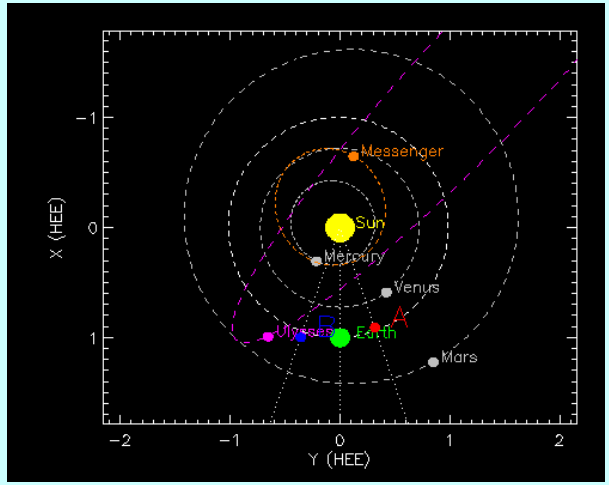
The CDPP databases should be able to be integrated in VOs using SPASE

VO projects in heliophysics

The up-coming “heliospheric” constellation

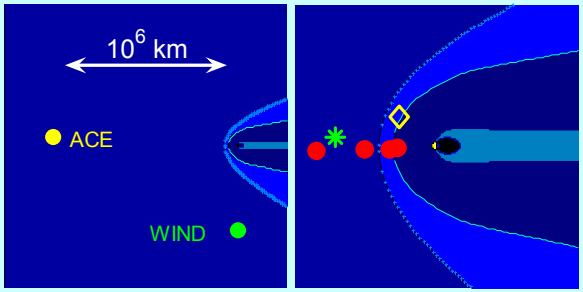


Continuous solar observations:
SOHO, STEREO, SOLAR-B, RHESSI,
Ground observatories

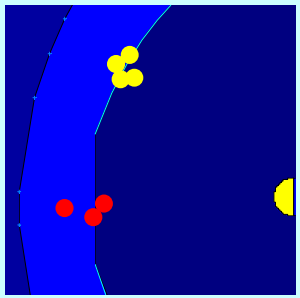


Constellation of probes distributed at large scale :

Heliospheric probes: STEREO-A/B, ULYSSES, VOYAGER
Planetary probes: MESSENGER, VEX, MEX, MGS, CASSINI



Constellation of probes distributed at medium scale around the Earth orbit:
ACE, WIND, THEMIS, GOES,
GEOTAIL, CLUSTER, LANL



Two sub-constellations in small scale cluster configuration

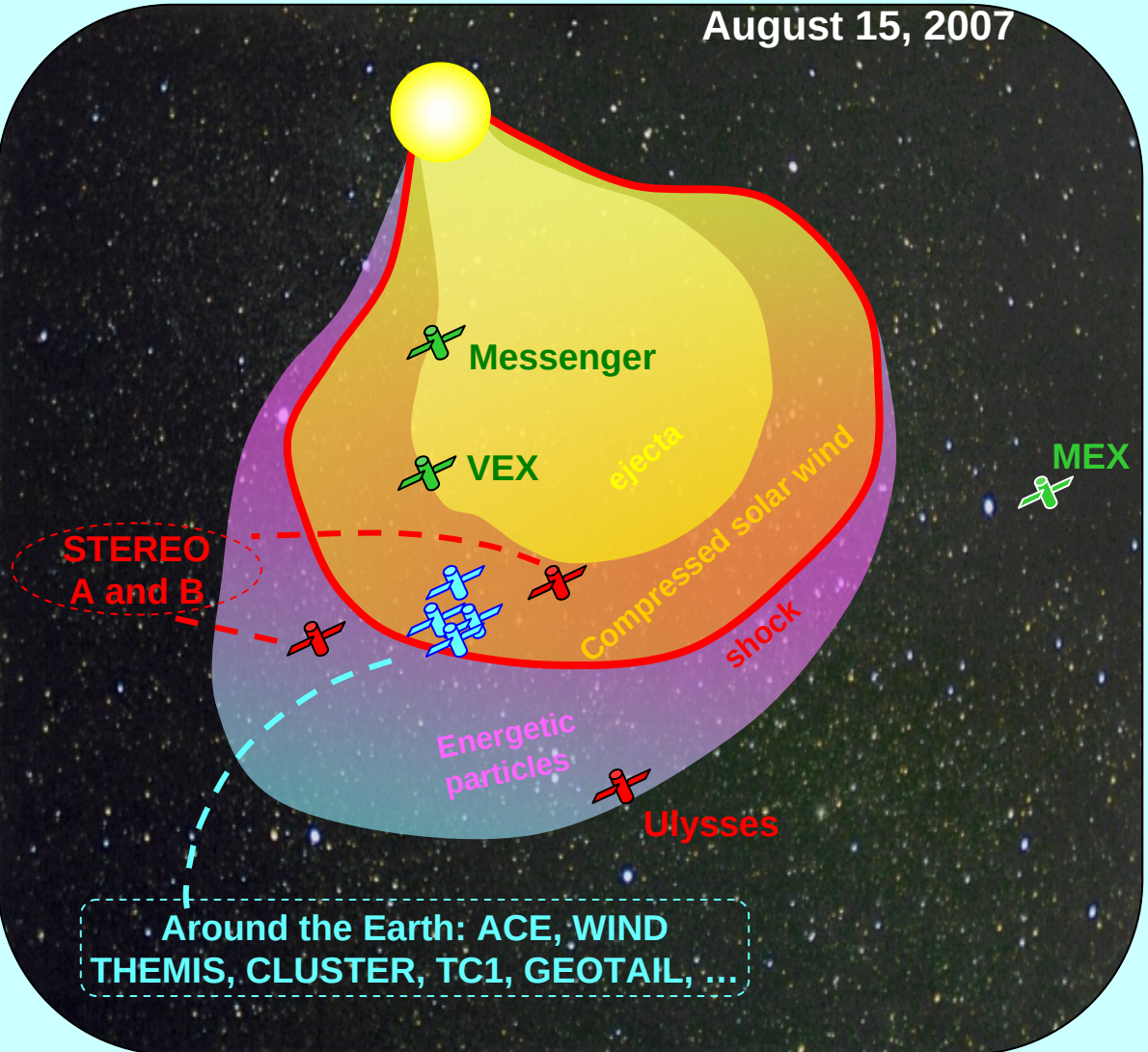
THEMIS, CLUSTER,

+ detailed earth-ionosphere data

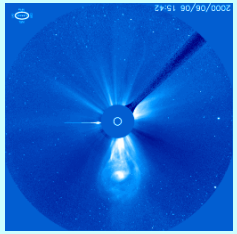
+ astronomical observations (aurora)

Example: study of CME using the heliospheric constellation

- ►Origin and propagation?
- ►Energetic particle acceleration?
- ►Impact of the Earth environment?

