

An interoperable web-based service offered through the EuroPlaNet/IDIS Plasma Node usable for planetary plasma data exploitation and comparative studies: Application to the Martian and Venusian environments

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Abstract

These last years, the french Plasma Physics Data Centre (CDPP) has developed a new service, AMDA (Automated Multi-Dataset Analysis), which is a web-based facility for on line analysis of space physics data (heliosphere, magnetospheres, planetary environments) coming from either its local database or distant ones (Cassini MAPSKP, Cassini SKR, CDAweb, THEMIS).

In collaboration with the ASPERA Teams (CESR Toulouse, IRF Kiruna), the Europlanet-IDIS Plasma Physics node established in close cooperation between CDPP and IWF Graz aims to include MEX/ and VEX/ASPERA data in the local database of AMDA, and has set up an interoperable connection between AMDA and the VEX/MAG database hosted by IWF Graz.

We will present the service AMDA and illustrate some of its foreseen functionalities and potential applications for the comparative analysis of the Martian and Venusian plasma environments.

The IDIS Plasma Physics thematic node

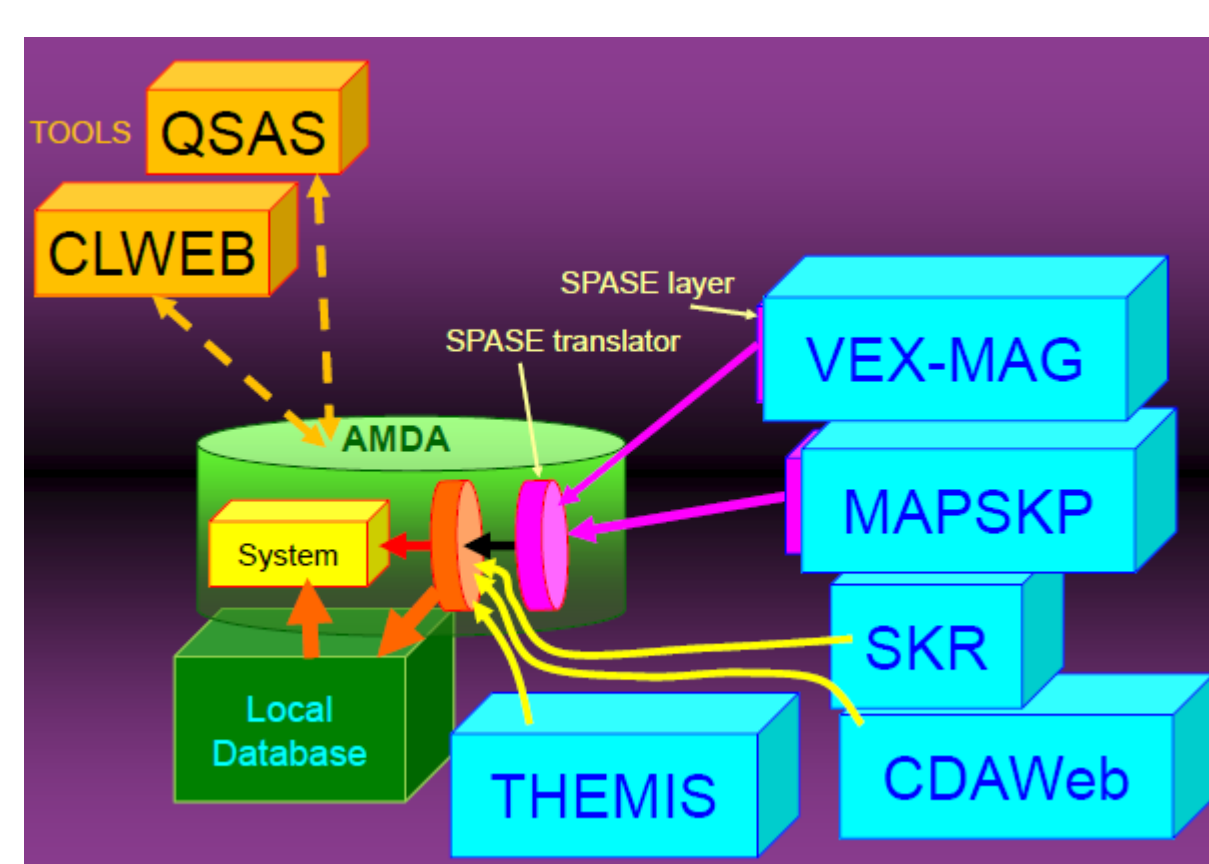
The Integrated and Distributed Information Service (IDIS) is one of the activities in Planetary Sciences developed during the EuroPlaNet (<http://europlanet.cesr.fr/>) project. This service is divided into five thematic nodes and one technical top node.

