

Development of a demonstrator for Europlanet at CDPP.

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



The CDPP

<http://cdpp.cesr.fr>

The CDPP was created in 1998 by both CNES and CNRS.

The CDPP is hosted at CESR, Toulouse

1st mission: long term archive of plasma data obtained with experiment realised with french participation, making them available to the community

2nd mission: providing added value on the archived data
→ services, tools

3rd mission: scientific animation (workshop, ...)

4th mission: participation to Virtual Observatory projects

The CDPP participates to EUROPLANET/IDIS (co-leading institute with IWF/Graz of the Plasma Node)

→ demonstrator AMDA – MAPSKP - SKR

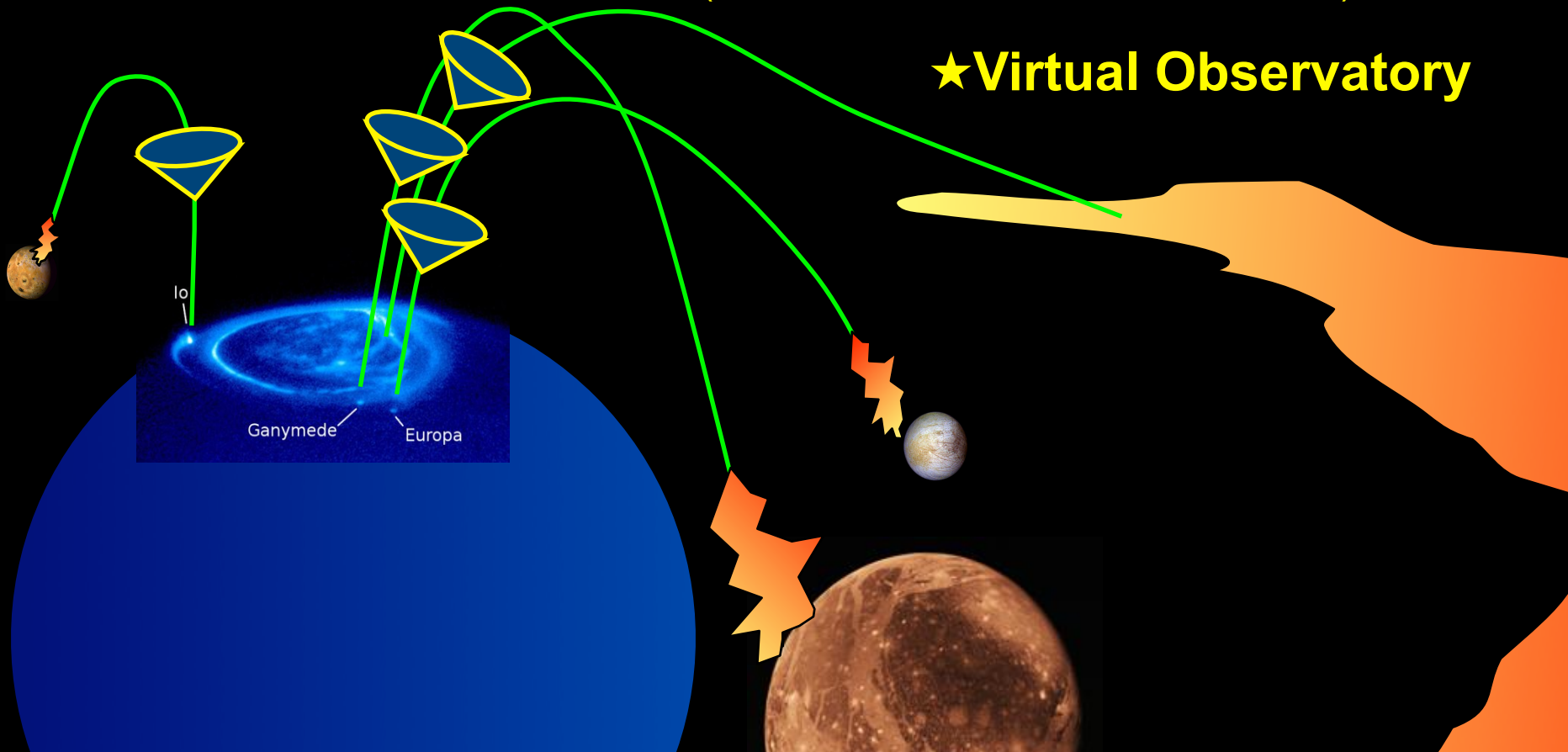
An observatory of planetology

Study of the planetological object => pluri-disciplinary approach

Plasmas, fields, radio, dust, moon surfaces, rings, atmosphere,

Requires to be able to access and to exploit resources of many origins, of various natures (data, models, simulations, tools, ...).