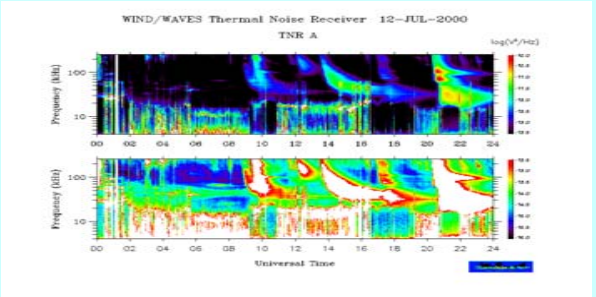


Needs of:

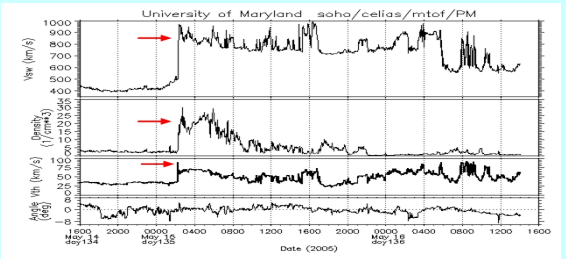


➢Solar data

➢Remote sensing from radio data



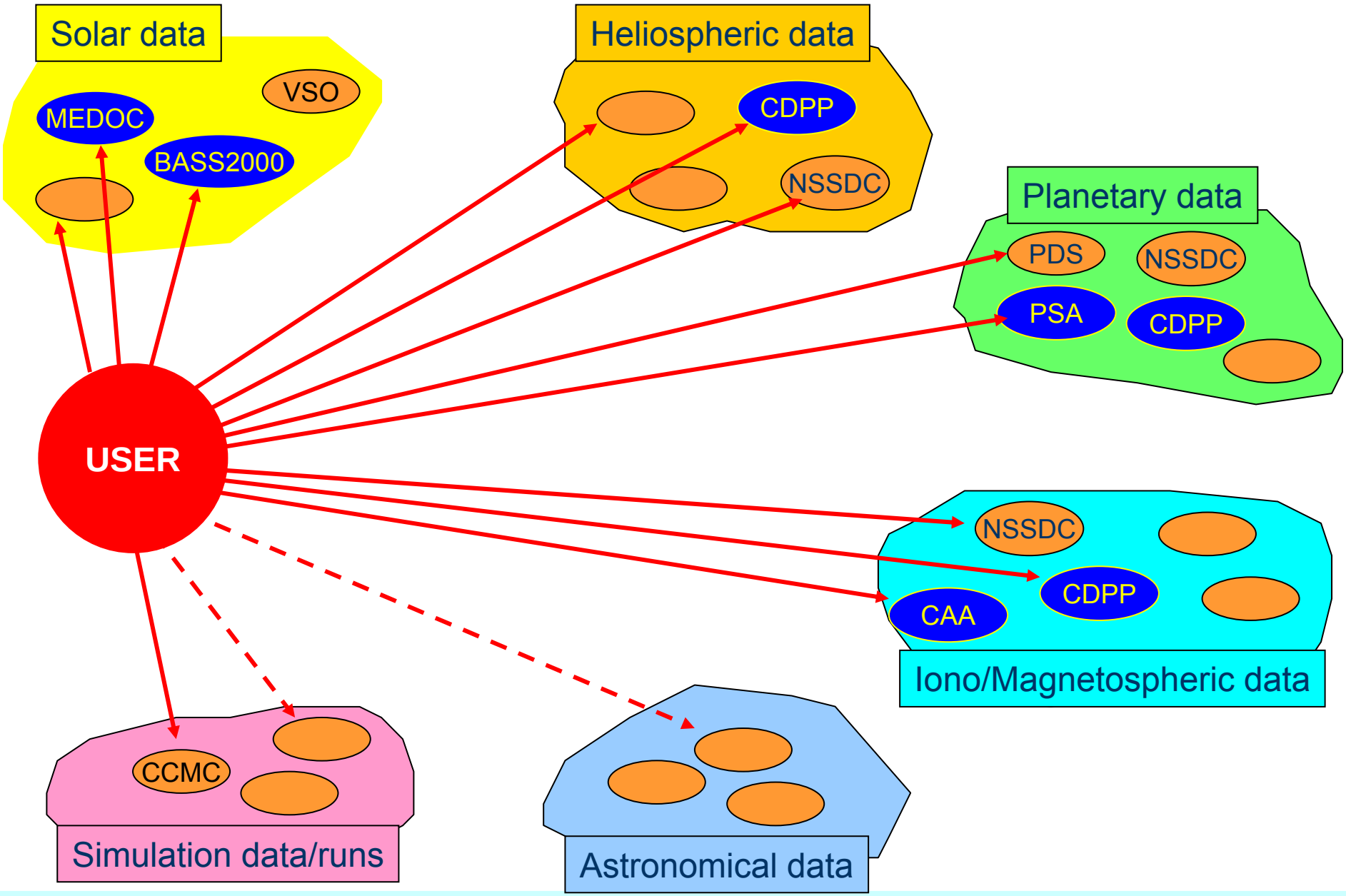
➢In situ measurements



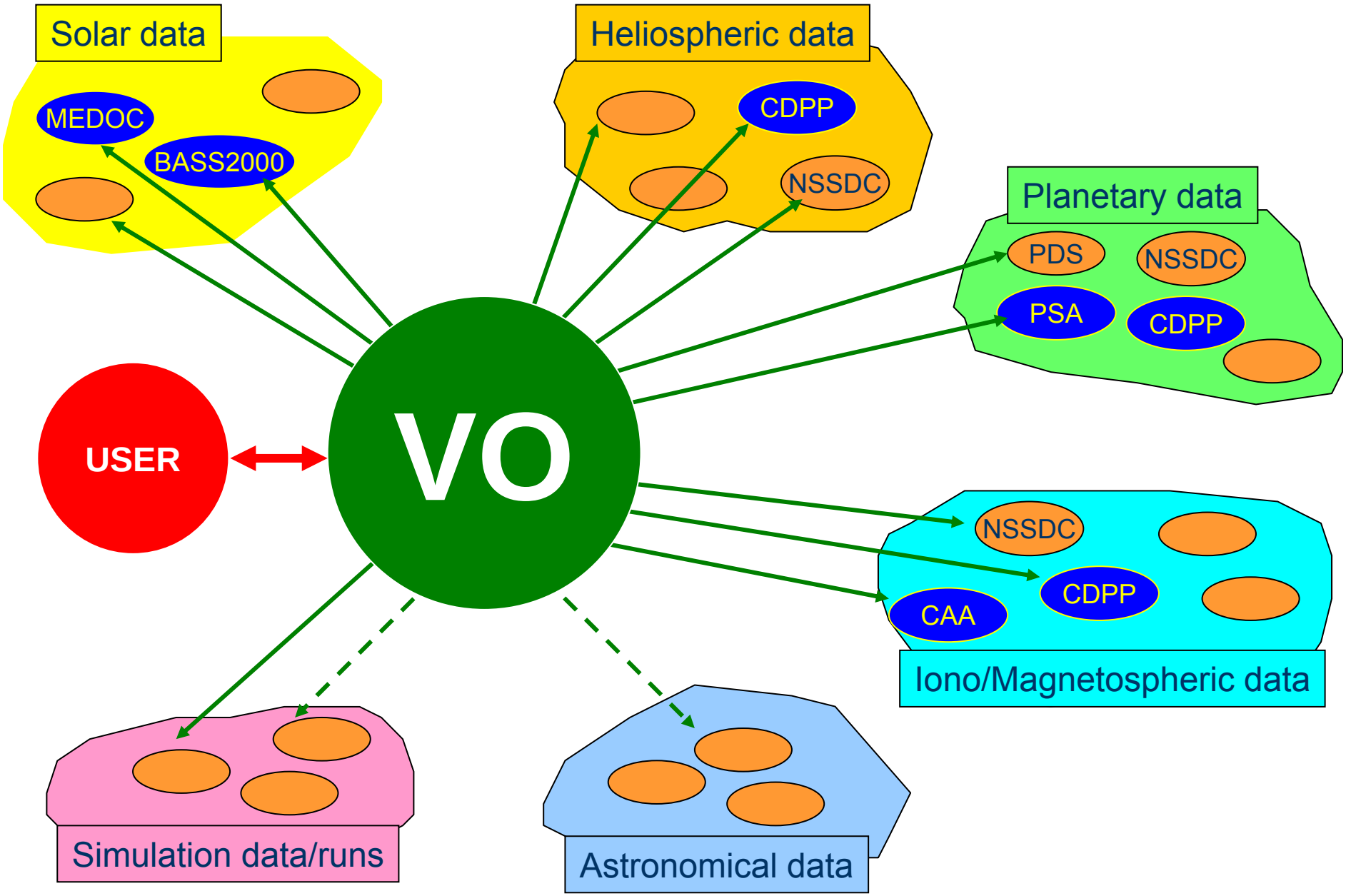
➢Model runs or simulation results

And services for performing their integrated analysis

Necessity for a virtual observatory in heliophysics



Necessity for a virtual observatory in heliophysics