In the long-term (FP7, EuroPlaNet RI - and beyond), the objective is to provide the planetary science community with Virtual Observatory tools for the access of data and information from laboratory measurements, ground- and space-based observations as well as modeling results, allowing comparative and pluri-disciplinary studies of planetary objects and environments.

The Plasma Physics thematic node of IDIS (<http://europlanet-plasmanode.oaw.ac.at/>) is established in close cooperation between the CDPP Toulouse (<http://cdpp.cesr.fr/>) and the IWF Graz (<http://www.iwf.oaw.ac.at/>).

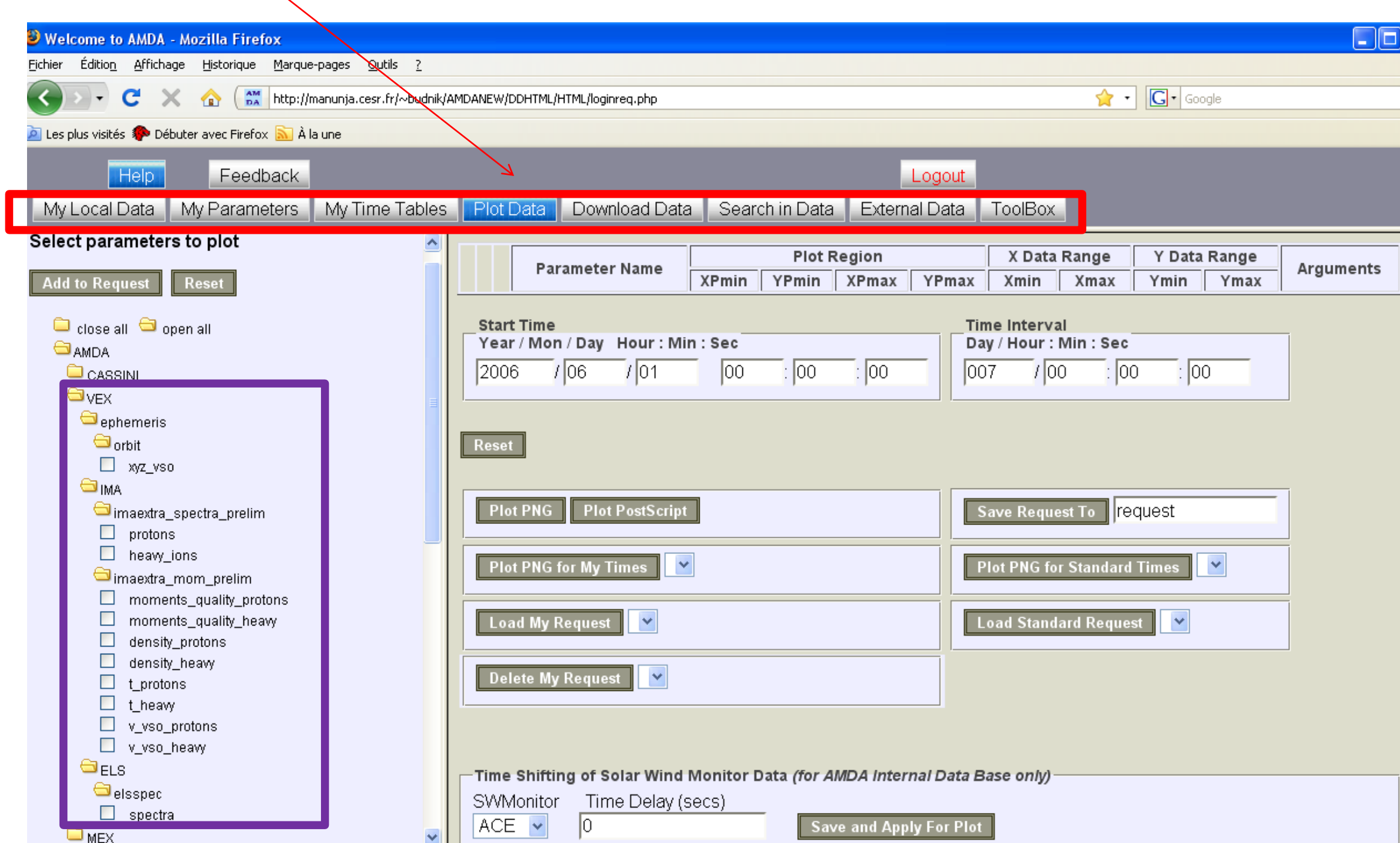
CDPP, the french Plasma Physics Data Centre & its service, AMDA, Automated Multi-Dataset Analysis

