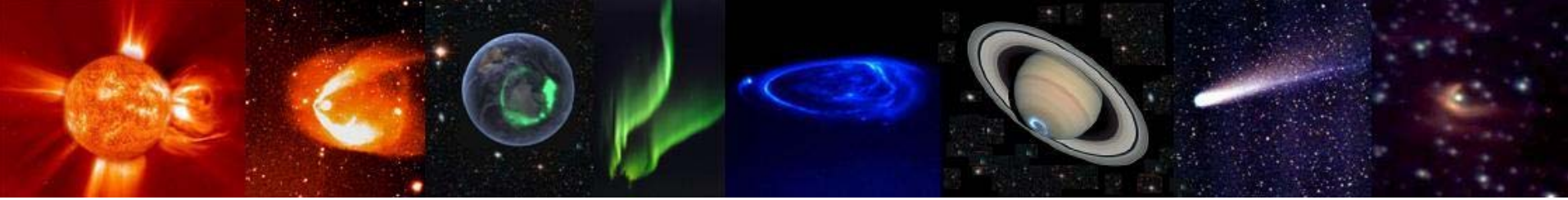
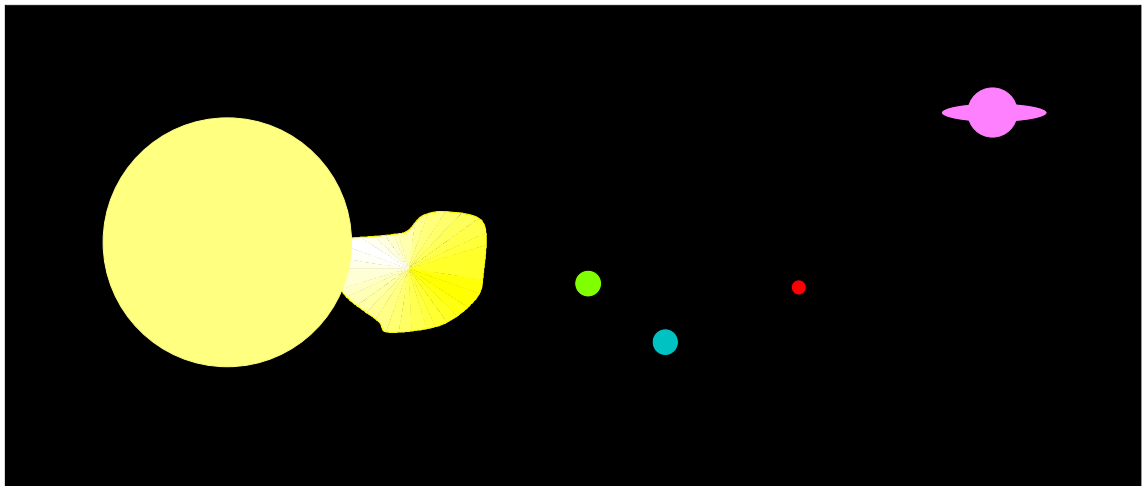


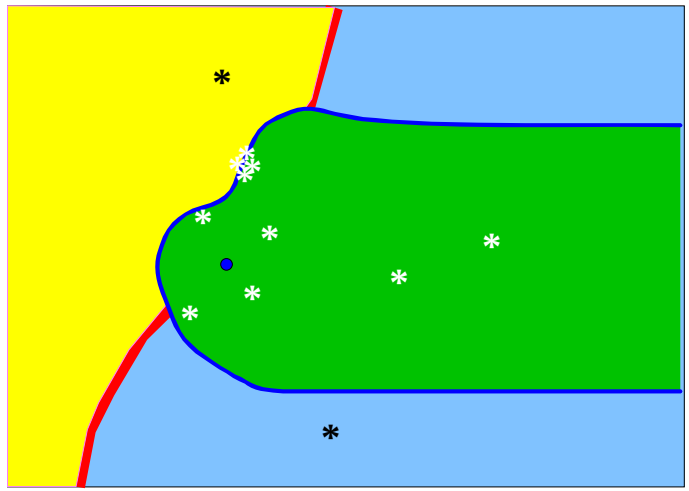
Participation du CDPP au développement des OV: SPASE, HELIO, Europlanet...

Christian Jacquey

The CDPP (Centre de Données de Physique des Plasmas) is the french national centre of natural plasma data.

Etude des phénomènes et objets plasmas





Les études des phénomènes plasmas font appel à:

- des données obtenues à partir d'observatoires multiples
- et pour chaque observatoire, à partir d'instruments multiples

Etude de phénomènes dynamiques

$\Rightarrow$ le temps joue un rôle central

$\Rightarrow$ besoin de modèles propagatifs

Les besoins des utilisateurs dans nos disciplines

- Grande masse de données, variées, présentant souvent des structures complexes et non-uniformes.
  - ⇒Aide à la recherche de données
  - ⇒Outils d'exploration automatisée du contenu des données

- Etude multi-observatoires et multi-instruments
  - ⇒Accès aux données dans une forme utilisable
  - ⇒Outils et services aidant à l'analyse intégrée de données multi-jeux.

Context

- SPASE (Space Physics Archive Search and Extract elaborates the norm (data model and dictionnary) for space physics data exchange
  $\Rightarrow$**First version released end of 2006.**

- Based on SPASE, several VOs in the solar or plasma physics fields are in construction in the USA

- In Europe, the FP7 has been opened

In the scientific view, the present period offers fantastic opportunities for building-up progresses.
Many missions are flowing simultaneously.
It is now the righ time for developing VOs in our disciplines.

Space Physics Archive Search and Extract

Space Physics Archive Search and Extract (SPASE) Consortium

Announcements:
SPASE face-to-face meeting (July 9-11, 2007) more...

Have a question?
Ask SPASE

The SPASE data system is a model for scientific data systems. It is based on the latest web-based technologies and is designed to be a distributed data systems with a heterogenous mix of platforms and systems.

These pages focus on the data model for the SPASE data system. The data model includes the structure of messages passed between systems; how to enrich data for interchange and archiving; and a data dictionary defining all terms and keywords used in the system. A full description of the data model is included under Documents.

Also included are examples that implement the data model.