★ **Virtual Observatory**

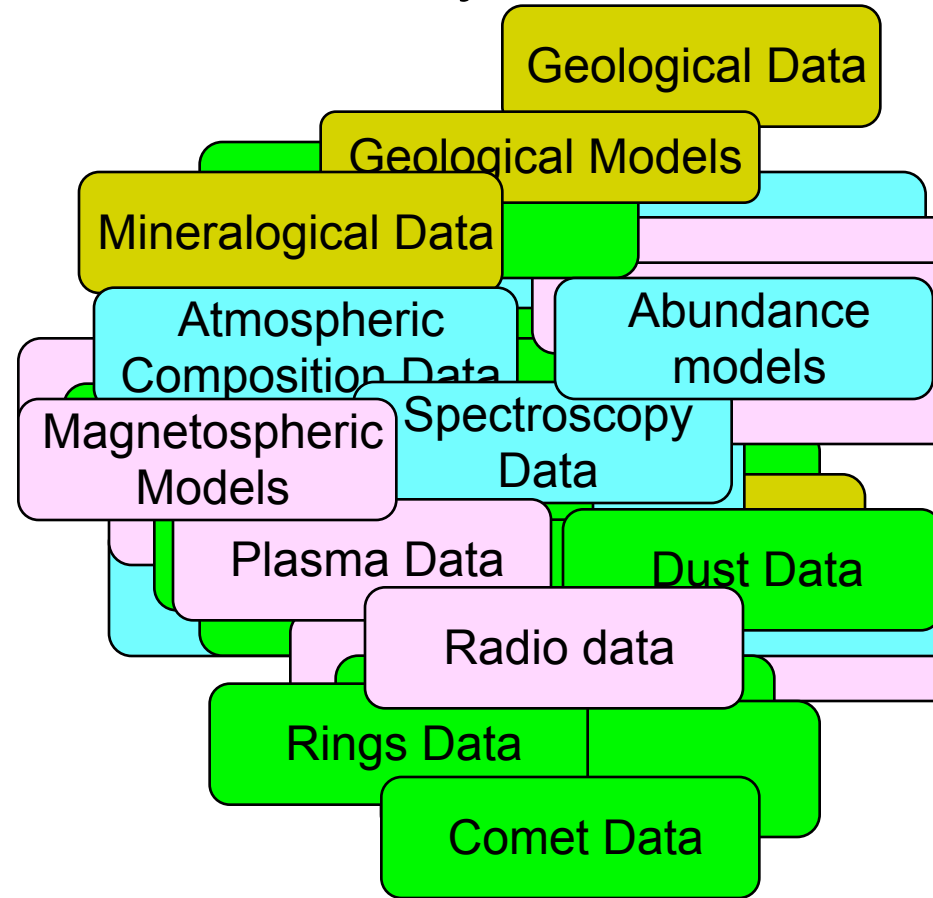
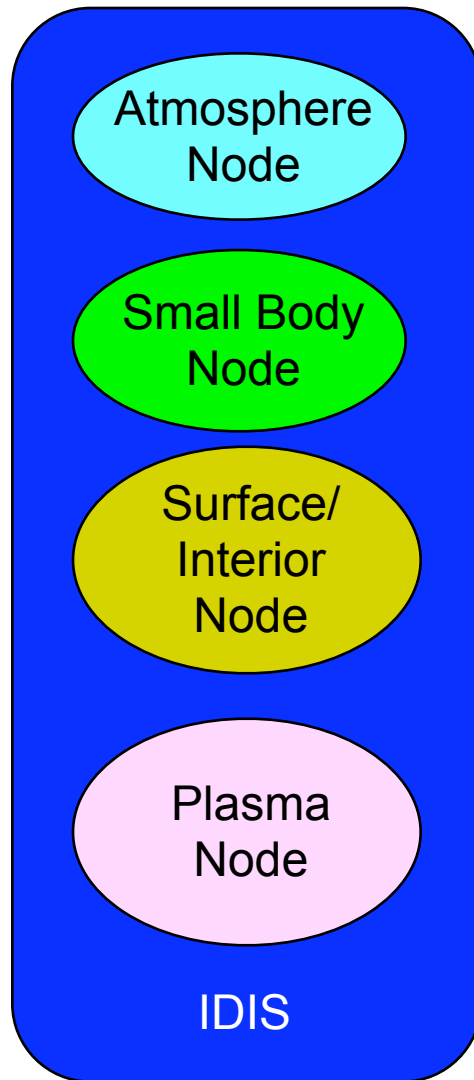