<http://cdpp.cesr.fr/>



Rules of the Road
When using data with AMDA, please follow the Rules of the Road.

AMDA (Automated Multi-Dataset Analysis) is a web-based facility for on line analysis of space physics time series data coming from either its local database or distant ones. This tool allows the user to perform on line classical manipulations such as data visualization, parameter computation or data extraction. AMDA also offers innovative functionalities such as event search on the content of the data in either visual or automated way, and the generation, use and management of time-tables. AMDA will be connected in the future with CLWEB (E. Penou), a tool developed at CESR that allows to perform high level manipulations (distribution function, partial moment computation) on many data sets.



How to register to AMDA?

Using AMDA is free. Because each user is offered a workspace on CDPP disks, each access needs to be logged. The user workspace is saved from session to session.

This requires a personal registration at AMDA service which is simply done by mailing at amda@cesr.fr. Feedback from users is important.

VEX/MEX Data (Prototype)

VEX & MEX orbital data in VSO coordinate system (60s)
VEX & MEX ASPERA ELS spectra (4s)
VEX/MAG magnetometer data in VSO coordinate system (1min, T. Zhang)

Not fully validated (prototype):

VEX & MEX ASPERA/IMA spectra for both protons & heavy ions (192s)
VEX ASPERA/IMA moments for both protons and heavy ions (A. Fedorov)

AMDA innovative functionalities detailed

In order to enable complex operations on data, AMDA has been built around elementary objects: the parameter and the time table. AMDA functionalities allow to use and couple these two object classes.

• **Parameter editor.** In the *My Parameters* interface, the user can compute new parameters by editing a mathematical expression combining existing parameters. Usual mathematical functions are enabled but also more refined one such as temporal shift, derivative, smooth, mean, Heterogeneous time bases are handled by AMDA transparently to the user (by interpolating/averaging data).

• **Remote data access.** In the *External Data* interface, the user can browse through the parameters of the distant databases, select the desired ones and save them in his/her own external data tree. Any data centers whose data are described by the SPASE datamodel may be reachable by AMDA.

• **Download data.** In the *Download Data* interface, newly created, remotely accessed or local parameters can be equally downloaded (or exported) by the user in different formats (plain ASCII, CEF, CDF) and with a chosen resolution. Time series may optionally be joined on a common time basis before exporting.

• **Visualization editor.** In the *Plot Data* interface, the user can edit a figure combining any available parameter with the desired options (reference frame, scaling, etc). The interface provides the option to apply time shifting for solar wind propagation. This functionality also accepts time tables as input. Widgets allow to skip the figure from a time interval to the next/previous one.

• **Visual search.** While browsing the requested figures, the user can retain intervals when a special feature, visually determined, occurs. He can do so by double clicking at the start/stop of the event. An interface is provided to store this interval in a list: the user can therefore create a time table by visual inspection.

• **Automated conditional search.** A second way to create a time table is by selecting time intervals when a particular condition applied on given parameters is fulfilled. In the *Search in Data* interface, the user can edit his/her condition with mathematical functions and logical operands (>, <, and, or).

• **Time table manager.** In the *My TimeTables* interface, time tables produced by visual inspection or conditional search may be edited, modified, saved and imported/exported. It is possible to apply operations on a single time table: extend/shrink/shift by a given duration; or on multiple time tables: union or intersection. Time tables may be imported/exported in ASCII format or in VOTable format compliant with IVOA.

