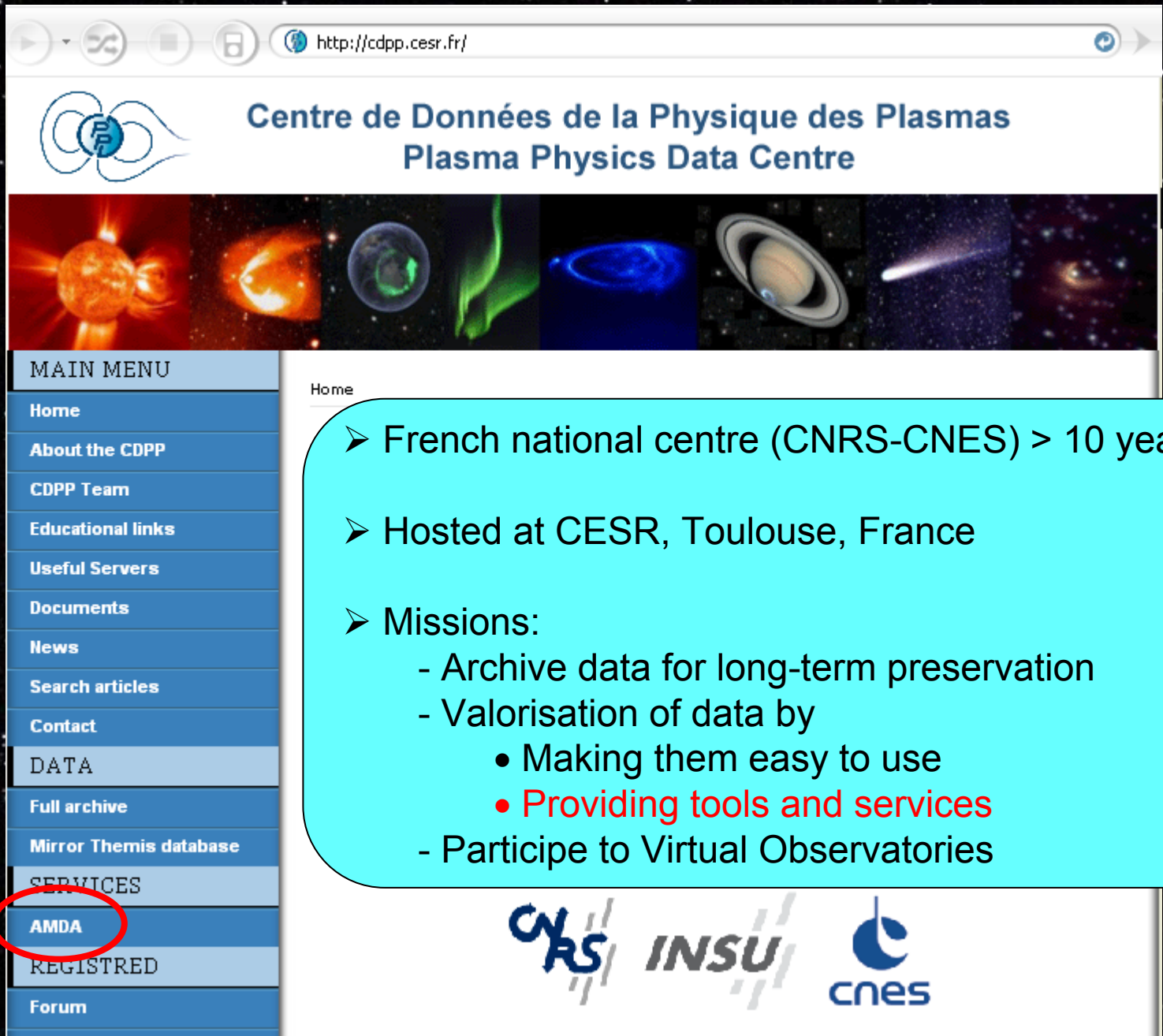
AMDA, Automated Multi-Dataset Analysis:
A web-based service provided by the CDPP

Christian Jacquey Michel Gangloff
and the CDPP team

The CDPP (http://cdpp.cesr.fr)



- French national centre (CNRS-CNES) > 10 years
- Hosted at CESR, Toulouse, France
- Missions:
  - Archive data for long-term preservation
  - Valorisation of data by
    - Making them easy to use
    - Providing tools and services
  - Participe to Virtual Observatories

CNRS INSU cnes

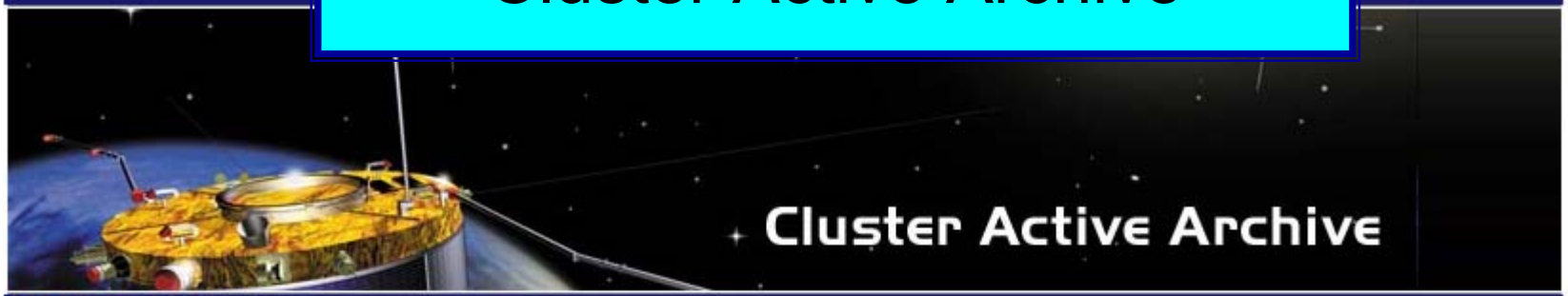
Some key features in space physics observation analysis (1)

- Need to perform integrated analysis of many multi-spacecraft and multi-instrument datasets
  - time series
  - "cube" data
  - images, movies
  - Simulation data

- Dynamical processes

$\Rightarrow$ Targeted data are organised in respect to "events" (time span)

Cluster Active Archive



CAA DATA
CAA Data Download Area
CAA Graphical Products
CAA Quicklook Plots
CAA Inventory Plots
Rules of the Road
USER AREA
List Profiles
Modify User Details
CLUSTER ACTIVE ARCHIVE
Getting Started
News
Subscribe News
User Statistics
Delivery Plans
Ingestion Status
Reviews NEW
Documentation
Software
Links

Logged in:No surname Help Logout

CLUSTER ACTIVE ARCHIVE SEARCH PAGE

Select search parameters below. If nothing is selected (i.e. there is no filtering with timespan /observatory /etc), ALL products for the entire ingested period will be listed. Currently there is a limit of 1 GB for downloading through the web interface. For larger requests, please use the command-line interface.

SEARCH INVENTORY QUICKLOOK RESET

	YYYY	MM	DD	HH	mm	SS
Start Time						
Duration			00	00	00	
Stop Time						

Observatory

- Cluster-1
- Cluster-2
- Cluster-3
- Cluster-4
- Cluster-Multi

Experiment

- ASPOC
- AUX
- CIS
- DWP
- EDI

DARTS

Data Archives and Transmission System
DARTS

Astrophysics | Solar Physics | Solar-Terrestrial Physics

Reimei | Geotail | Akebono | THEMIS | CEF

- ► Instruments
- ► Data
- - Caveats
- - Orbit
- - 2-Hour Plot
- - 8-hour LEP Et
- - Interactive Plot
- - ASCII Listing
- - MGF High Resolution
- - MGF Search Coil
- - LEP Ion Distributiontion
- - Eclipse List
- ► Publications
- ► Support Letters (2007)
- ► Contacts
- ► Related Sites

ASCII Listing of Magnetic Field, Electric Field, and Ion Mon

This page provides ASCII listings of Geotail MGF magnetic field, EFD electric field, and LEP ion moment data for any available intervals th
forms.

- You should carefully read the caveats before you use the data.
- Data Format

1. Select date and time interval.

Date: 1993 Sep 18

Start Time (HHMM): 0000 End Time (HHMM): 2400

2. Select a coordinate system.

◉ GSM ○ GSE ○ SM ○ SC

GSM: X to the sun; X-Z plane contains the Earth's dipole axis.
GSE: X to the sun; Z along the ecliptic pole.
SM : Z along the Earth's dipole; X-Z plane contains the sun direction.
The Y axis completes the right-handed coordinate system, Y=Z x X (duskward).
SC : The satellite coordinate system. Z along the satellite spin axis; X-Z plane contains the sun direction. The Y axis completes the right-han

IMAGE

Online IMAGE magnetometer data - request form

Note: rules of the road updated (Nov 19, 2007)

Starting time of the event (YYYYMMDDHH; year with 4 digits!):

Length of the event (hours, max. 48):

Stations: (•) All ( ) Fennoscandia ( ) Svalbard ( ) TAR-SOR ( ) TAR-NAL
( ) Your list:

Format: [ ] IAGA [ ] Column [ ] Column_old [ ] WDC (1-min) [ ] GADF [ ] PostScript [ ] jpg

Sampling interval: (•) original (10 or 20 s) ( ) one minute averages

Compression: (•) none ( ) gzip

File string (optional): image

Your name (obligatory):

Institute (obligatory):

Email (obligatory):

http://superdarn.jhuapl.edu/archive/map.north/cgi/validate.cgi?cfg=%2Fwww%2Fsuperdarn%2Fregister%2Fregister.cfg&...