EUROPLANET/IDIS

Integrated and Distributed Information System

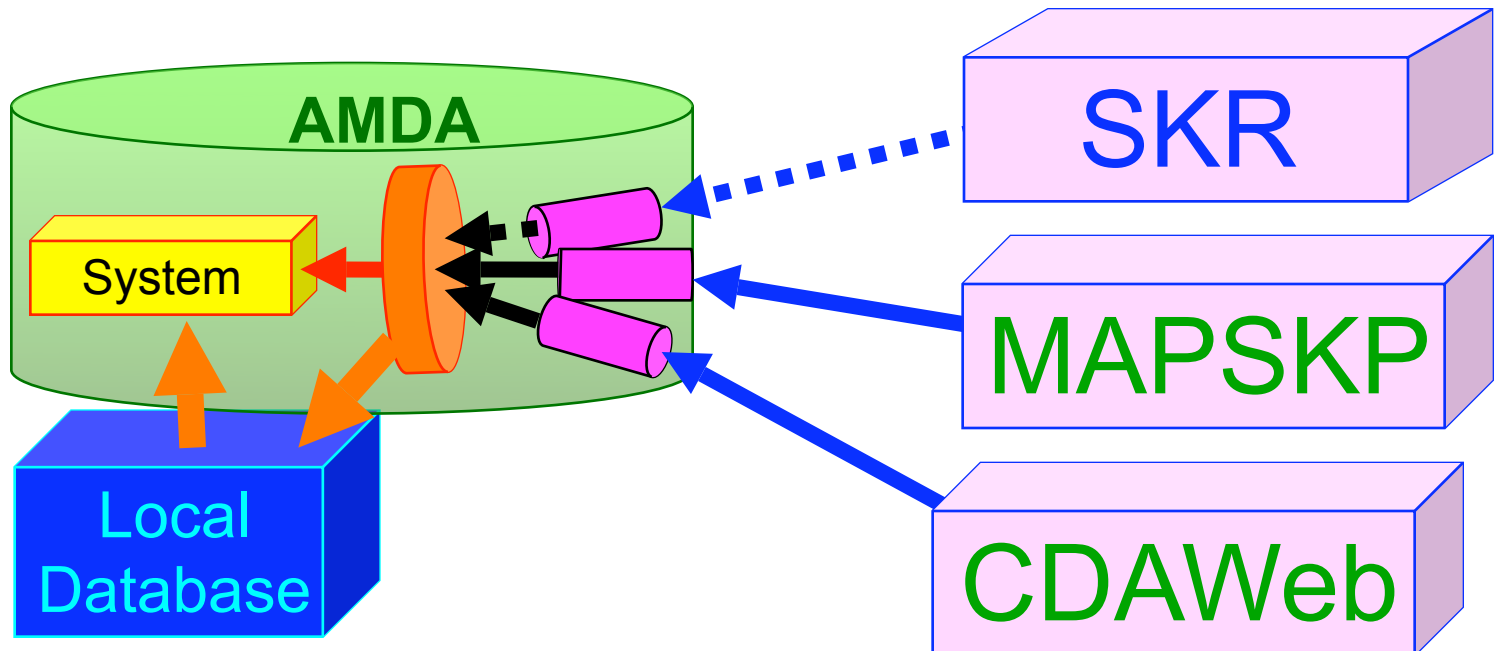


User



AMDA, Automated Multi-Dataset Analysis (<http://cdpp-amda.cesr.fr>)

- Multi-spacecraft and multi-instrument data
 - Visualization
 - User defined parameter computation
 - Standard model computation
 - Data and computed parameter extraction
 - Event list production and management
- Automated and semi-automated (visual) search on the content of the data
- Access to external databases (**now: CDAWeb, MAPSKP** , **next: SKR**, VEX-MAG, HST images, MEDOC solar data, ...)