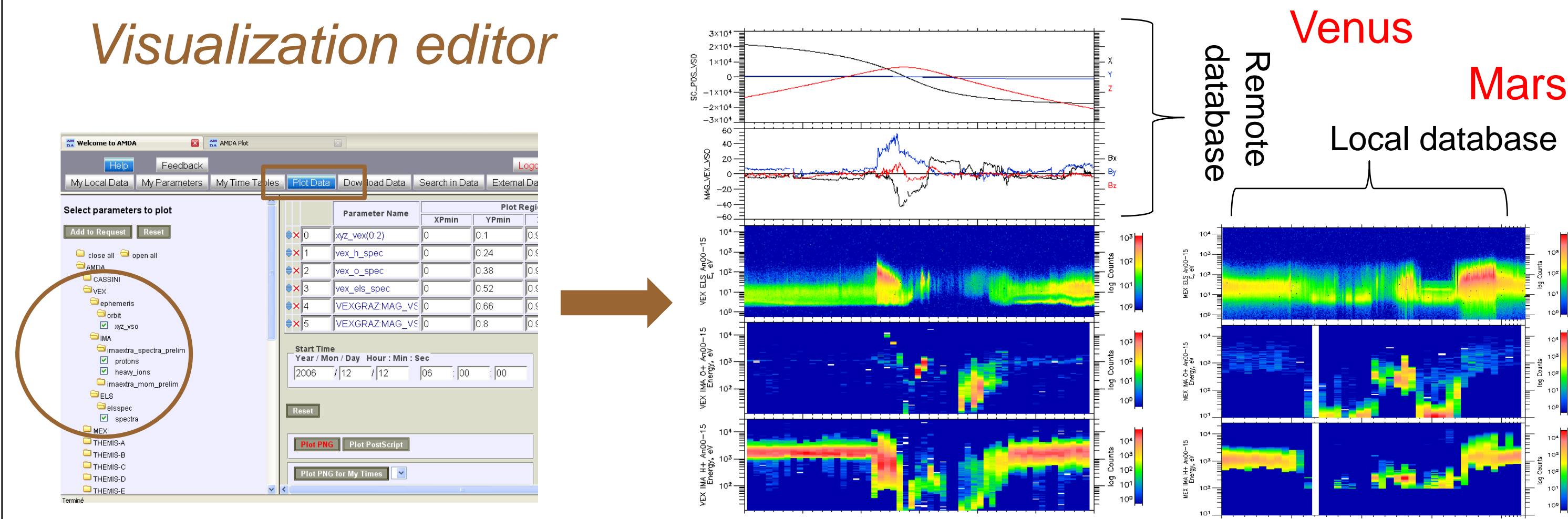
AMDA Reference papers

C. Jacquy et al. (2009), AMDA, Automated Multi-Dataset Analysis: A web-based service provided by the CDPP, in press in the **proceedings of the 15th Cluster Workshop**

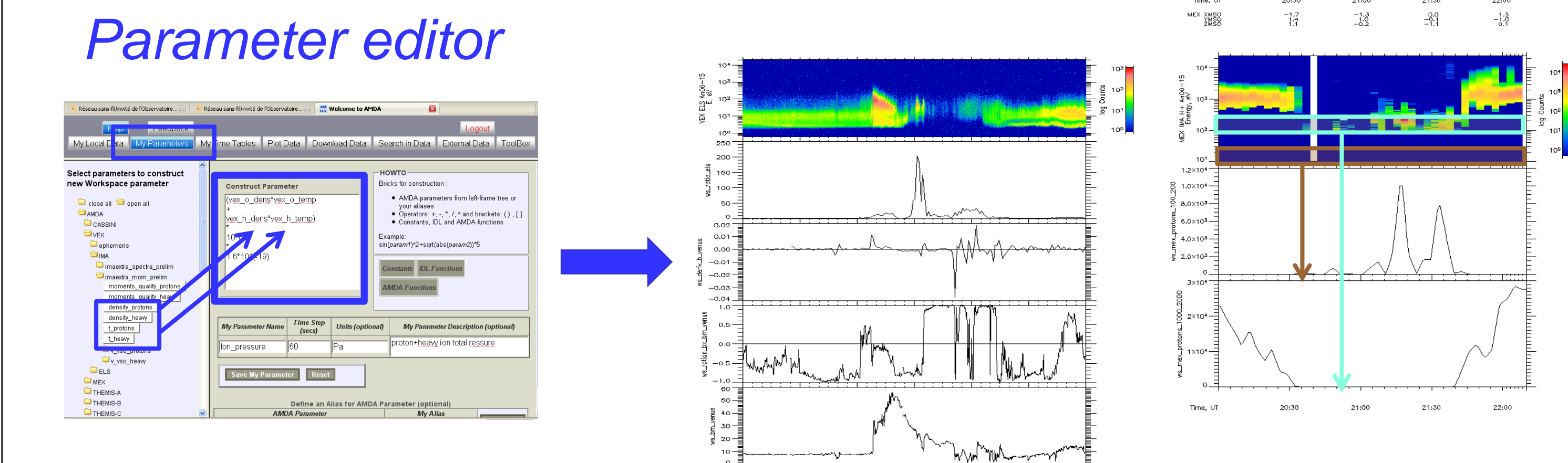
V. Génot et al., Space Weather applications with CDPP/AMDA, submitted to **Advances in Space Research**, april 2009