Heliophysics projects for the CDPP

- HELIO, project submitted to the EU

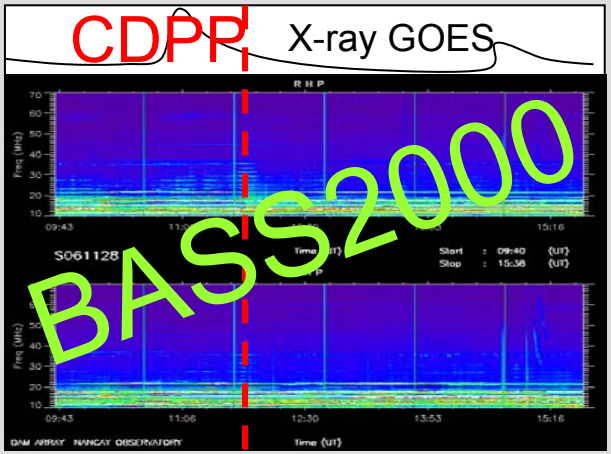
  SPASE inside, likely

  $\Rightarrow$ In selection process

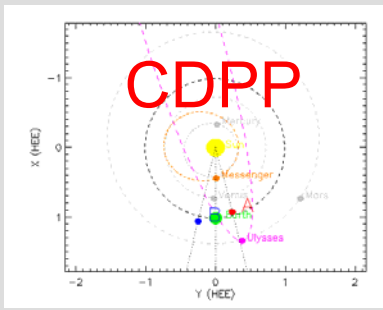
- VHM, Virtual Heliophysics Monitor, CDPP-MEDOC-BASS2000

  $\Rightarrow$simple, for pre-selected data, useful for survey, event search, …
  $\Rightarrow$to be built from AMDA, with little resources
  $\Rightarrow$to be operational before end of 2007