Tools to demonstrate the utility and capability of the SPASE metadata and framework

If you should have any questions or comments please contact us.

Data Model Document

Current Version (1.2.0)
Released: 2007-05-22
Current Draft (1.2.1)
updated: 2007-09-24
Current Draft (1.3.0)
updated: 2007-09-24
All documents

Services

Control Authority

Data Dictionary

Search
Tree
XML Schema
XML Stylesheet
XML Templates
XMI Models
Ontologies

News

Situation at CDPP in 2005

Data were available only in the native format

Very few services available, poor added value on the data

Collections of data not complete enough for scientific exploitation

For 2005, the CDPP invest efforts in:

- -restructuring its system
- -developing a new format
- -extending its local database and accessing to distant databases
- -developing tools and services in the “prototyping way”
- -implementing interoperable services
- -participating in international and european VO projects
- -Information and exchange system for the development team and the users (twiki)

Access to distant databases

The CDAWeb made available web-services:

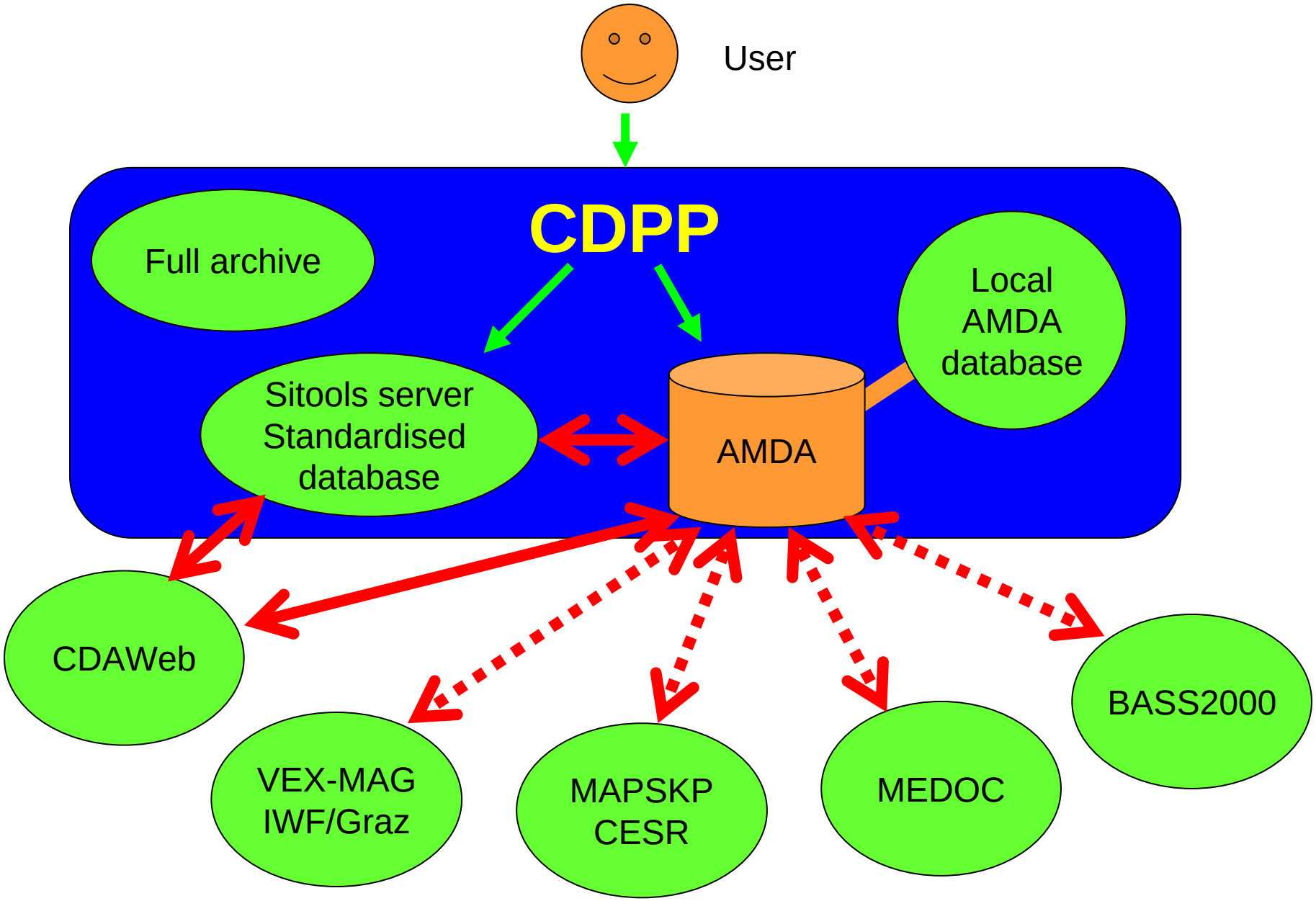
-Web-services for asking information on the database content, on the available datasets
-for requesting data and extracting them on the flight.

These web-services have been implemented at CDPP (in test version)

- In its SITOOLS data servers
- In its integrated analysis tool AMDA

Web-services have been developed in order to access to the standardised database of CDPP (SITOOLS server) from AMDA