APL

SuperDARN

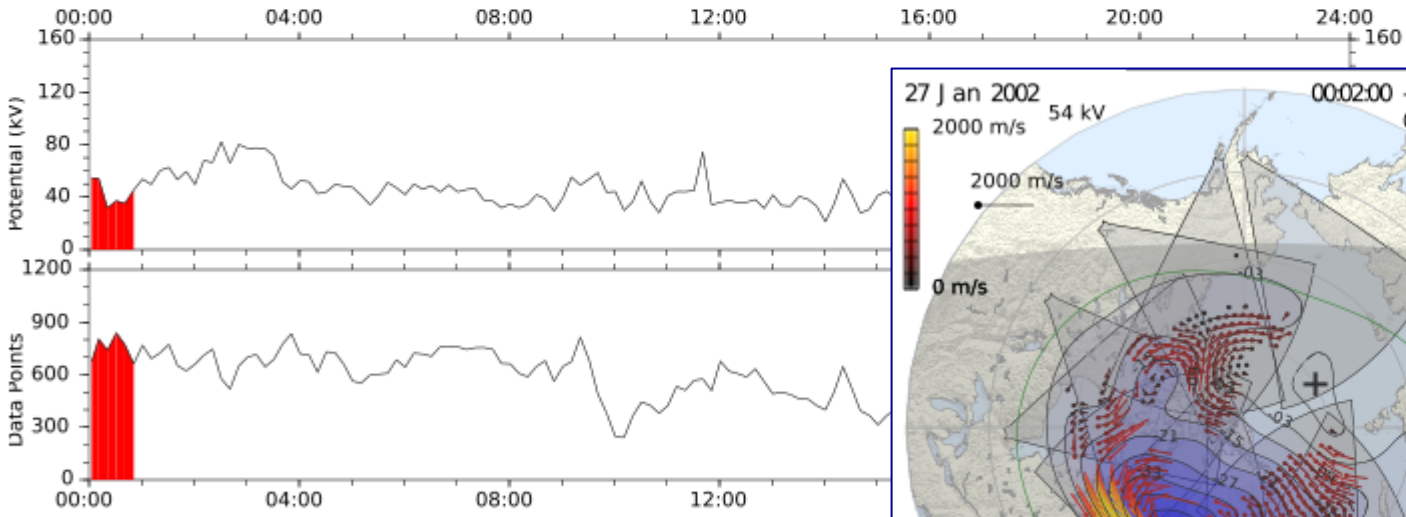
Information | Real-Time Data | Data Archive | Resources

Home | Global Convection Maps (Northern Hemisphere)

Welcome, Jacquey | Change Registration

Previous Day | 27 | January | 2002 | Change Date | Next Day

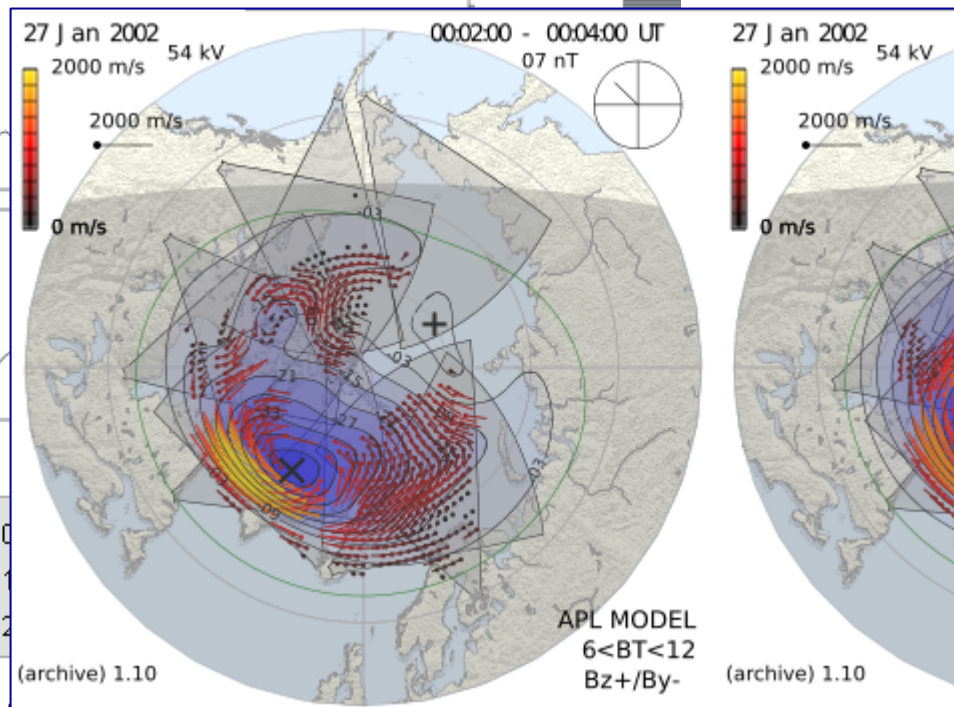
Download Digital Data for this Day



00:00 | 01:00 | 02:00 | 03:00 | 04:00

08:00 | 09:00 | 10:00 | 11:00 | 12:00

16:00 | 17:00 | 18:00 | 19:00 | 20:00



CDAWEB

http://cdaweb.gsfc.nasa.gov/cgi-bin/eval2.cgi

GODDARD SPACE FLIGHT CENTER
Space Physics Data Facility

+ Goddard Home
+ Visit NASA.gov

SEARCH NASA + GO

+ SPDF HOME | + DATA & ORBITS | + MODELS at CCMC | + RESOURCES | + RESEARCH

+ CDAWeb Home
CDAWeb
+ FEEDBACK

Coordinated Data Analysis Web

CDAWeb Data Explorer

Select start and stop times from which to GET or PLOT data:

Use pre-defined start/stop times

September 2005 Events 2005/09/07 00:00:00 2005/09/20 00:00:00

Use custom start/stop times

Start: 2009/05/03 00:00:00 (YYYY/MM/DD HH:MM:SS.mmm)

Stop: 2009/05/04 00:00:00 (YYYY/MM/DD HH:MM:SS.mmm)

Select an activity:

Plot Data : *select one or more variables from list below and press submit.*

Also create PS and PDF outputs (all plot types except images and plasmagrams).

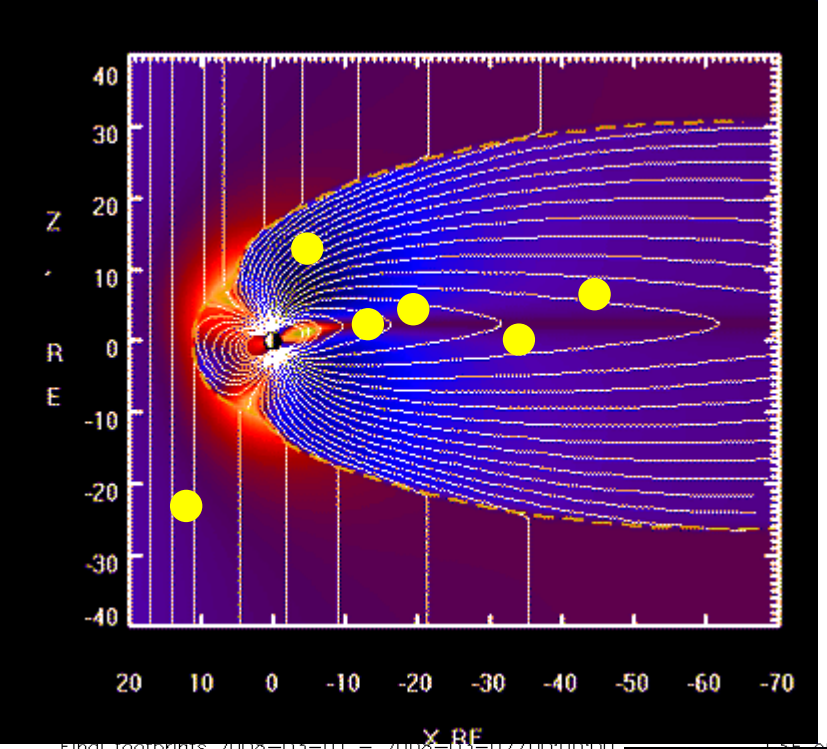
Many panels per dataset are allowed but <=4 panels optimal for standard Y-axis height and single page display. NEW