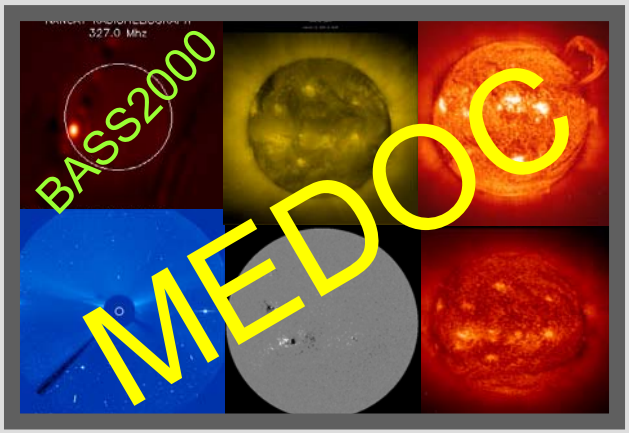
General functions



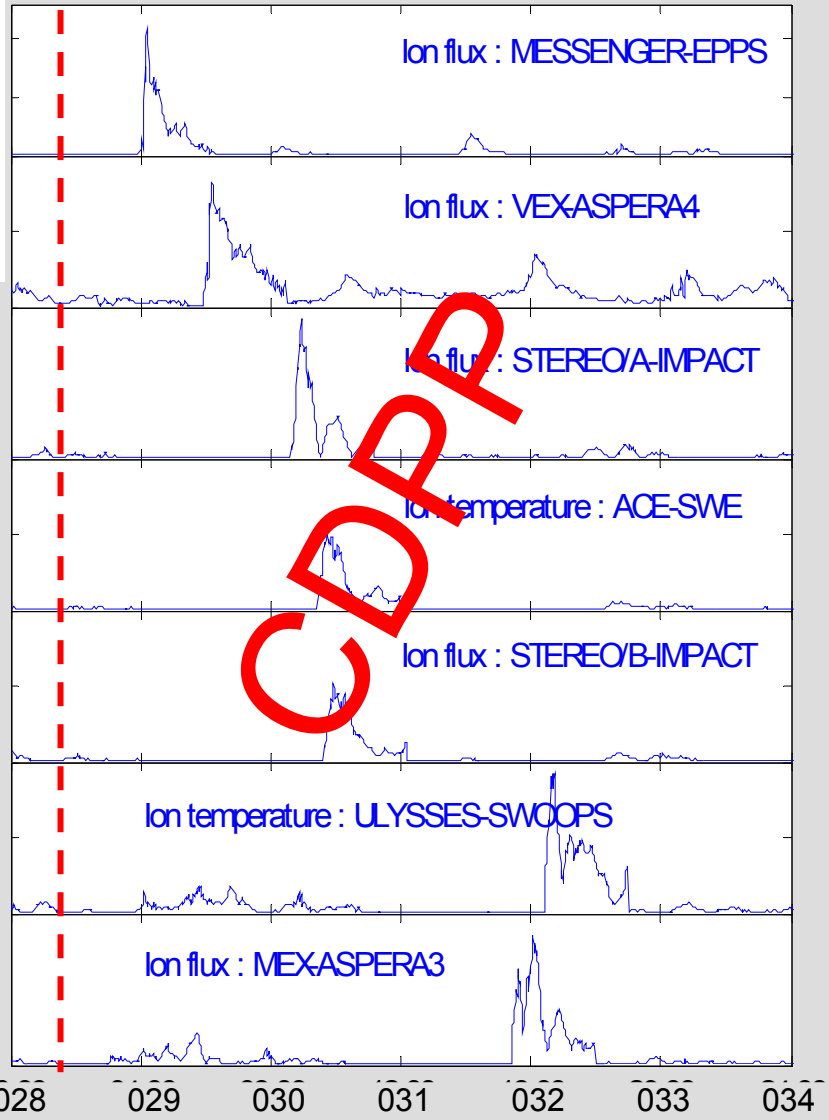
SOL/tools



Time tools



PLAS tools



SOL/Workspace/Composer

PLAS/Workspace/Composer

VO projects in planetology for the CDPP

►FP6: specifications for IDIS, a future planetology VO for the Europlanet project

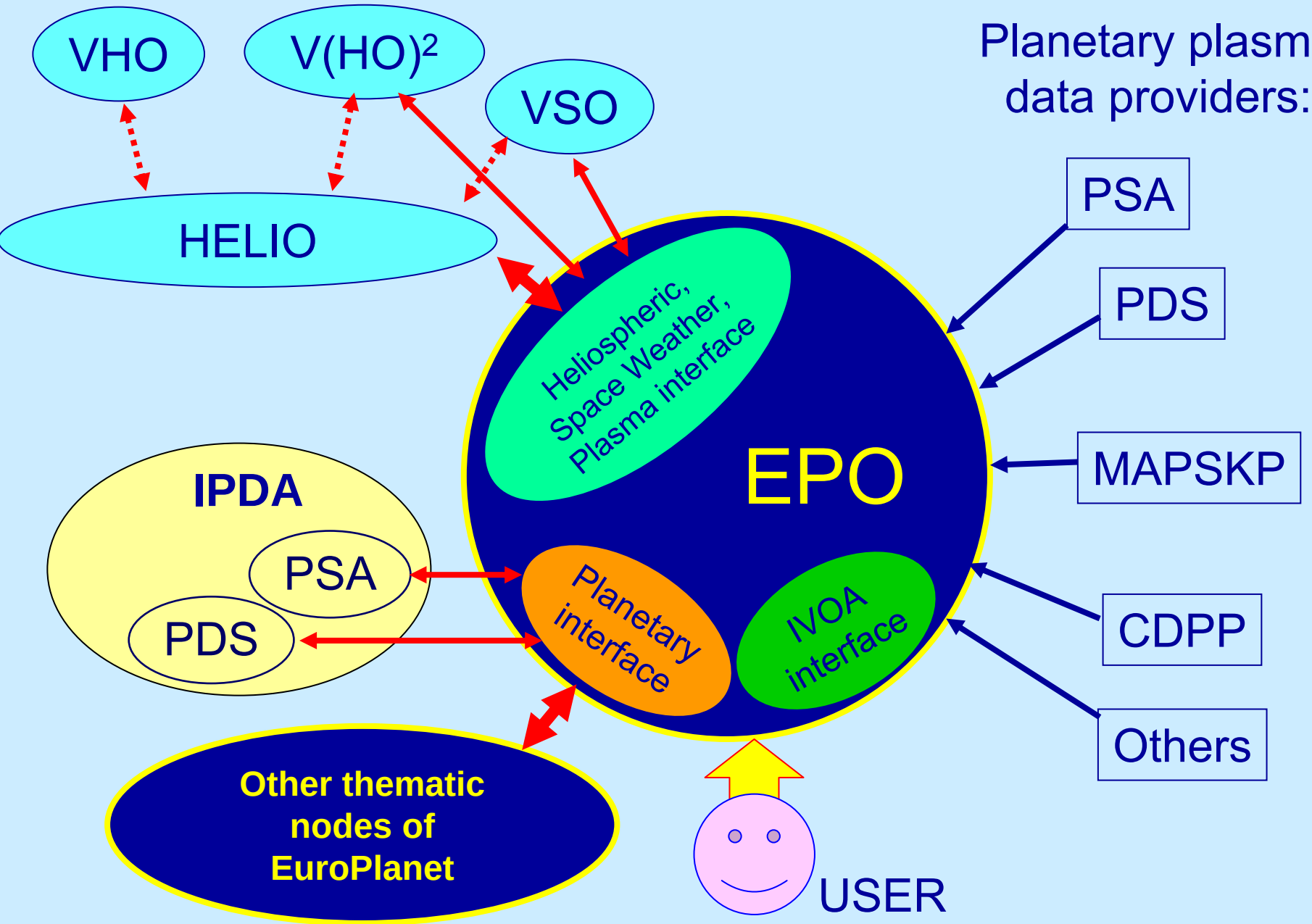
→ thematic nodes / top node organisation
(the CDPP is co-leading institute of the plasma node)
→ use case analysis ⇒ user requirement specifications
→ analysis of the existing norms: PDS, SPASE, (IVOA) ⇒ recommendation
→ science demonstrator using AMDA
→ registry demonstrator using SPASE

Questions:

- Is the PDS standard adapted for building VO?
- Could the SPASE standard be extended in order to describe planetary plasma data?