Schematic map of data access at CDPP

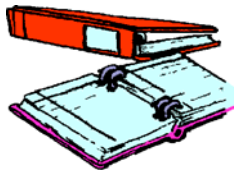


AMDA

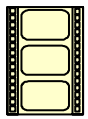
Automated Mutli-Dataset Analysis

Example: event search

Old fashion: “paper” search

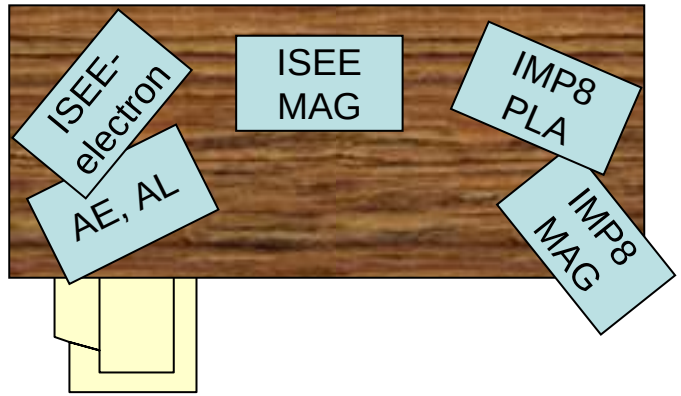


AE, AL

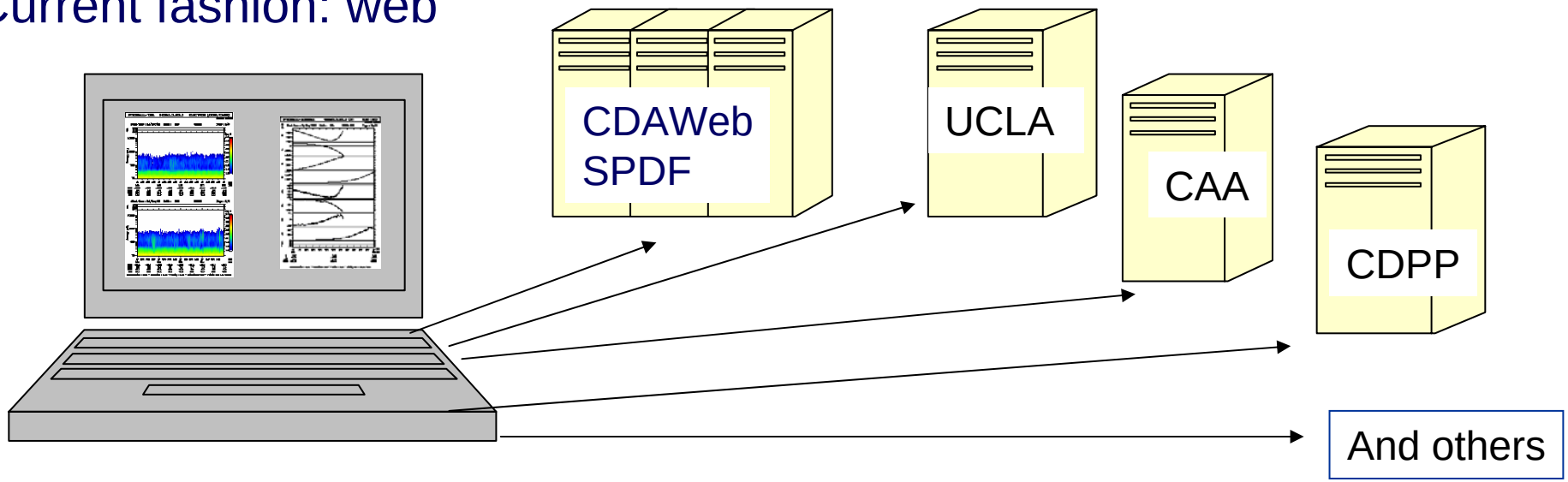


ISEE-data

IMP-8



Current fashion: web



Event search takes time and energy

AMDA (**A**utomated **M**utiple **D**ataset **A**nalysis)
http://cdpp-amda.cesr.fr

Système intégré permettant d'exploiter en ligne et de façon transparente des données multi-jeux et des tables d'événements.

Le système ne travaille pas avec des fichiers de données mais avec des objets.

Fonctionnalités:

- ►Accès automatisé aux données
- ►Calculs de paramètres édités par l'utilisateur
- ►Visualisation. Edition de figures génériques
- ►Recherche conditionnelle d'événements automatisée selon des critères éditables
- ►Recherche semi-automatisée d'événements (sélection visuelle)
- ►Accès à des données distantes (web-services)

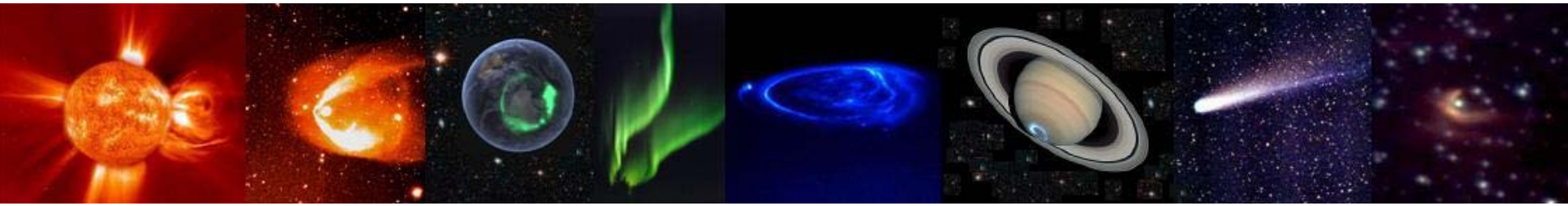
Tables d'événements ⇐

-Exploitation de vastes bases de données
-Echange entre bases de données et serveurs
-Recherche, caractérisation, classification d'événements
-Construction de catalogues
-Etudes statistiques, systématiques, historiques
-Constellations virtuelles

Scientific targets

- Heliophysics, Sun-Earth relationships
- Magnetospheric physics
- Planetology

Heliophysics

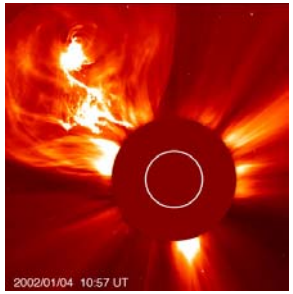


- National project: VHM, Virtual Heliophysics Monitor, CDPP-MEDOC-BASS2000
Demonstrator, in phase A

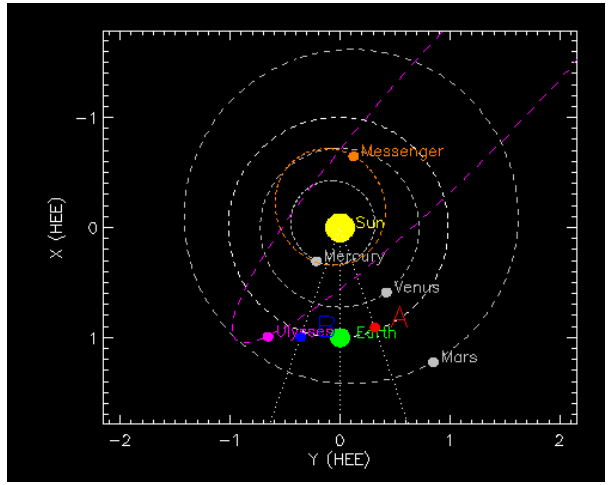
- European project: HELIO, FP7 proposal submitted to EU for building a European VO in heliophysics. In selection process.