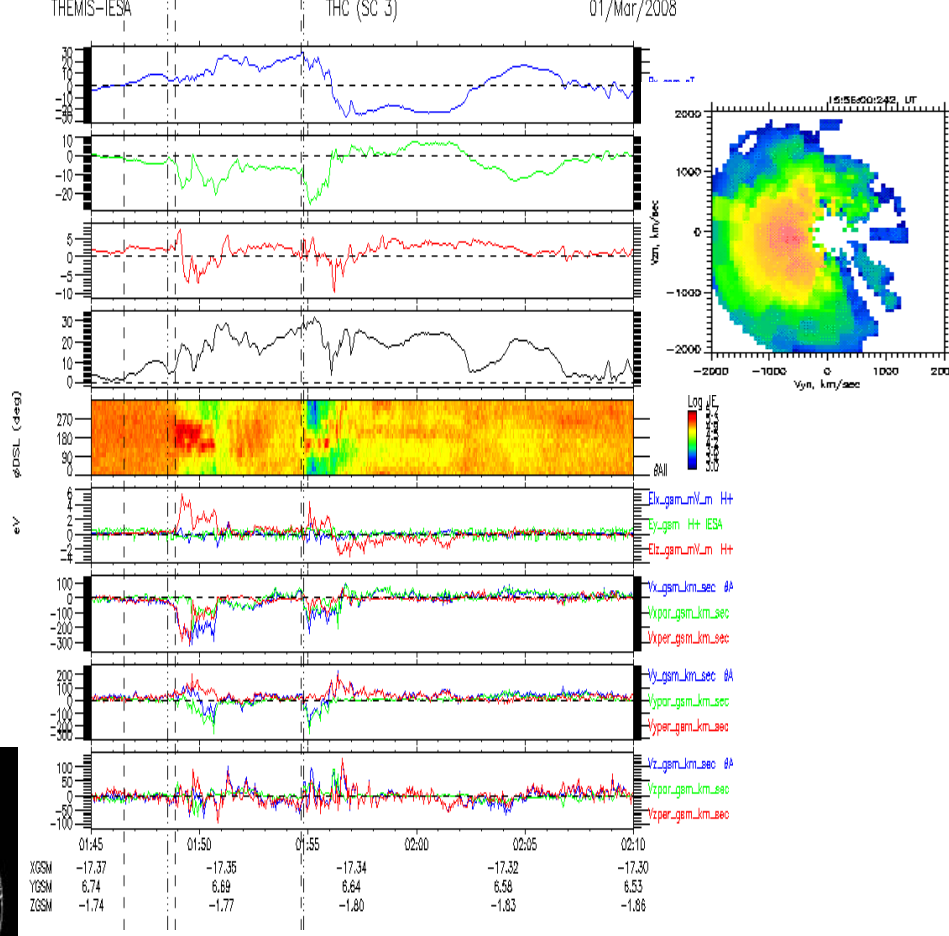
List Data (ASCII): *select one or more variables from list below and press submit. (Works best for <31 days)*

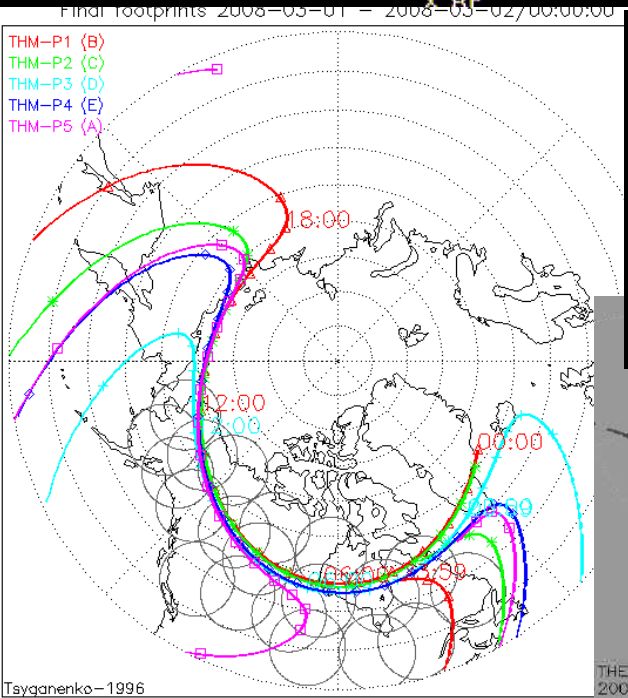
Download original CDFs : *press submit button to retrieve list of files. (Max. 200 days - use FTP site for larger requests)*

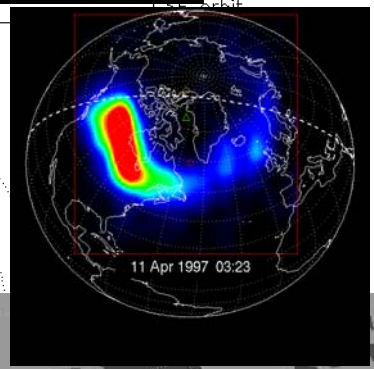
Create CDFs for download: *select one or more variables from the list below and press submit.*

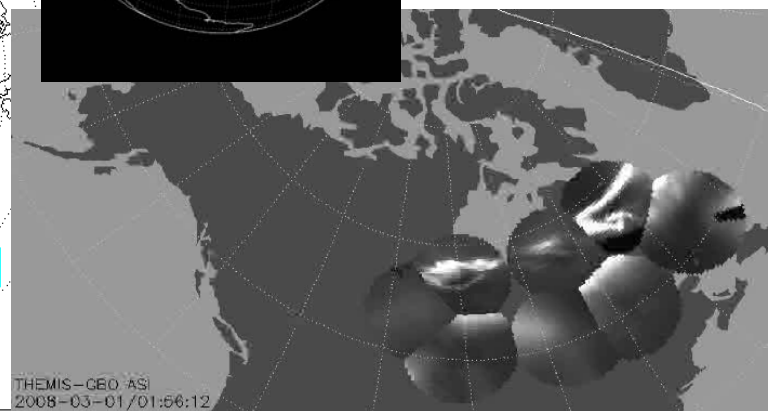
Create Version 3.0 compatible CDFs (Default is Version 2.7.2) NEW

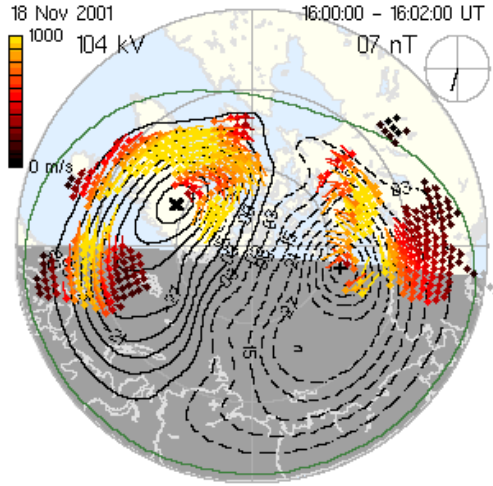

Z
R
E
X RE


THEMIS-IESA
THC (SC 3)
01/Mar/2008
Vzn, km/sec
Vyn, km/sec
φDSL (deg)
eV
01:45
01:50
01:55
02:00
02:05
02:10


Final Footprints 2008-03-01 - 2008-03-02 00:00:00
THM-P1 (B)
THM-P2 (C)
THM-P3 (D)
THM-P4 (E)
THM-P5 (A)
18:00
12:00
06:00
00:00
Tsyganenko-1996


11 Apr 1997 03:23


THEMIS-GEO ASI
2008-03-01/01:56:12

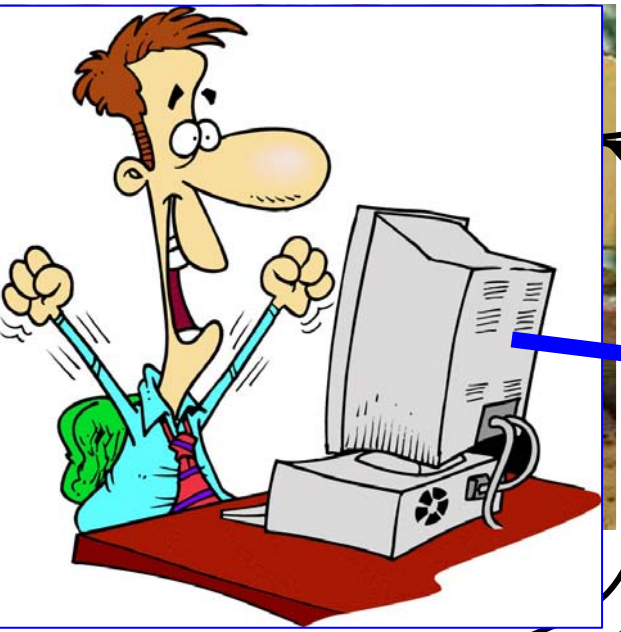

18 Nov 2001
16:00:00 - 16:02:00 UT
1000
104 kV
07 nT
0 m/s

Some key features in space physics observation analysis (2)

- Need to perform integrated analysis of many multi-spacecraft and multi-instrument datasets
  - time series
  - "cube" data
  - images, movies
  - Simulation data

- Dynamical processes

  ⇒ Targeting data is organised in respect to "events" (time span)



Indices, ISEE, IMP8, WIND, ACE, OMNI, INTERBALL, POLAR, GEOTAIL, CLUSTER, DoubleSTAR, THEMIS, VEX, CASSINI

AMDA

AMDA LOCAL DATABASE

SKR (at LESIA)

CASSINI MAPSKP (at CESR)

VEX-MAG (at IWF/Graz)

CDAWEB (at Goddard)

THEMIS (at CDPP/CESR)