►Participation to IPDA (International Planetary Data Alliance)

Europlanet Plasma Node (2010-2011)?



AMDA

(Automated Mutiple Dataset Analysis)

http://cdpp-amda.cesr.fr

contact: amda@cesr.fr

AMDA (Automated Mutiple Dataset Analysis)

http://cdpp-amda.cesr.fr

Integrated system allowing to access and exploit multi-set data and time tables, on line, in interactive, semi-automated or fully automated ways.

The system does not work with files but with objects

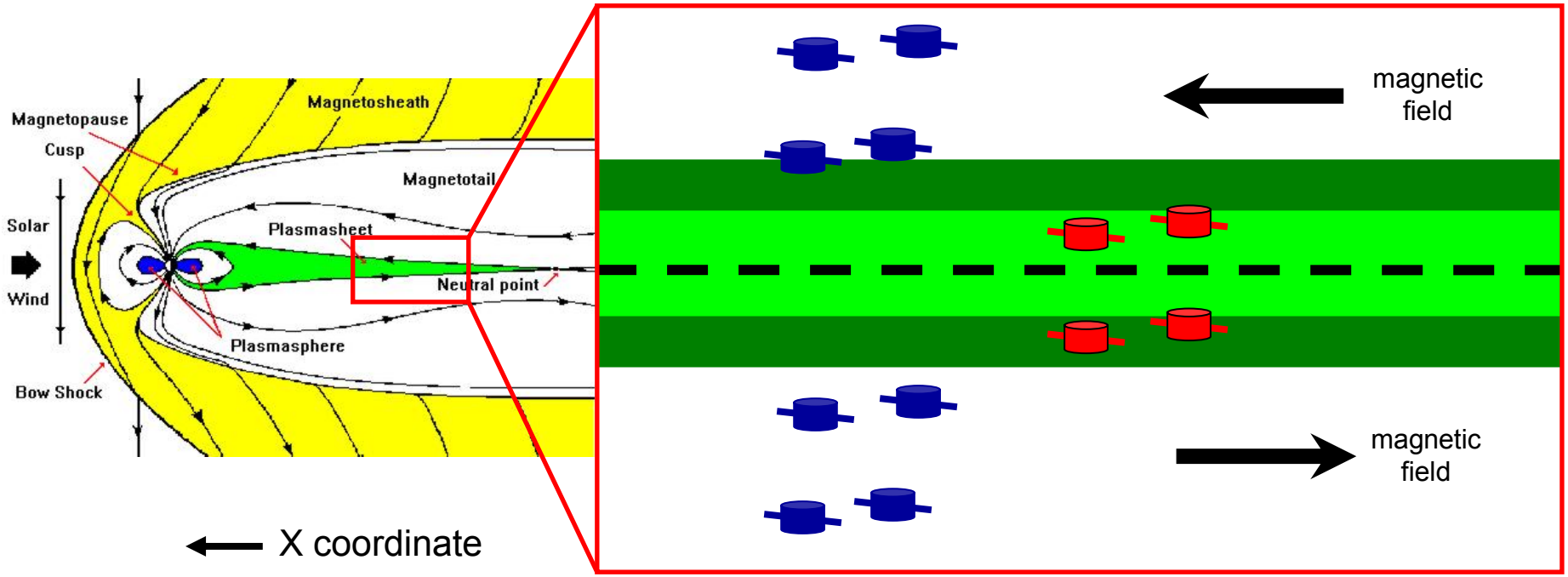
Functionalities:

- ►Automated access to data
- ►Computation of parameters edited by the user
- ►Visualisation. Edition of generic figures
- ►Automated conditional search in respect with criteria edited by the user
- ►Semi-automated search. Visual search
- ►Access to CDPP and CDAWeb data (web-services)

Time Tables ⇐

- -Exploitation of vast databases. Extraction of sub-databases.
- -Exchange between databases, centers or severs.
- -Search, caracterisation, classification of events
- -Construction of catalogues
- -Statistical, systematical, historical studies

An example: search of the events when the cross-tail current is “encircled” by CLUSTER