- V(HO)2, NASA proposal for building a supra-VO in heliophysics, not selected

The multi-scale heliospheric constellation

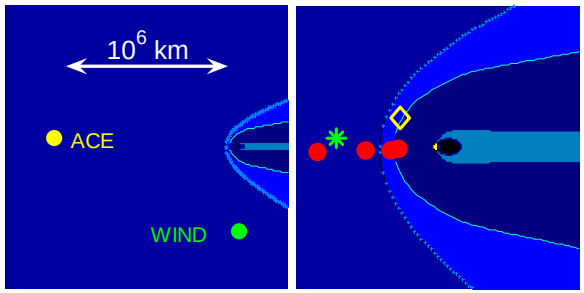


Continuous solar observations:
SOHO, STEREO, HINODE, RHESSI,
Ground observatories

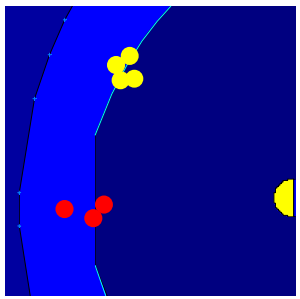


Constellation of probes distributed at large scale :

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



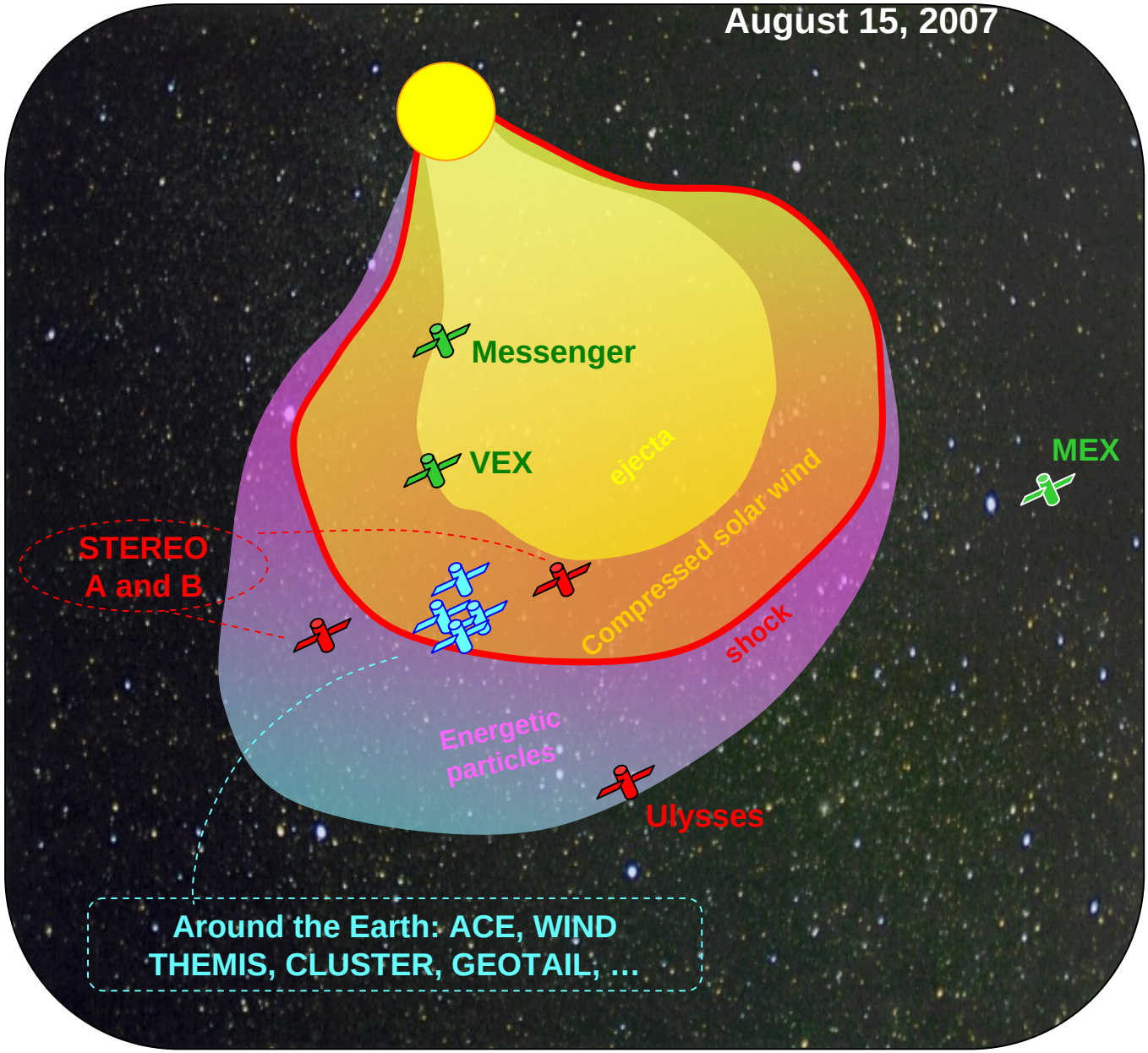
Two sub-constellations in small scale cluster configuration

THEMIS, CLUSTER,

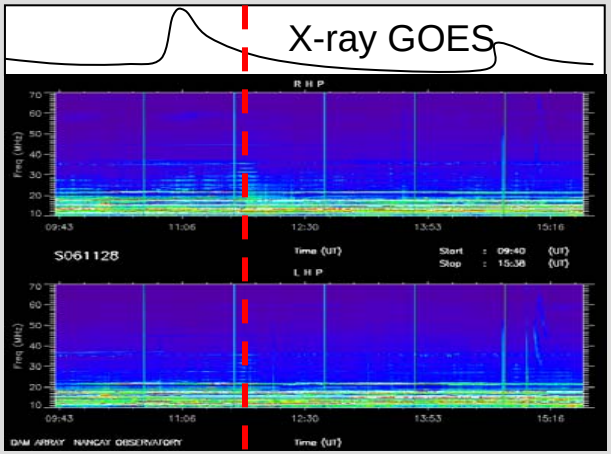
+ detailed earth-ionosphere data

+ astronomical observations (aurora)