APL SUPERDARN

DARTS

CAA

Others

VxOs

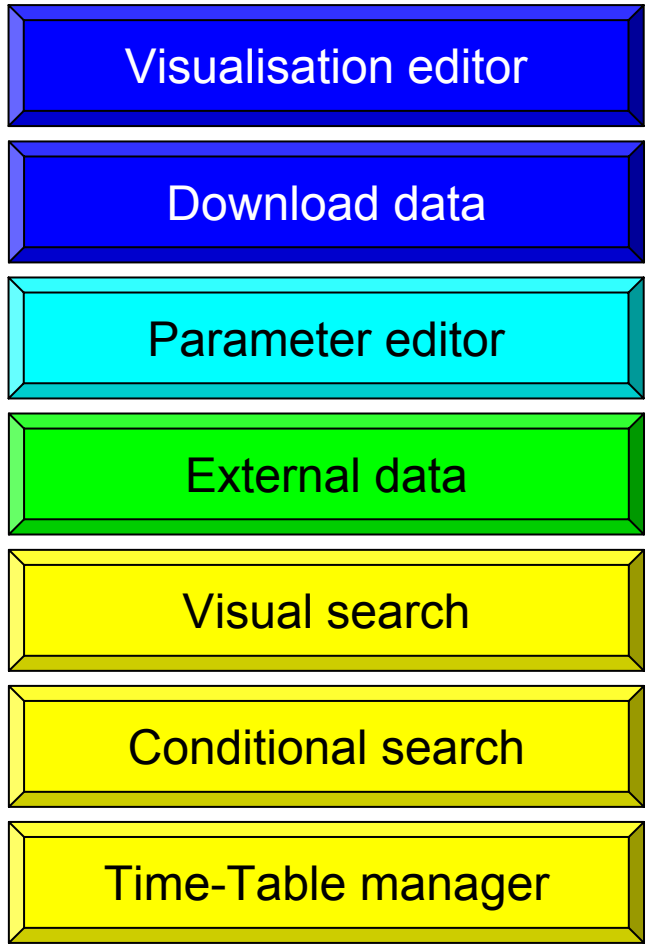
Collaboration in EUROPLANET RI Plasma Node
(CDPP, IWF, CESR, LESIA)

AMDA Automated Mutiple Dataset Analysis

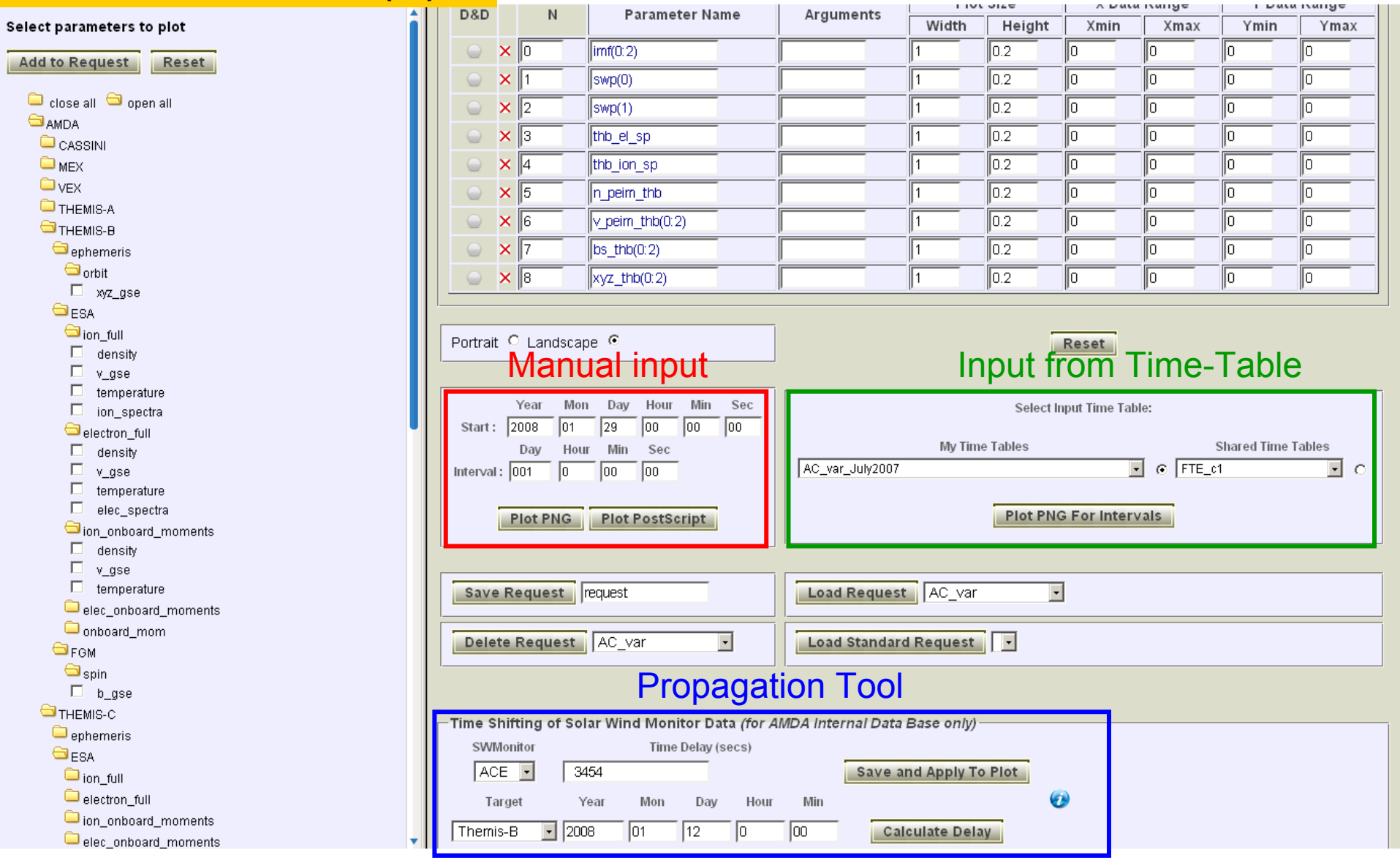
- Prototype
- Web based service
- Transparent (automated) access to data ⇒ **users deal with parameters, not files**
- Produces, ingests and manages **time-tables** and catalogues

AMDA is fully compliant with FireFox only

AMDA is public (http://cdpp-amda.cesr.fr), for either registred or guest users

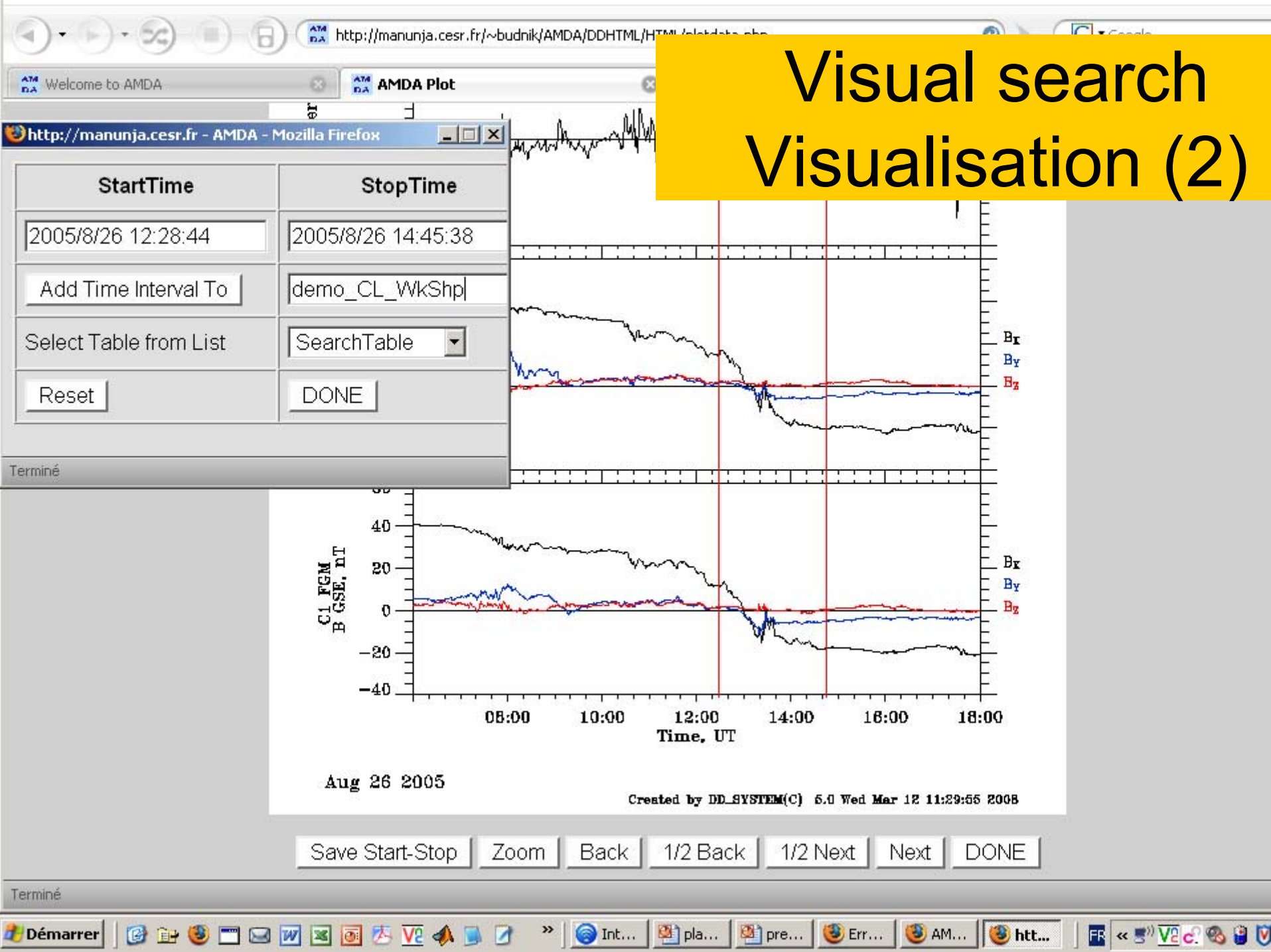


Visualisation (1)



⇒ Time delay computed from the data obtained in the solar wind

Visual search
Visualisation (2)