First steps in AMDA

1/ Jobs

My Workspace Plot Data Download Data Conditional Search External Data Help Data Inventory Graph Feedback

Select parameters to plot

Add Parameters to Request Reset

- open all | close all
- Missions
- Ground-based Indices
- Model Parameters along Orbit / Time Series
- Models along Orbit / Space
- My Workspace Parameters
 - cassini_rs

My External Data

- close all | open all
- MAPSKP
 - Cassini
 - TRAJ
 - TRAJ_CASS
 - POSITION_KSM
 - MAG
 - MAG_KSM
 - VECTOR
 - MAGNITUDE
 - RPWS
 - RPWS_KEY
 - QUALITY_FLAG
 - ELECTRIC_SPECTRAL_DENSITIES

Your Request

Object Name	Object Plot Region				X Data Range		Y Data Range		Argument
	XPmin	YPmin	XPmax	YPmax	Xmin	Xmax	Ymin	Ymax	

3/ time interval selection

Start Time
Year / Mon / Day Hour : Min : Sec
2008 / 01 / 29 00 : 00 : 00

Time Interval
Day / Hour : Min : Sec
000 / 12 : 00 : 00

Reset

Plot PNG Plot PostScript Save Request To request

Plot PNG for My Times SearchTable Plot PNG for Standard Times

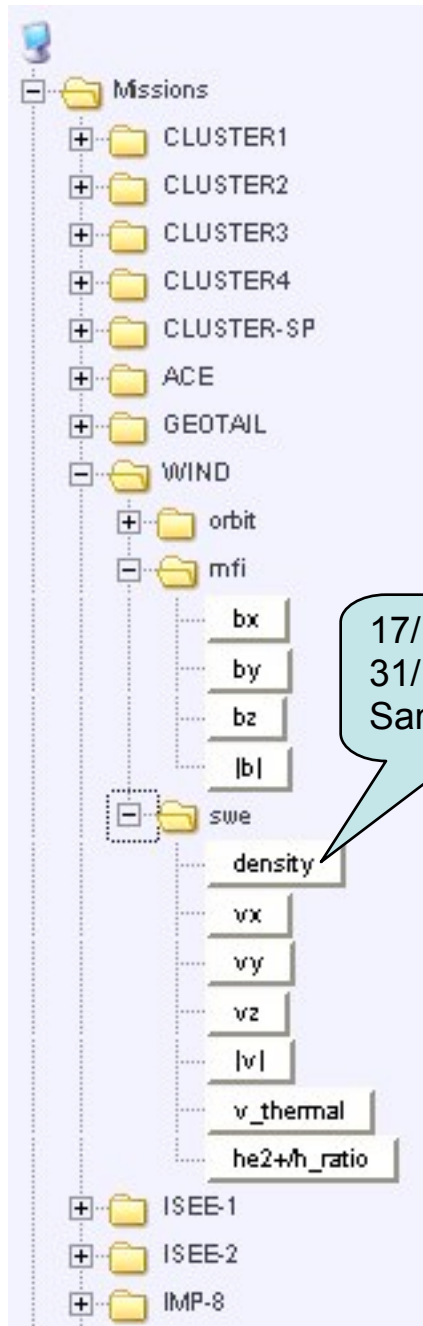
Load My Request THA_210607 Load Standard Request AcThDsCl_B

4/ Operations on data

Time Shifting of Solar Monitor Data

SWMonitor Time Delay (secs)
ACE 0 Save and Apply to Data

Target Year / Mon / Day Hour : Min
Themis-A 2008 / 01 / 29 00 : 00 Calculate Delay



Parameter :

A parameter is a data time series :

- magnetic ou electric field
- particule distribution moment
- index
- ...
- *a combination of these*

→ valid within a time interval

→ with a given sampling rate

→ used for :

- visual display
- conditional search
- download, ...