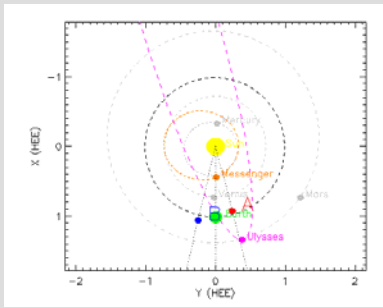
Large scale constellation



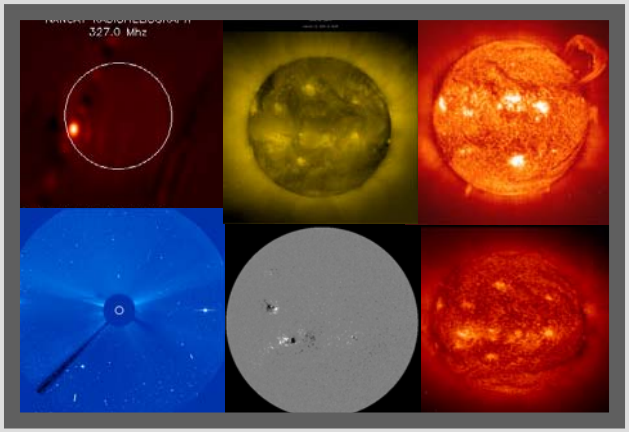
General functions



SOL/tools

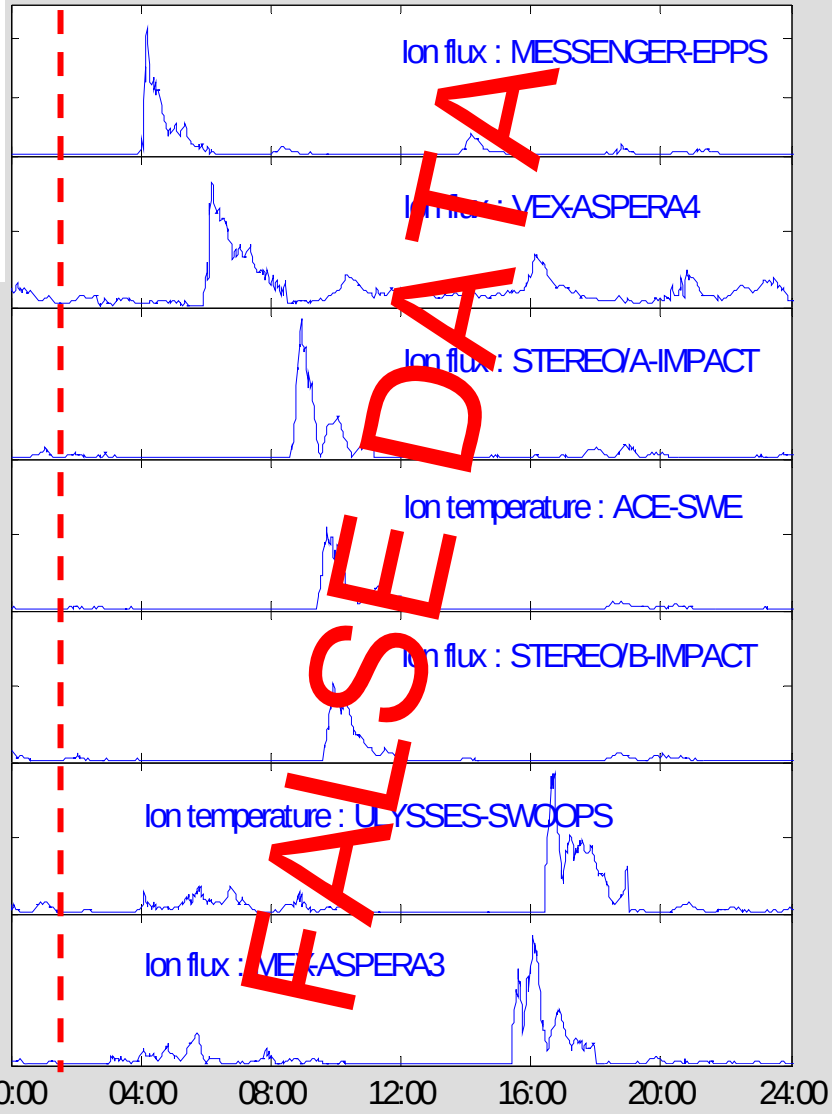


Links to simulation



PLAS tools

Time tools



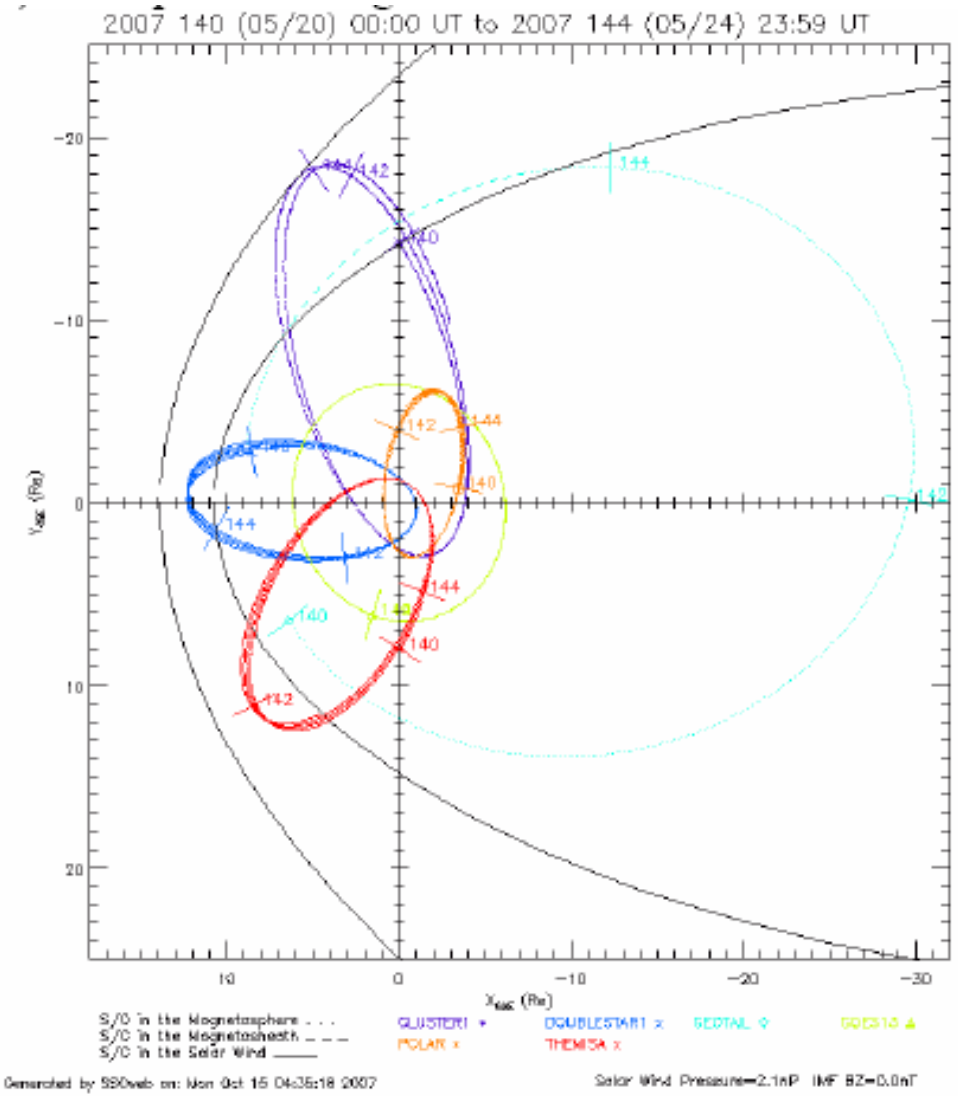
SOL/Workspace/Composer