Conditional search

ata | Download Data | Conditional Search | External Data | Help | Fe

Select parameters to compose the condition

open all | close all

- Missions
  - CLUSTER1
    - orbit
      - x
      - y
      - z
      - r
    - fgm
      - bx
      - by
      - bz
      - |b|
    - cis-hia
    - cis-codif
    - efw
    - whisper
    - staff
    - cis-hia+fgm
  - CLUSTER2
    - orbit
    - fgm
      - bx
      - by
      - bz
      - |b|
    - efw
    - whisper
    - staff
  - CLUSTER3

Construct Your Search Condition:

```
b_c1(0)*b_c2(0)*b_c3(0)*b_c4(0)>0 &
xyz_c1(0)<-10 &  min([b_c1(0), b_c2(0),
b_c3(0), b_c4(0)])<0 & max([b_c1(0), b_c2(0),
b_c3(0), b_c4(0)])>0
```

Syntax of Condition expressio

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

Example
sin(*param1***) > 0 & *param2* < 0**

Averaging/Interpolation
Sampling time step
60 secs

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

Start Time
Year / Mon / Day Hour : Min : Sec
2002 / 08 / 01 02 : 00 : 00

Time Interval
Day / Hour : Min : Sec
030 / 00 : 00 : 00

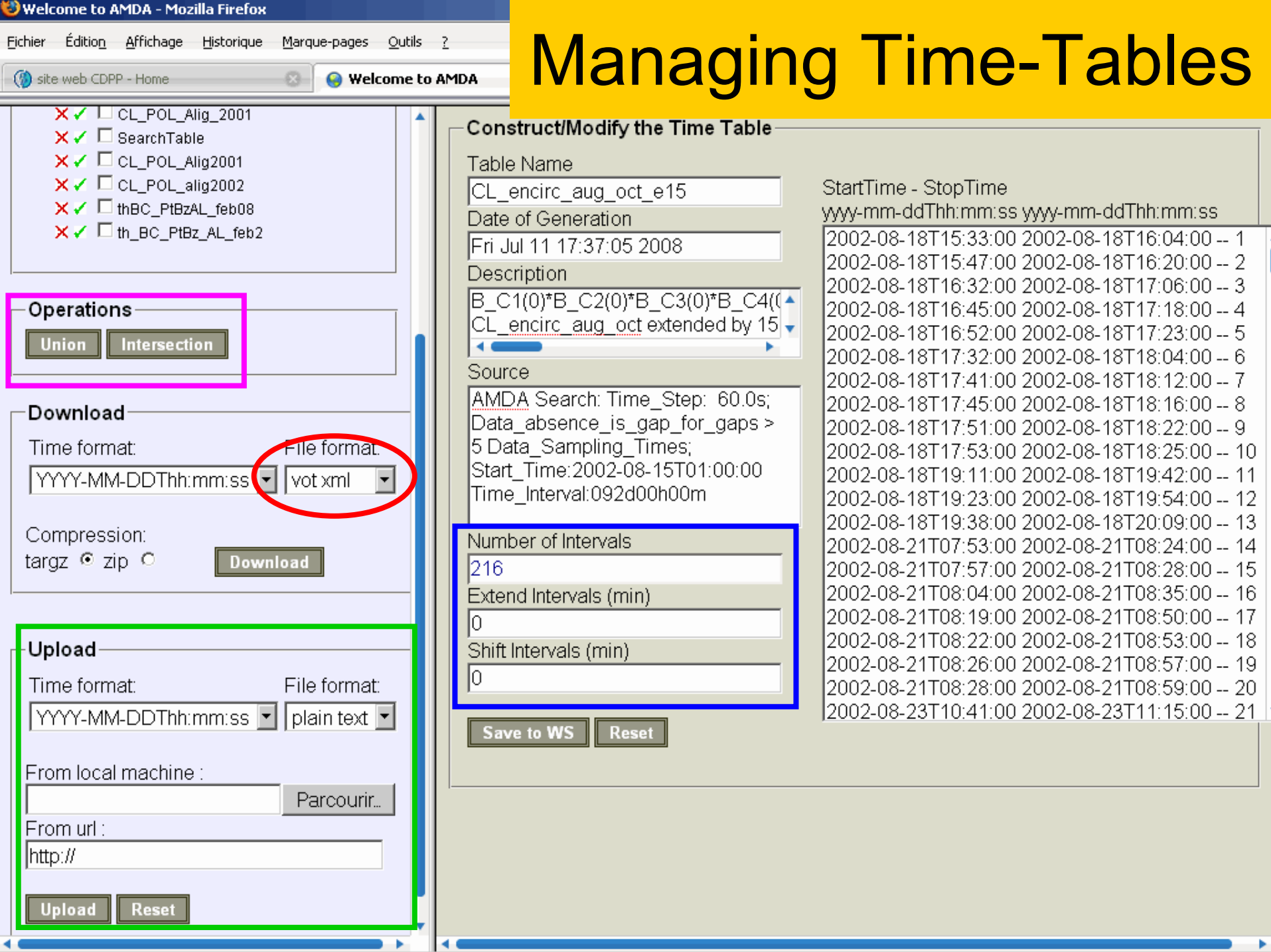
Reset

Generate Table demo_CLwksp

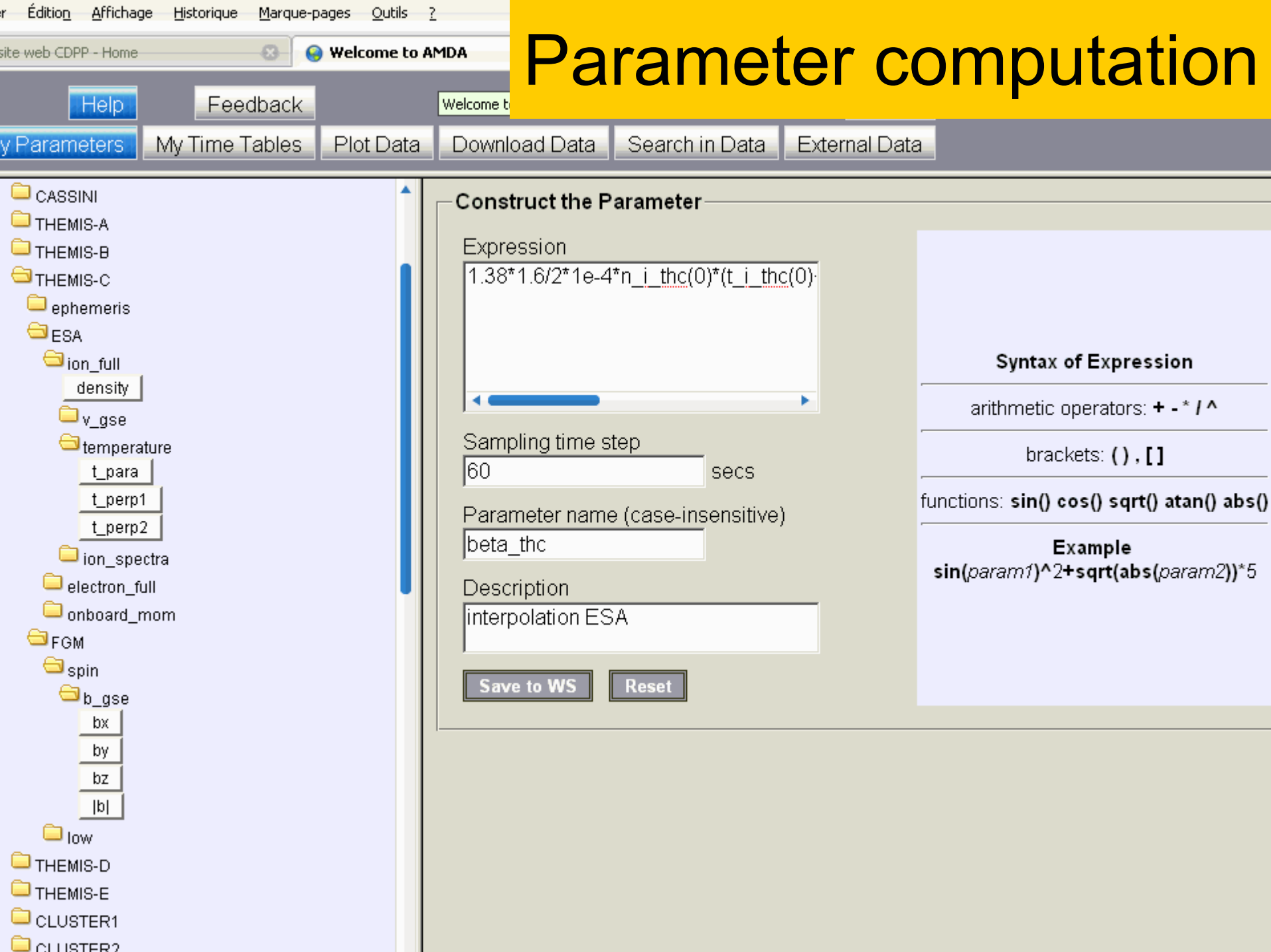
Save Condition
search

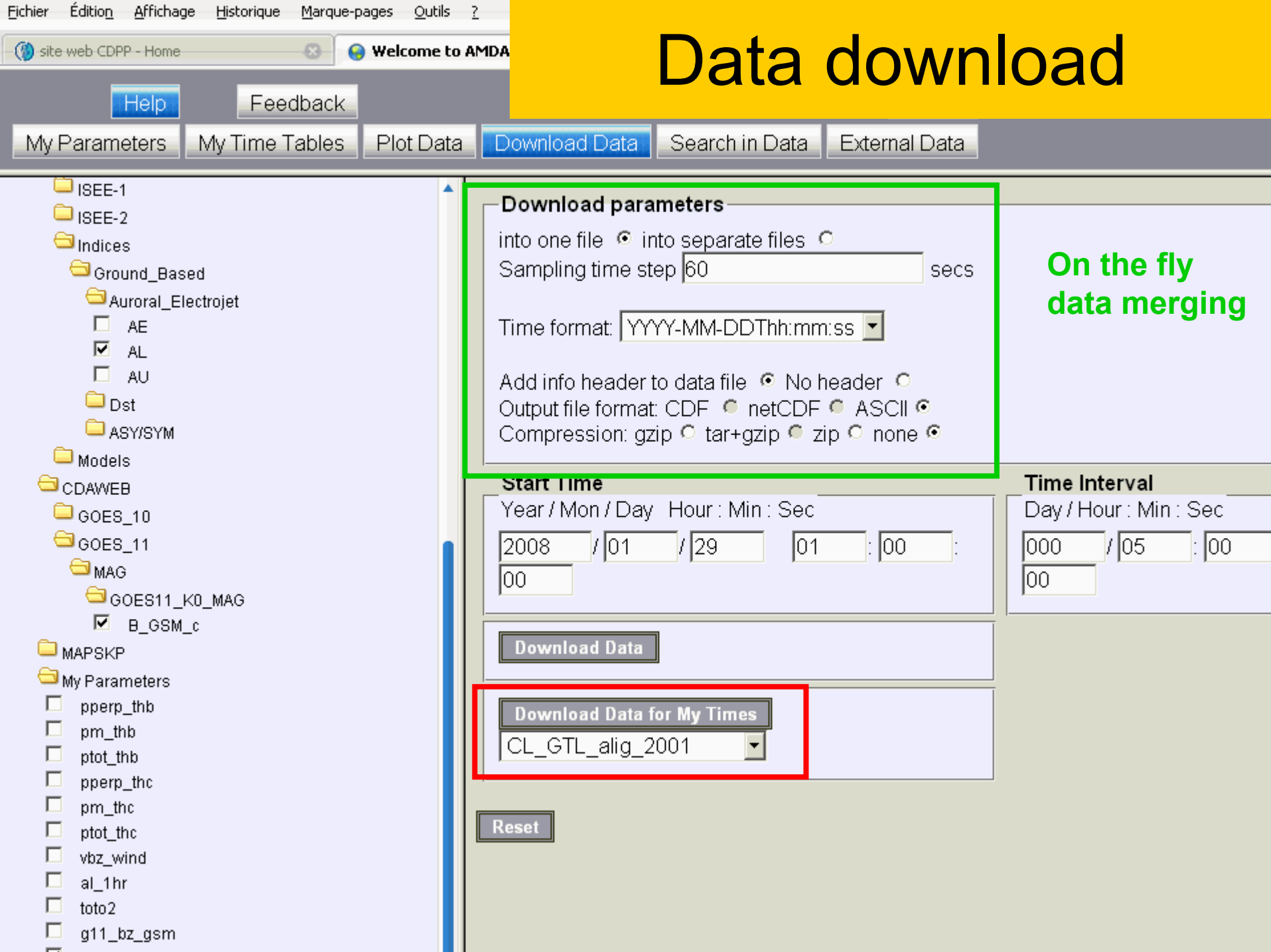
Generate Table From SearchTable

Load Condition

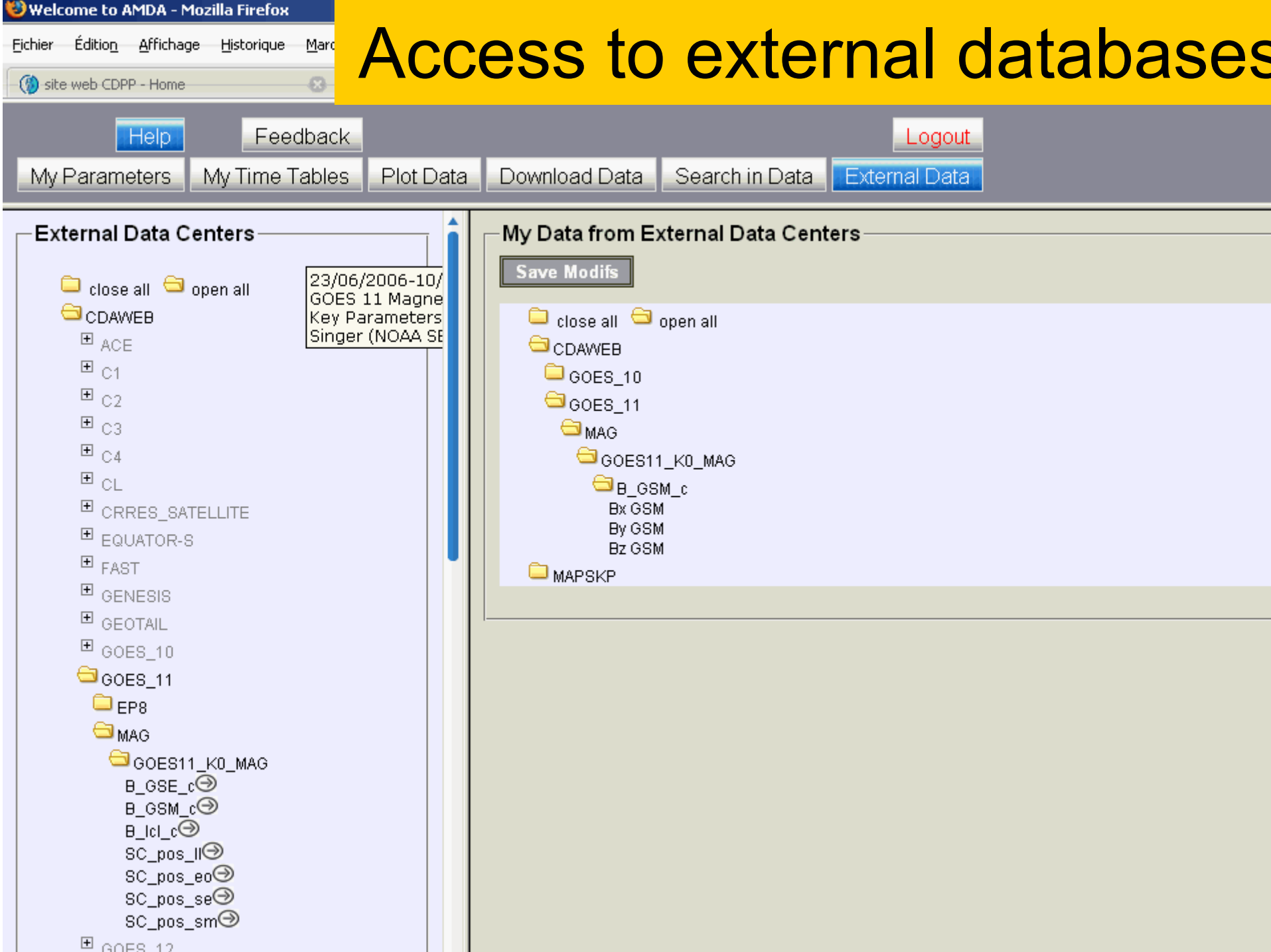

Welcome to AMDA - Mozilla Firefox
Fichier Édition Affichage Historique Marque-pages Outils ?
site web CDPP - Home
Welcome to AMDA
Managing Time-Tables
CL_POL_Alig_2001
SearchTable
CL_POL_Alig2001
CL_POL_alig2002
thBC_PtBzAL_feb08
th_BC_PtBz_AL_feb2
Operations
Union
Intersection
Download
Time format:
YYYY-MM-DDThh:mm:ss
File format:
vot xml
Compression:
targz
zip
Download
Upload
Time format:
YYYY-MM-DDThh:mm:ss
File format:
plain text
From local machine :
Parcourir...
From url :
http://
Upload
Reset
Construct/Modify the Time Table
Table Name
CL_encirc_aug_oct_e15
Date of Generation
Fri Jul 11 17:37:05 2008
Description
B_C1(0)*B_C2(0)*B_C3(0)*B_C4((
CL_encirc_aug_oct extended by 15
Source
AMDA Search: Time_Step: 60.0s;
Data_absence_is_gap_for_gaps >
5 Data_Sampling_Times;
Start_Time:2002-08-15T01:00:00
Time_Interval:092d00h00m
Number of Intervals
216
Extend Intervals (min)
0
Shift Intervals (min)
0
Save to WS
Reset
StartTime - StopTime
yyyy-mm-ddThh:mm:ss yyyy-mm-ddThh:mm:ss
2002-08-18T15:33:00 2002-08-18T16:04:00 -- 1
2002-08-18T15:47:00 2002-08-18T16:20:00 -- 2
2002-08-18T16:32:00 2002-08-18T17:06:00 -- 3
2002-08-18T16:45:00 2002-08-18T17:18:00 -- 4
2002-08-18T16:52:00 2002-08-18T17:23:00 -- 5
2002-08-18T17:32:00 2002-08-18T18:04:00 -- 6
2002-08-18T17:41:00 2002-08-18T18:12:00 -- 7
2002-08-18T17:45:00 2002-08-18T18:16:00 -- 8
2002-08-18T17:51:00 2002-08-18T18:22:00 -- 9
2002-08-18T17:53:00 2002-08-18T18:25:00 -- 10
2002-08-18T19:11:00 2002-08-18T19:42:00 -- 11
2002-08-18T19:23:00 2002-08-18T19:54:00 -- 12
2002-08-18T19:38:00 2002-08-18T20:09:00 -- 13
2002-08-21T07:53:00 2002-08-21T08:24:00 -- 14
2002-08-21T07:57:00 2002-08-21T08:28:00 -- 15
2002-08-21T08:04:00 2002-08-21T08:35:00 -- 16
2002-08-21T08:19:00 2002-08-21T08:50:00 -- 17
2002-08-21T08:22:00 2002-08-21T08:53:00 -- 18
2002-08-21T08:26:00 2002-08-21T08:57:00 -- 19
2002-08-21T08:28:00 2002-08-21T08:59:00 -- 20
2002-08-23T10:41:00 2002-08-23T11:15:00 -- 21