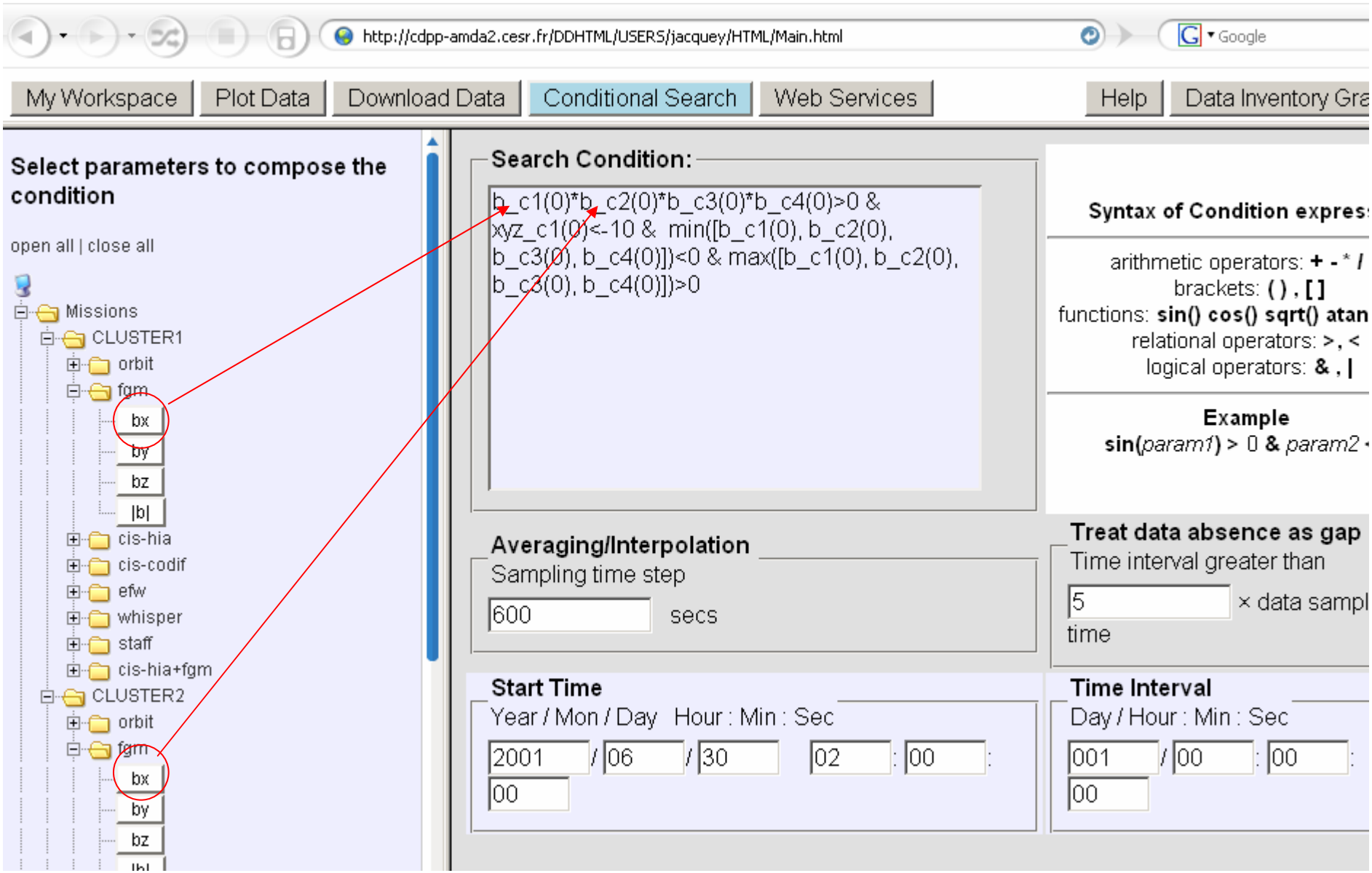


Looking for the time periods when 2 s/c are above the neutral sheet and the 2 other ones are below

Test:

- X1< -10 Re
- $BX_1 * BX_2 * BX_3 * BX_4 > 0$
- $\min([BX_1\ BX_2\ BX_3\ BX_4]) < 0$
- $\max([BX_1\ BX_2\ BX_3\ BX_4]) > 0$

Editing the criteria



AnisotropyTable

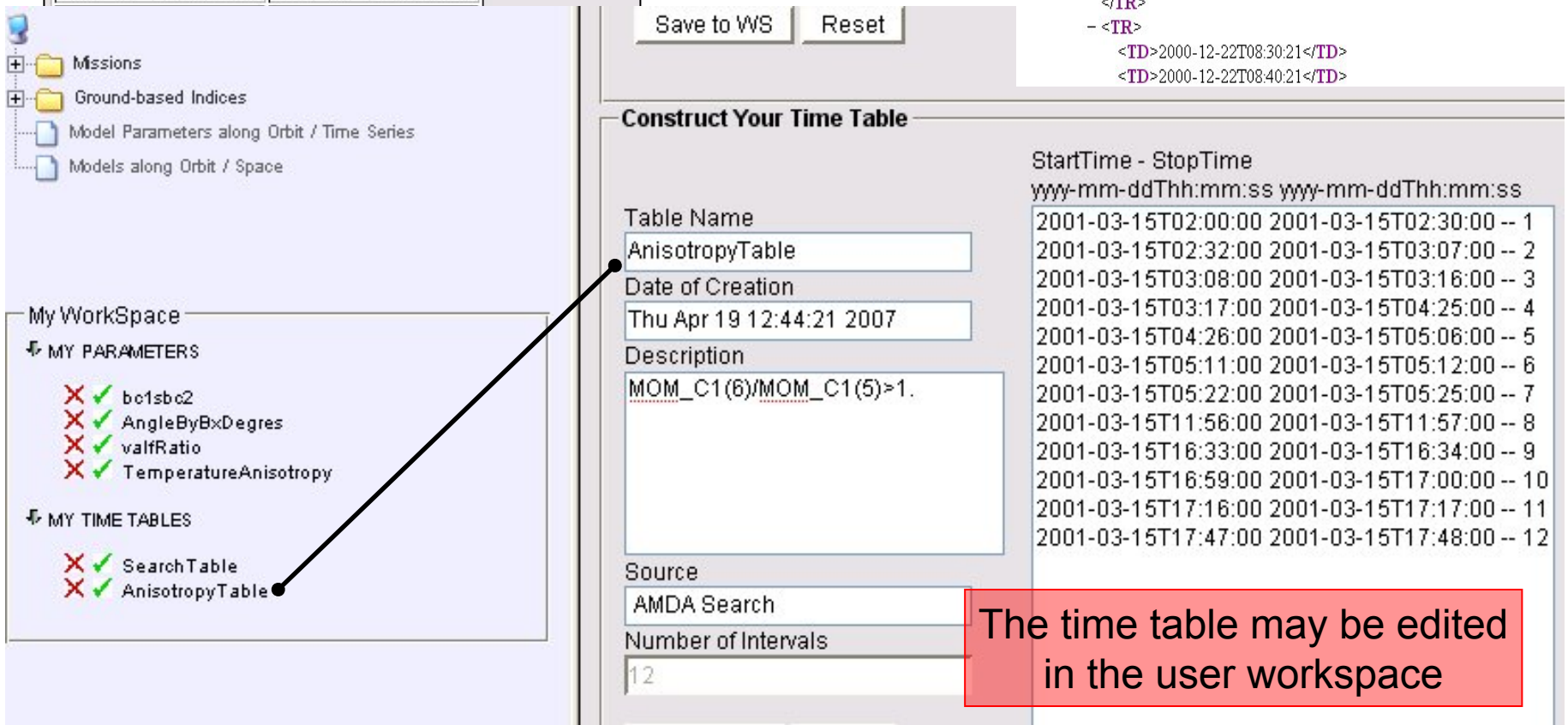
generated Thu Apr 19 12:44:21 2007

under conditions MOM_C1(6)/MOM_C1(5)>1.