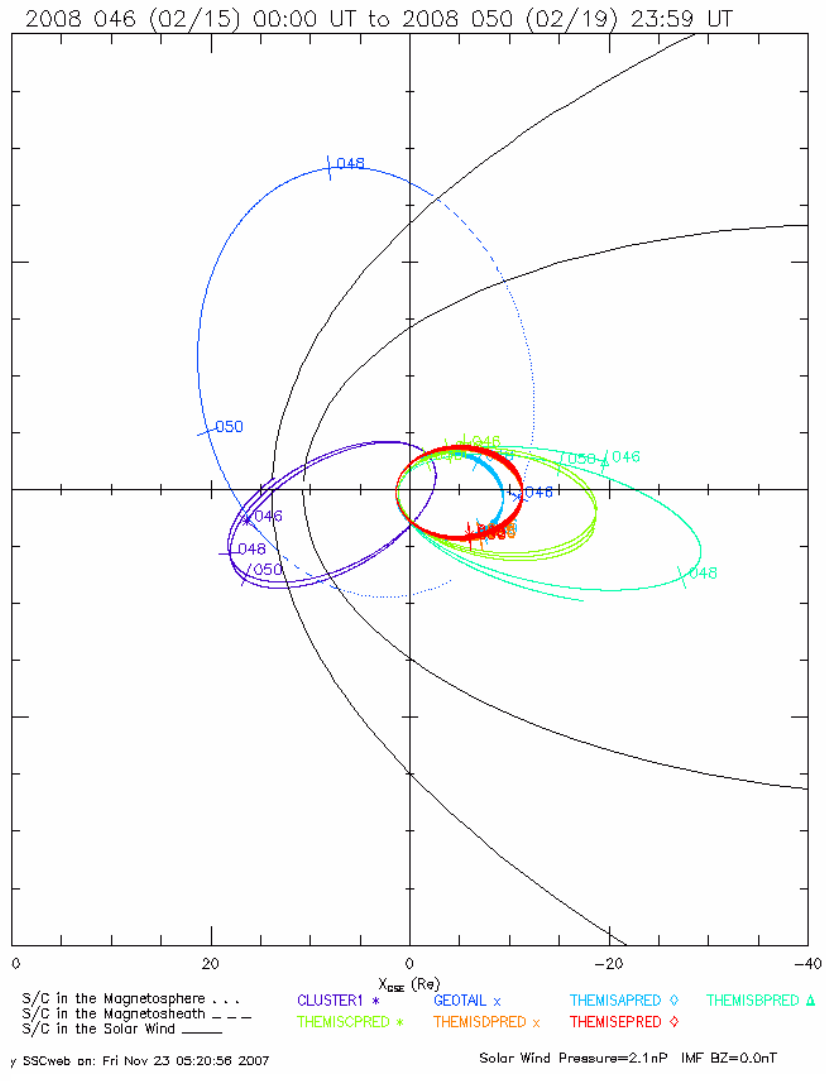
PLAS/Workspace/Composer

Magnetospheric physics

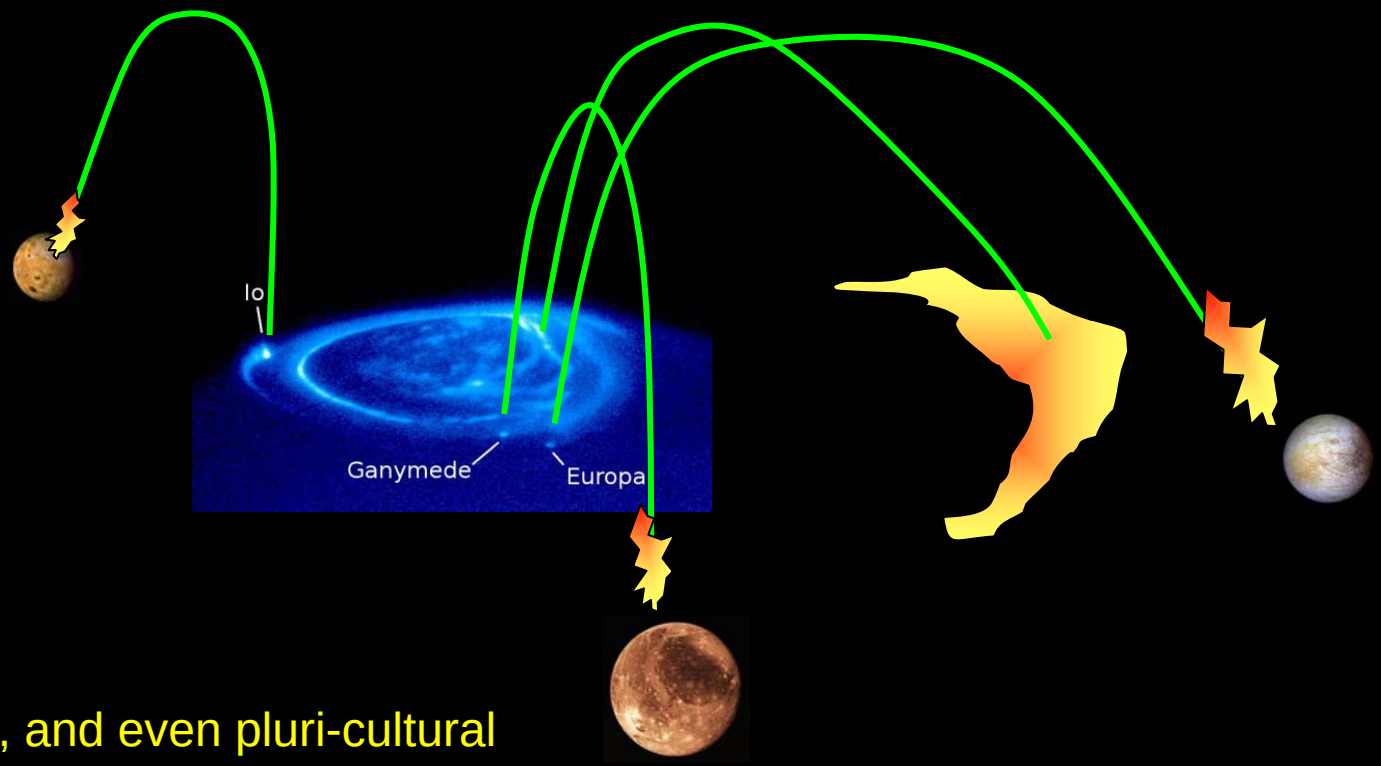
- Large-scale process at the origin of substorm
- Instabilities
- Multi-scale dynamics of the magnetopause versus solar wind or magnetosheath conditions