The file system hierarchy of the archive is hidden to the user

Building a parameter 1/2

CDPP Home Page Welcome to AMDA

My Workspace Plot Data Download Data Conditional Search Web Services Help Data Inventory Graph F

Select parameters to construct new Workspace parameter

open all | close all

- Missions
 - CLUSTER1
 - orbit
 - fgm
 - bx
 - by
 - bz
 - lbl
 - cis-hia
 - cis-codif
 - efw
 - whisper
 - staff
 - cis-hia+fgm
 - CLUSTER2
 - orbit
 - fgm
 - bx
 - by
 - bz
 - lbl
 - efw

Construct Your Parameter

Expression: `b_c1(3)/b_c2(3)`

Sampling time step: secs

Parameter name:

Description:

Construct Your Time Table

StartTime - StopTime
yyy-mm-ddThh:mm:ss yyy-mm-ddThh:mm:ss

Table Name:

Date of Creation:

Syntax of Expression

arithmetic operators: + * / ^
brackets: () []

functions: `sin()` `cos()` `sqrt()` `atan()` `abs()`

example: `sin(param1)^2+sqrt(abs(param2))^5`

clicks

temporal resolution

parameter name

Description

Building a parameter 2/2

Select parameters to construct new Workspace parameter

open all | close all

local data base

- Missions
- Ground-based Indices
- Model Parameters along Orbit / Time Series
- Models along Orbit / Space

user workspace

My WorkSpace

- MY PARAMETERS
 - bc1sbc2
 - AngleByBxDegrees
 - valfRatio
 - TemperatureAnisotropy
- MY TIME TABLES

Construct Your Parameter

Expression
mom_c1(6)/mom_c1(5)

Sampling time step
60 secs

Parameter name
TemperatureAnisotropy

Description

the new parameter is stored in the user workspace

Save to WS Reset

Parameters from

- different missions
- different instrument
- with different resolution

can be combined

The new parameter is now a virtual element of the data base. It will be computed in real time whenever it is necessary for a plot, condition search or download

Time Tables 1/2

- Timetables (or event lists) are a series of time intervals defined with a condition on some criterion based on parameters
- They produced and managed “manually” by the scientists for their own use or for a community of users
- AMDA is increasing the possibilities of this vector of information with providing a generic tool to create, manage and share these objects.

Timetables shall be used to:

- extract a sub-data base,
- execute long term treatments or interactive treatments
- create event catalogues,
- be a reference for the community.

Create a timetable : 1- condition search

The screenshot shows a software interface for creating a timetable. On the left, a tree view under 'Missions' shows a folder 'CLUSTER1' with sub-items 'orbit', 'fgm', and 'cis-hia'. The 'cis-hia' folder is expanded, showing parameters: 'dens', 'vx_gse', 'vy_gse', 'vz_gse', 'lv1', 't_para', and 't_perp'. A red box labeled 'clicks' has two arrows pointing to the 't_perp' parameter and the 'Construct Your Search Condition' field.

The 'Construct Your Search Condition' field contains the text: `mom_c1(6)/mom_c1(5)>1.`

A red box contains the mathematical expression: $T_{\perp}/T_{\parallel} > 1$

A larger red box contains the text: 'Edit a condition with maths functions/operators'.

On the right, a 'Syntax of Condition expression' panel lists: arithmetic operators (+, -, ^, /, ^), brackets ((), []), functions (sin(), cos(), sqrt(), atan(), abs()), relational operators (>, <), and logical operators (&, |). An example shows: `sin(param1) > 0 & param2 < 0`.

Below the search condition, there are sections for 'Averaging/Interpolation' (Sampling time step: 60 secs), 'Start Time' (Year/Mon/Day Hour:Min:Sec: 2001/03/15 02:00:00), and 'Time Interval' (Day/Hour:Min:Sec: 001/00:00:00). A red box labeled 'Define a time interval or use another timetable' has an arrow pointing to the 'Time Interval' field.

At the bottom, there are buttons for 'Reset', 'Generate Table To...' (AnisotropyTable), 'Generate Table From...' (SearchTable), 'To new Time Table...' (NewSearchTable), 'Save Condition To...' (Search), and 'Load Condition From...'.