StartTime	StopTime
2001-03-15T02:00:00	2001-03-15T02:30:00
2001-03-15T02:32:00	2001-03-15T03:07:00
2001-03-15T03:08:00	2001-03-15T03:16:00
2001-03-15T03:17:00	2001-03-15T04:25:00
2001-03-15T04:26:00	2001-03-15T05:06:00
2001-03-15T05:11:00	2001-03-15T05:12:00
2001-03-15T05:22:00	2001-03-15T05:25:00

Tables may be exported in VOTable format

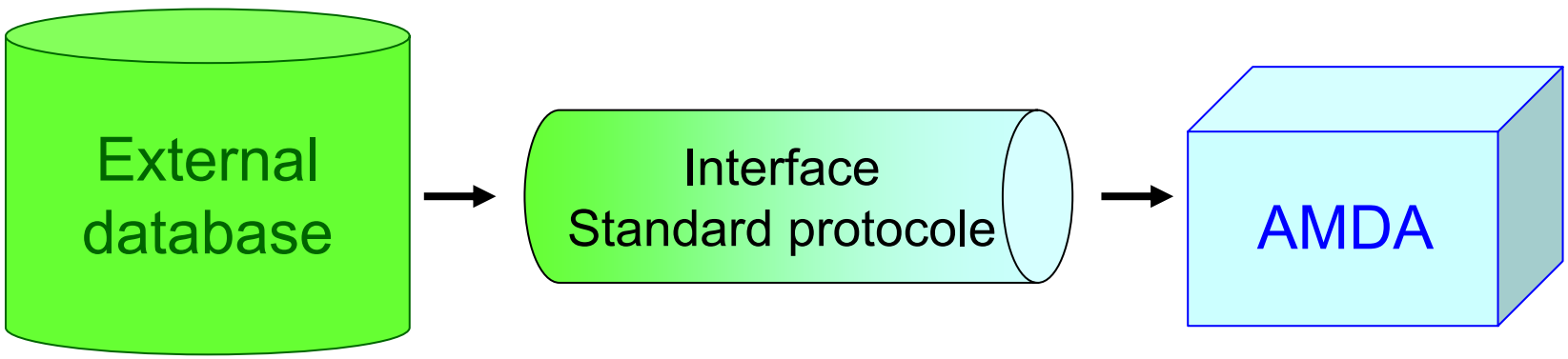
```
<VOTABLE version="1.1" xsi:schemaLocation="http://www.ivoa.net/xml/VOTable/v1.1 C
- <DESCRIPTION>
    List of shocks from: http://www.sp.ph.ic.ac.uk/~eal/shocks-staffsa-031022.txt This list has
    from this time to get Start Time we add 5 minutes to this time to get Stop Time Creation Da
  </DESCRIPTION>
- <RESOURCE>
    <DESCRIPTION> SPACECRAFT=CLUSTER </DESCRIPTION>
  - <TABLE>
    - <FIELD datatype="char" name="Start Time" ID="TimeIntervalStart" ucd="time.start"
        <DESCRIPTION>time tag for beginning of interval</DESCRIPTION>
      </FIELD>
    - <FIELD datatype="char" name="Stop Time" ID="TimeIntervalStop" ucd="time.stop"
        <DESCRIPTION>time tag for end of interval</DESCRIPTION>
      </FIELD>
    - <DATA>
      - <TABLEDATA>
        - <TR>
            <TD>2000-12-22T08:19:49</TD>
            <TD>2000-12-22T08:29:49</TD>
          </TR>
        - <TR>
            <TD>2000-12-22T08:30:21</TD>
            <TD>2000-12-22T08:40:21</TD>
```



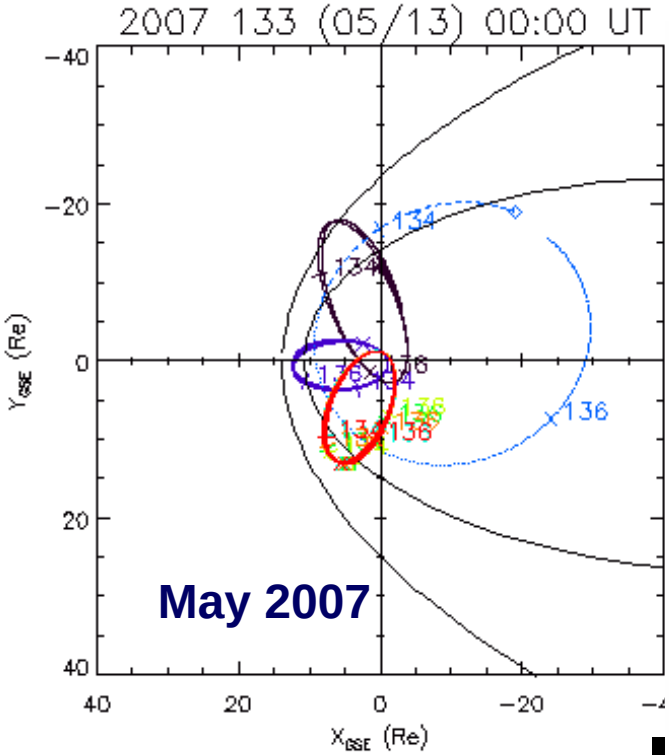
The time table may be edited in the user workspace

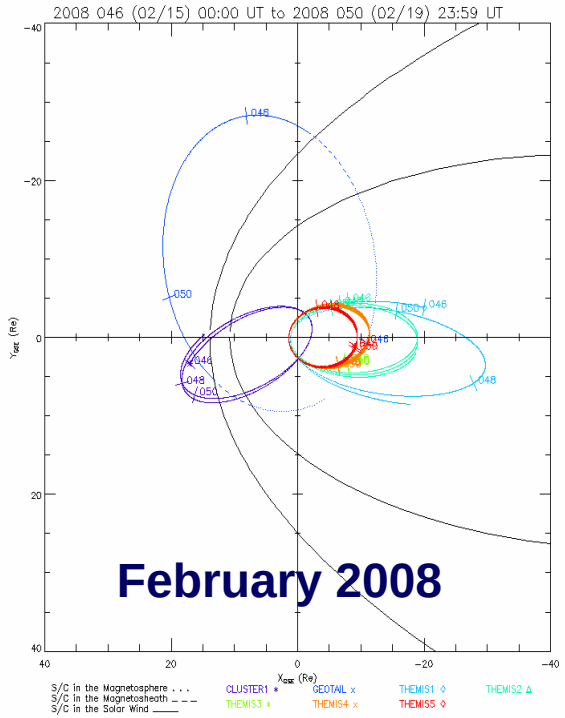
AMDA-NG (New Generation)

- Refactoring AMDA
- Some of the targets:
  - AMDA-NG independent of the databases it uses
  - A SPASE compatible interface