- Particle acceleration (shock, magnetotail, cusp, …)
- Turbulence
- … (so many interesting topics)

The magnetospheric constellation





Planetology



Challenges:

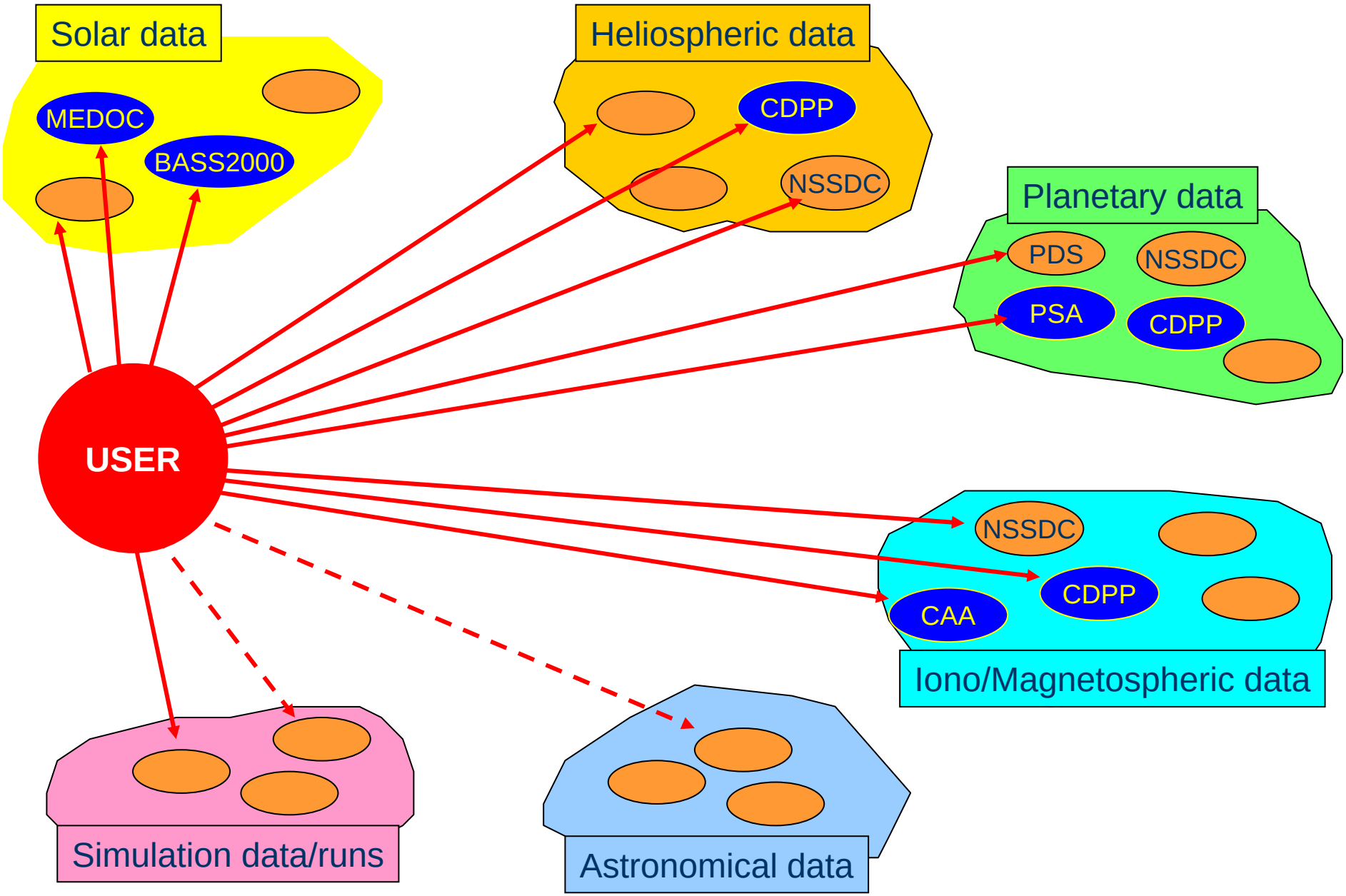
- Pluri-disciplinary, and even pluri-cultural
- Extrem diversity of the data and tools