AMDA applications for comparative studies

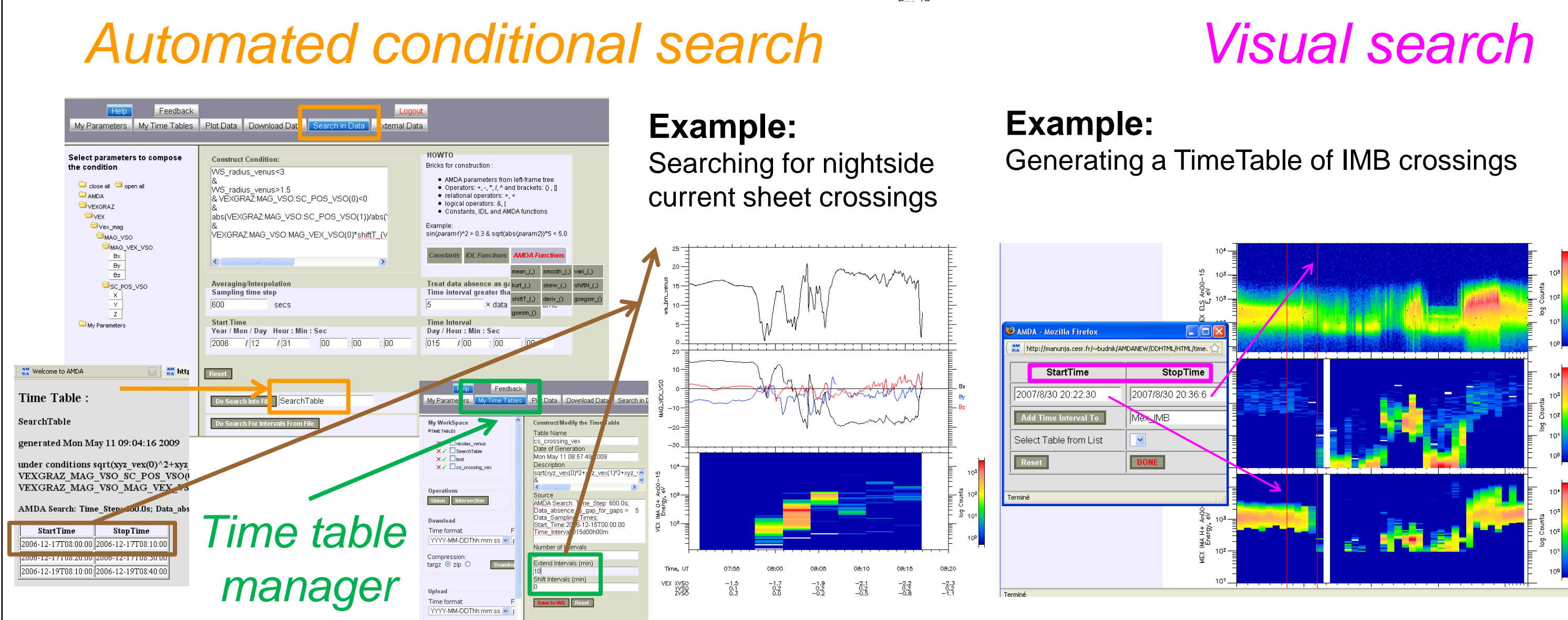
Visualization editor



Parameter editor



Automated conditional search



Visual search