Application: Magnetospheric observatory





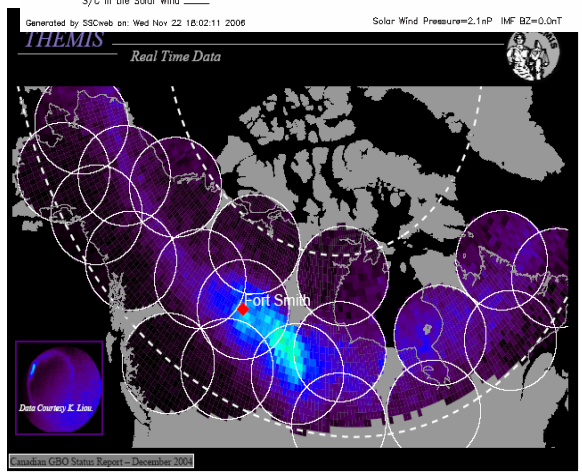
A lot of space data:

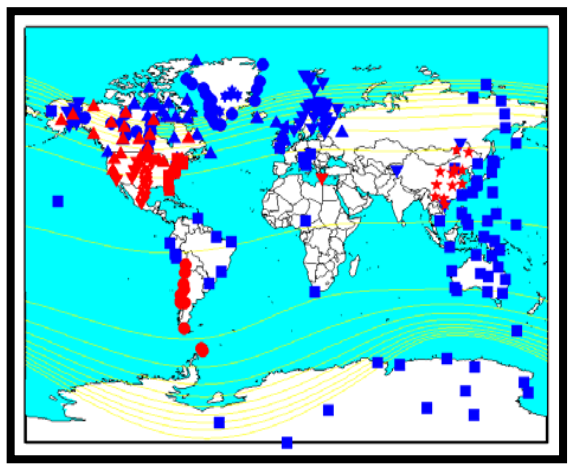
THEMIS, CLUSTER, DoubleStar, GEOTAIL,POLAR, DEMETER, geosynchronous,

ACE, WIND

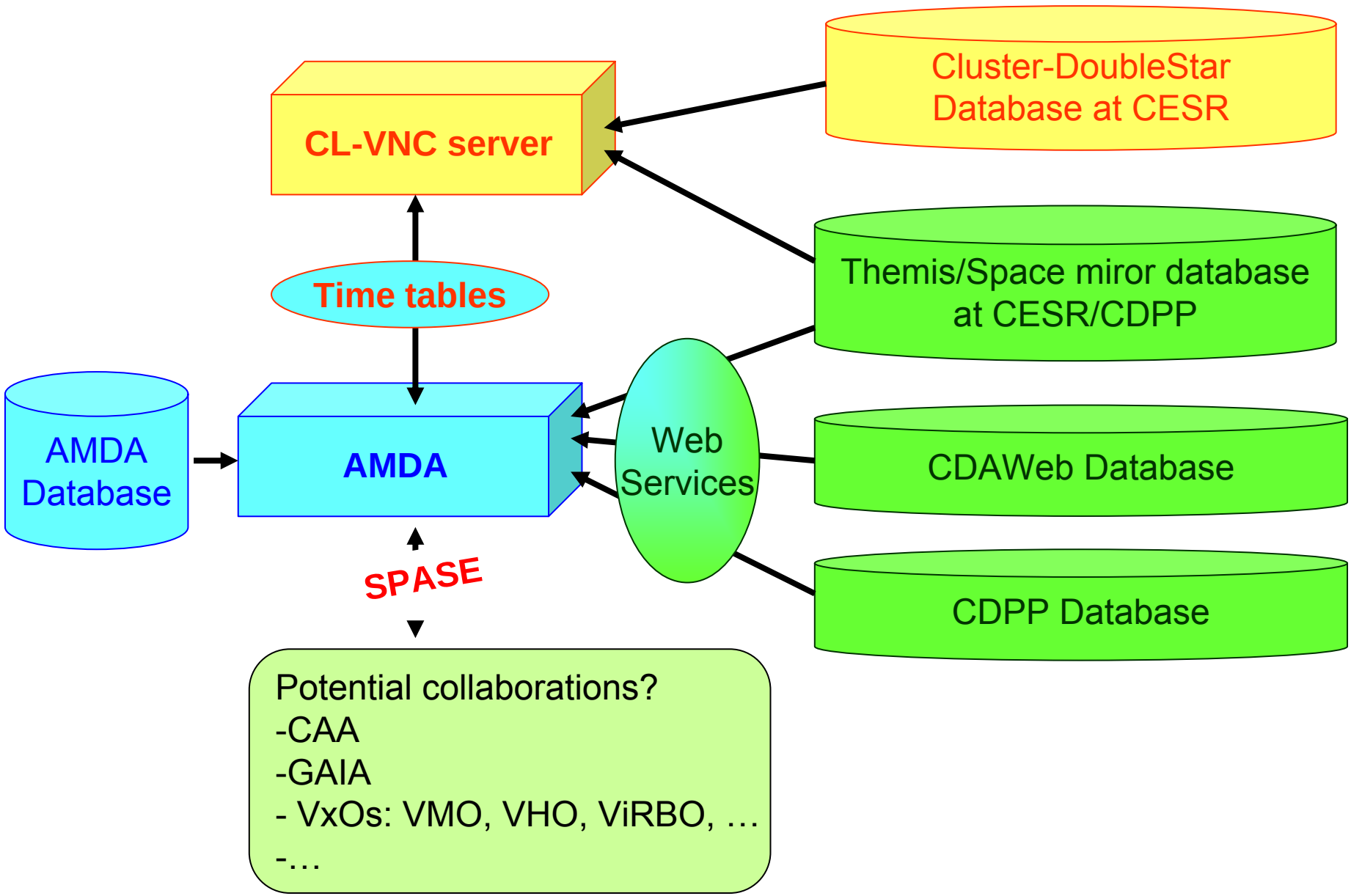
A lot of ground data:

Magnetometers, imagers, …





Magnetospheric observatory at CDPP/CESR



Conclusion

- The CDPP develops (or is going to) SPASE compatible interfaces for
  - -its databases
  - -Its tools

- The CDPP participates to European (HELIO, EuroPLANET) and national (VHM) projects of VOs in heliophysics and planetology, and promotes the use of SPASE

⇒ Extension of SPASE toward planetary plasma data?

- The CDPP develops a magnetospheric observatory (Themis, Cluster, DoubleStar, Geotail, …)

- The CDPP develops AMDA, a Automated Multi-Dataset Analysis tool

⇒Time Tables (Event Lists) should play a key role in future VOs

How do to describe them?