Create a timetable : 1- condition search

Time Table :

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
2001-03-15T11:56:00	2001-03-15T11:57:00
2001-03-15T16:33:00	2001-03-15T16:34:00
2001-03-15T16:59:00	2001-03-15T17:00:00
2001-03-15T17:16:00	2001-03-15T17:17:00
2001-03-15T17:47:00	2001-03-15T17:48:00

Condition:

$T_{//} > 1$

Syntax of Condition expression

arithmetic operators: + - ^ / ^
brackets: () , []
functions: **sin() cos() sqrt() atan() abs()**
relational operators: > , <
logical operators: & , |

Example
 $\sin(param1) > 0 \& param2 < 0$

Treat data absence as gap
Time interval greater than
5 × data sampling time

Time Interval
Day / Hour : Min : Sec
001 / 00 : 00 : 00

Min : Sec
02 : 00 : 00

AnisotropyTable

SearchTable

newSearchTable

Save Condition To... Search

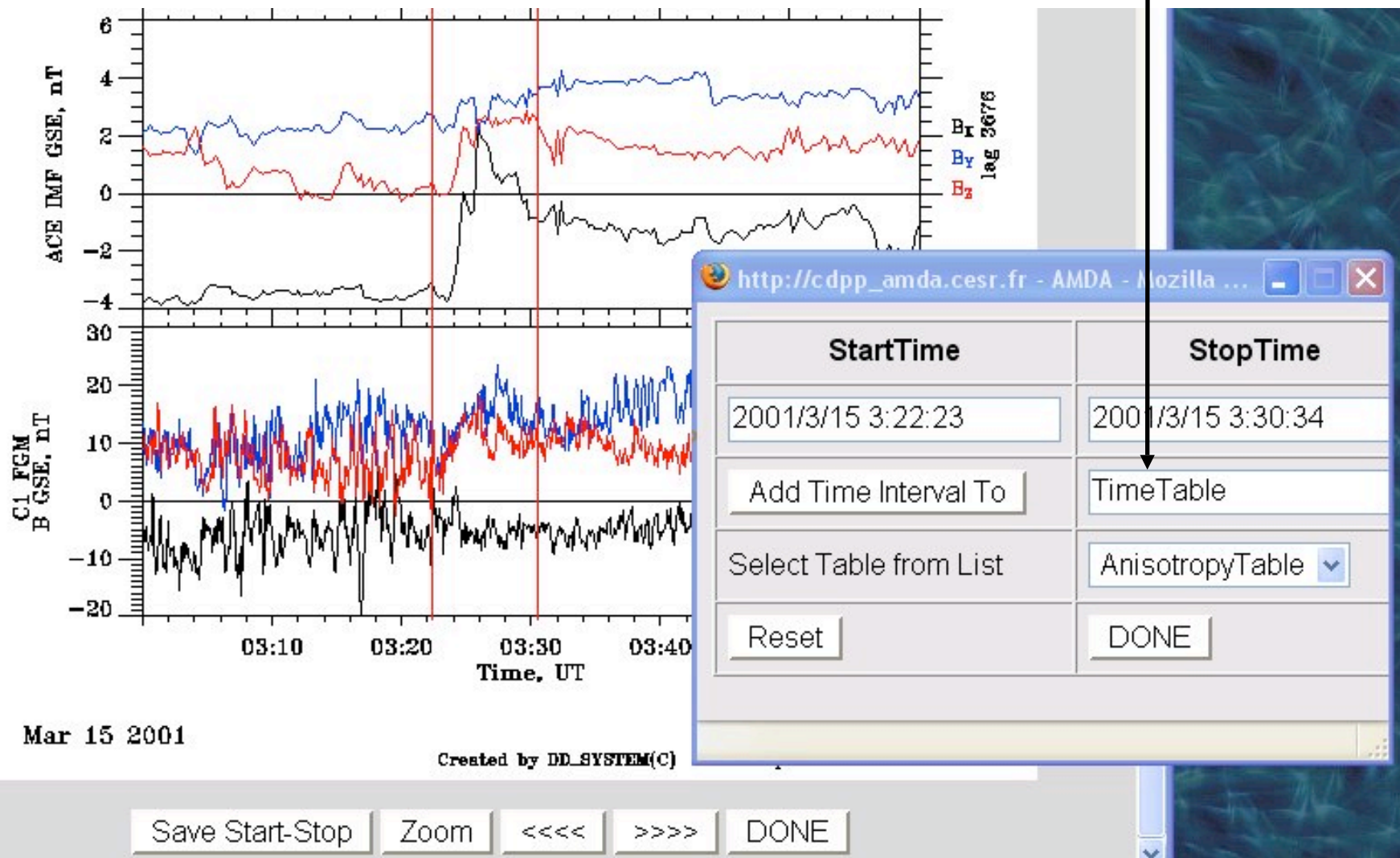
Load Condition From... Search

Define a time interval or use another timetable

Edit a condition with maths functions/operators

Create a timetable : 2- visual inspection

interesting intervals are selected with clicks and added to a timetable



Time Table :

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
2001-03-15T11:56:00	2001-03-15T11:57:00
2001-03-15T16:33:00	2001-03-15T16:34:00
2001-03-15T16:59:00	2001-03-15T17:00:00
2001-03-15T17:16:00	2001-03-15T17:17:00
2001-03-15T17:47:00	2001-03-15T17:48:00

The time table may be edited
in the user workspace

Time Table :

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

My Workspace

MY PARAMETERS

- bc1sbc2
- AngleByBxDegres
- valfRatio
- TemperatureAnisotropy

MY TIME TABLES

- SearchTable
- AnisotropyTable

The time table may be edited
in the user workspace

Save to WS Reset

Construct Your Time Table

StartTime - StopTime
yyy-mm-ddThh:mm:ss yyy-mm-ddThh:mm:ss

Table Name
AnisotropyTable

Date of Creation
Thu Apr 19 12:44:21 2007

Description
 $MOM_C1(6)/MOM_C1(5) > 1.$

Source
AMDA Search