The CDPP is co-leading institute of the Plasma Node of the Europlanet project

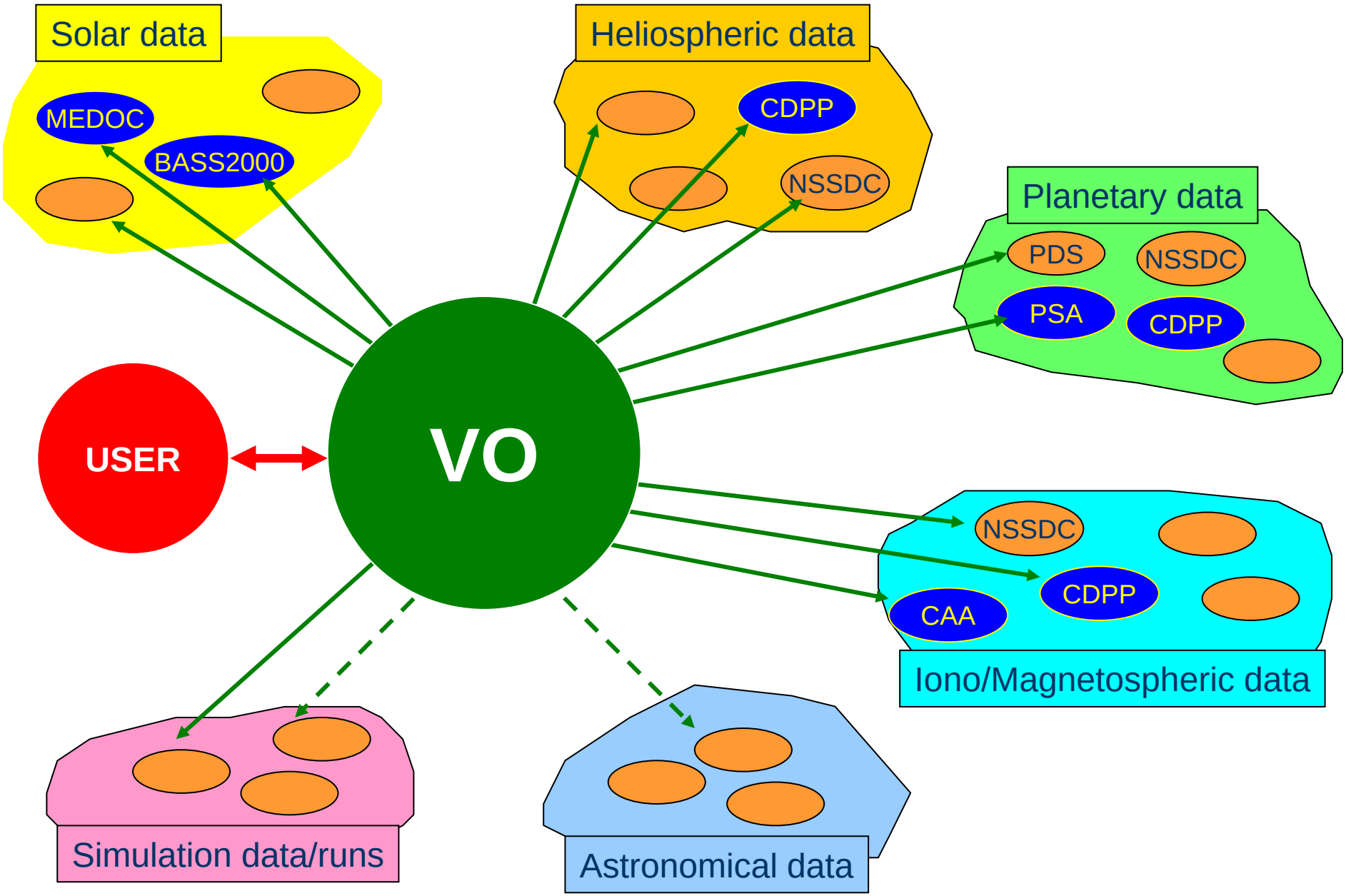
Planetology

- Comparative study
- Dynamics of the planetary ionised environment versus solar wind conditions
- Plasma interaction with moons, rings, dust, neutrals …
- Magnetosphere without ionosphere (Mercury)
- Multi-species plasmas
- Plasmas in small structures (comets, $L < R_L$)
- Global studies of the whole planetary objects

Necessity to access to many data and tools



A virtual observatory



Two main classes of data

Main reference: spatial coordinates. Time (datation of the measurement) secondary reference, often accessory

⇒ Astronomy, surface planetology,…
⇒ IVOA standards and tools more adapted

Main reference: Time (datation of the measurement). Spatial coordinates, observed region, secondary but important reference

⇒Dynamical phenomena studies, plasmas, magnetospheres, solar corona, …
⇒SPASE standards and tools more adapted

Hybrid data in atmosphere, small body of solar system, …

(Challenges for a VO of planetology) ⇔ (IVOA – SPASE exchange)

Conclusion

The CDPP is developing tools and services, including interoperable components

The CDPP is active in the VO developments, participating in national, european and international projects

Remark (1): the interoperability/VO competence or real investment is poorly present in Europe for the plasma and planetology field
$\Rightarrow$difficulties for preparing and proposing european projects
$\Rightarrow$difficulties for development of projects (Europlanet)

Remark (2): the formation provided by the ASOV has been a key input for starting the concrete developments at CDPP

Remark (3): needs for a similar institution at the European level.