Number of Intervals
12

Save to WS Reset

StartTime - StopTime
2001-03-15T02:00:00 2001-03-15T02:30:00 -- 1
2001-03-15T02:32:00 2001-03-15T03:07:00 -- 2
2001-03-15T03:08:00 2001-03-15T03:16:00 -- 3
2001-03-15T03:17:00 2001-03-15T04:25:00 -- 4
2001-03-15T04:26:00 2001-03-15T05:06:00 -- 5
2001-03-15T05:11:00 2001-03-15T05:12:00 -- 6
2001-03-15T05:22:00 2001-03-15T05:25:00 -- 7
2001-03-15T11:56:00 2001-03-15T11:57:00 -- 8
2001-03-15T16:33:00 2001-03-15T16:34:00 -- 9
2001-03-15T16:59:00 2001-03-15T17:00:00 -- 10
2001-03-15T17:16:00 2001-03-15T17:17:00 -- 11
2001-03-15T17:47:00 2001-03-15T17:48:00 -- 12

Building the external data tree

External data

external data tree selected by the user

External Tree

- close all
- open all
- CDAWEB**
- ACE
 - EPM
 - MFI
 - SIS
 - SSC
- SWE
 - AC_H2_SWE
 - Np
 - Vp
 - Tpr
 - alpha_ratio
 - V_GSE
 - V_RTN
 - V_GSM
 - SC_pos_GSE
 - SC_pos_GSM
 - AC_K0_SWE
 - AC_H0_SWE
 - AC_K1_SWE
- SWI
- ULE

User's Tree

save tree

- close all
- open all
- CDAWEB
 - ACE
 - SWE
 - AC_H0_SWE
 - Np
 - Vp
 - Tpr

Five red 'X' icons are visible on the right side of the User's Tree panel.

- daily update of the available data on distant database
- no file hierarchy on the user side
- AMDA can operate with no local data
→ integration into Virtual Observatories

External data tree

My Workspace Plot Data Download [

Select parameters to construct new Workspace parameter

open all | close all

- ⊕ Missions
- ⊕ Ground-based Indices
- Model Parameters along Orbit / Time Series
- Models along Orbit / Space

My External Data

- close all ⊕ open all
- ⊖ CDAWEB
 - ⊖ ACE
 - ⊖ SWE
 - ⊖ AC_H0_SWE
 - Np
 - Vp
 - Tpr

Local data base

Extract of the external data

- parameters are available for plots, conditional searches, ... on the fly, which implies that:
- the data have to be downloaded (3 days min.)
 - transform of the data format
 - creation of the AMDA parameter