Parameter computation




Fichier Édition Affichage Historique Marque-pages Outils ?
site web CDPP - Home
Welcome to AMDA
Data download
Help
Feedback
My Parameters
My Time Tables
Plot Data
Download Data
Search in Data
External Data
ISEE-1
ISEE-2
Indices
Ground_Based
Auroral_Electrojet
AE
AL
AU
Dst
ASY/SYM
Models
CDAWEB
GOES_10
GOES_11
MAG
GOES11_K0_MAG
B_GSM_c
MAPSKP
My Parameters
pperp_thb
pm_thb
ptot_thb
pperp_thc
pm_thc
ptot_thc
vbz_wind
al_1hr
toto2
g11_bz_gsm
Download parameters
into one file
into separate files
Sampling time step 60 secs
Time format: YYYY-MM-DDThh:mm:ss
Add info header to data file No header
Output file format: CDF netCDF ASCII
Compression: gzip tar+gzip zip none
On the fly data merging
Start Time
Year / Mon / Day Hour : Min : Sec
2008 / 01 / 29 01 : 00 : 00
Time Interval
Day / Hour : Min : Sec
000 / 05 : 00 : 00
Download Data
Download Data for My Times
CL_GTL_alig_2001
Reset

Access to external databases



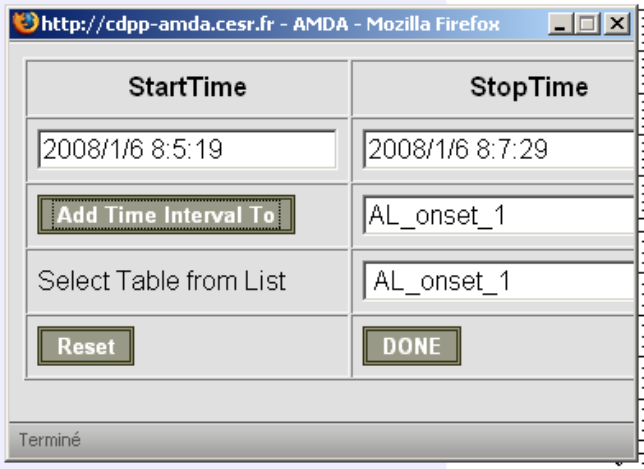
Use Cases

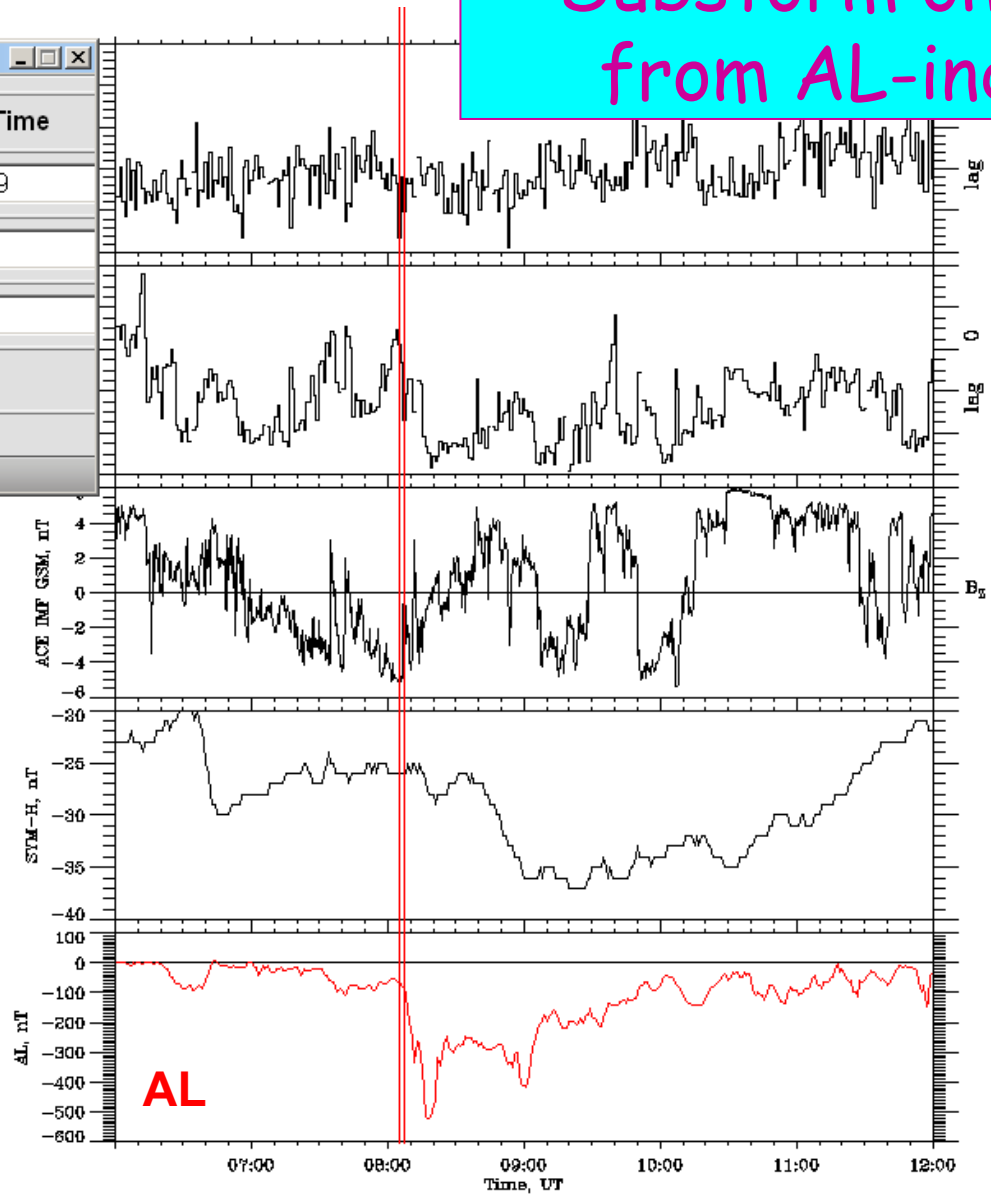
1. *Visual search of events: Substorm onsets from the AL-index*

2. *Automated search: magnetopause detection*

3. Parameter computation, automated search, time-table manipulation, visual search:
   - search for "quiet" convection periods

Substorm onsets from AL-index





Example:
Generate a Time-Table of AL negative bay onsets for substorm studies

Save Start-Stop | Zoom | Back | 1/2 Back | 1/2 Next | Next | DONE

Detection of the magnetopause with THEMIS

(Broussillon et al.)

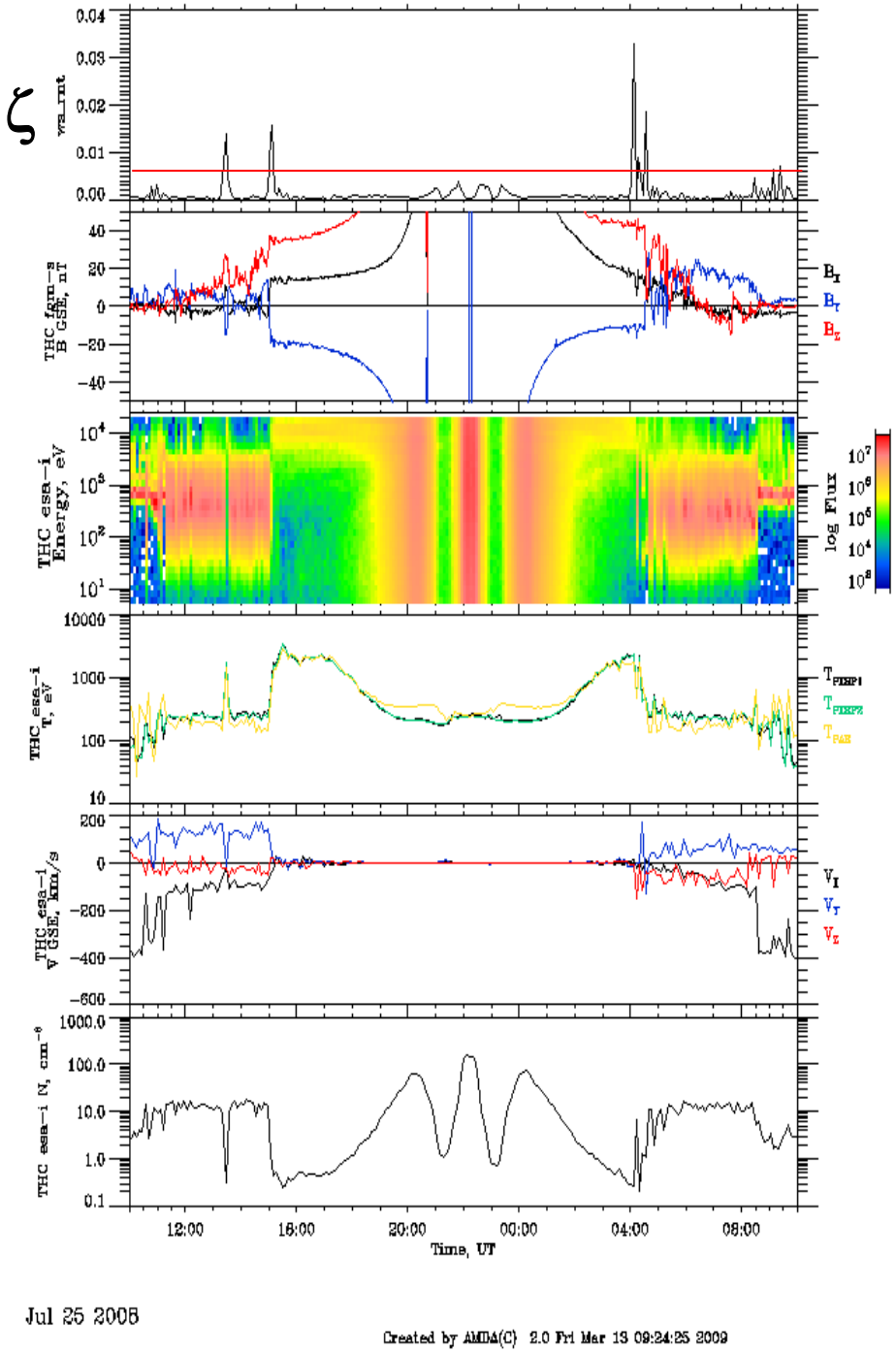
Building parameters:

$$\zeta = \frac{\frac{d}{dt}\left(\left\langle n/T_{\perp}\right\rangle_{300}\right)}{\left\langle n/T_{\perp}\right\rangle_{300}}$$

$U = \langle V_X \rangle_{1000}$

Conditional search:

$$\begin{cases} \zeta > \text{Threshold Value} = 6.10^{-3} \\ U > 250 \text{ km/s} \\ 8 < R < 17\ R_E \end{cases}$$



Search for "quiet" convection periods

Criteria:

- IMF: Southward but weak and roughly steady

-2 < IMF-BZ < 0 nT, from ACE data

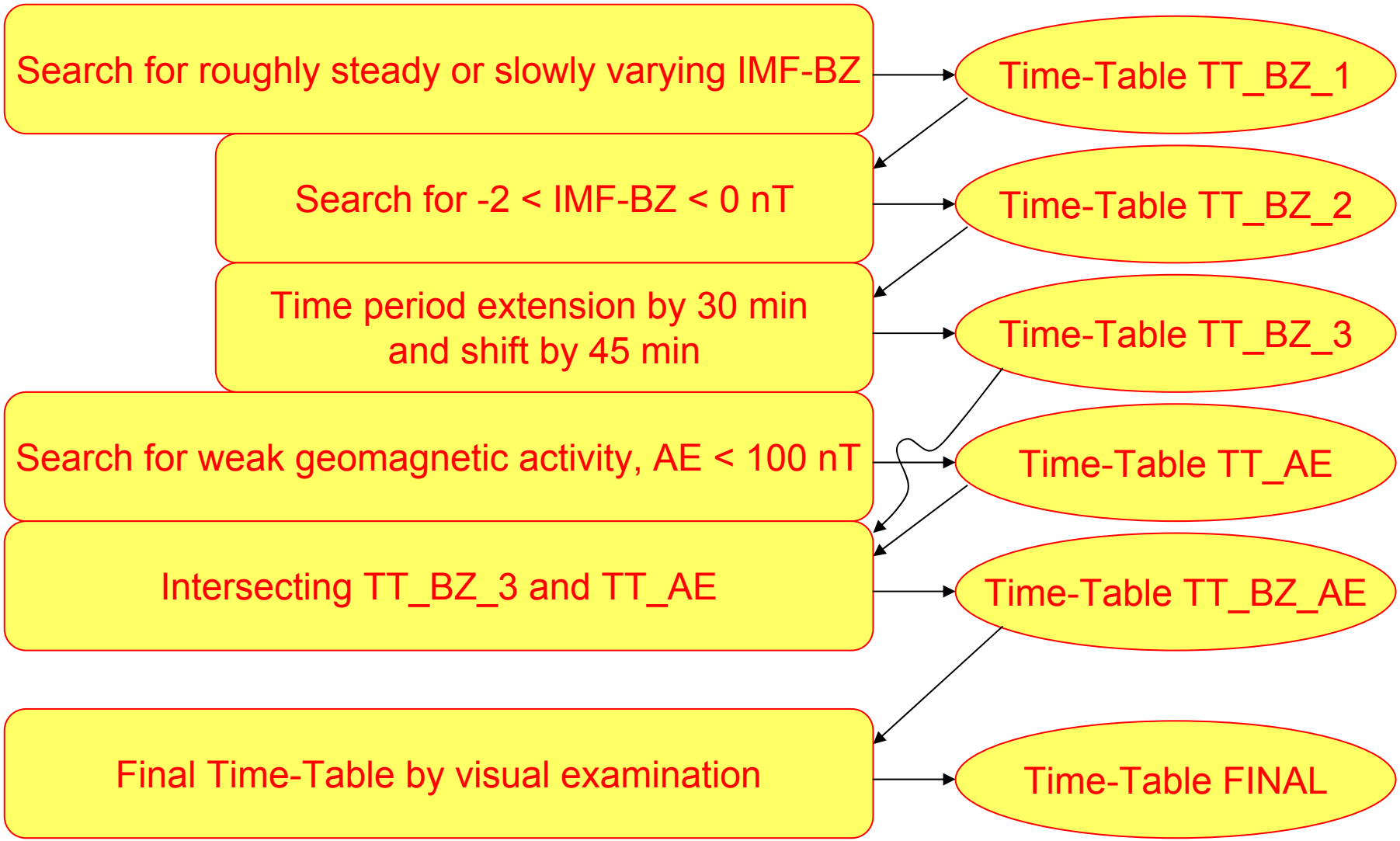
(VBz, Epsilon, …, would have been better)

- Weak geomagnetic activity: **AE < 100 nT**

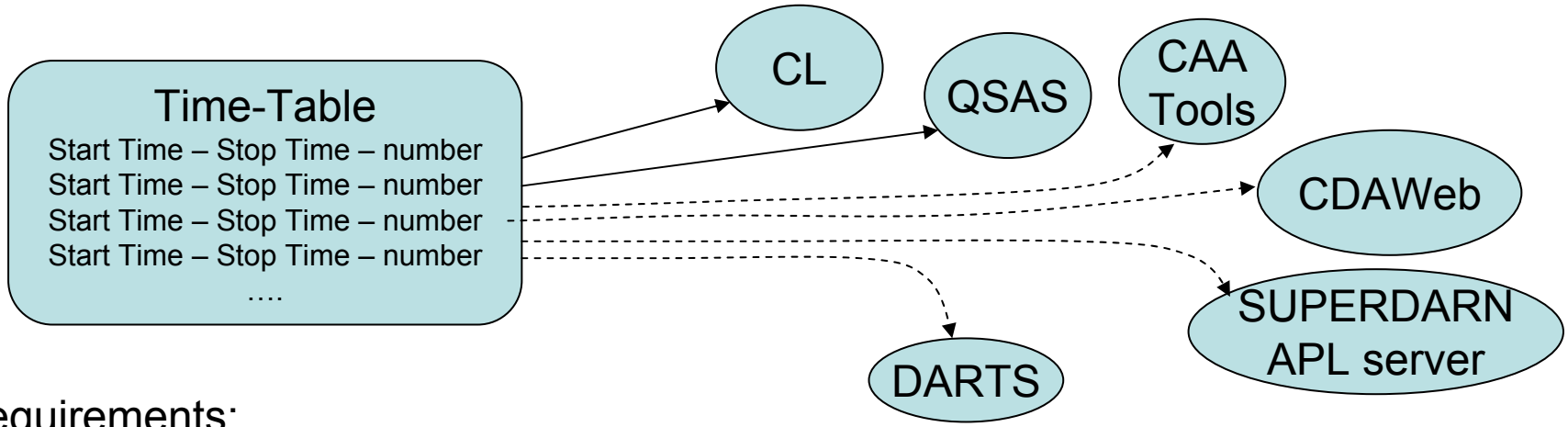
Goal:

Establish the list of periods corresponding to these criteria during the tail pass of the THEMIS mission (December 2007 to May 2008)

step by step sequence



Using the resulting time-table



Requirements:

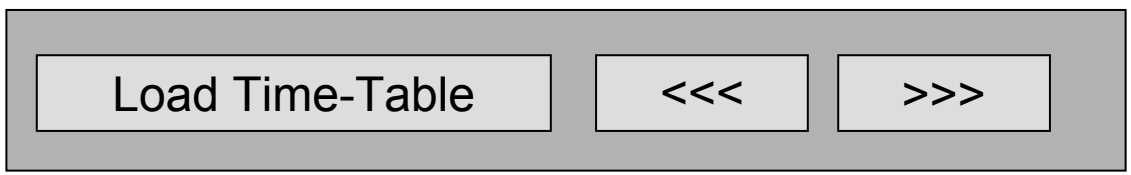
And others …

- A time-table format standard

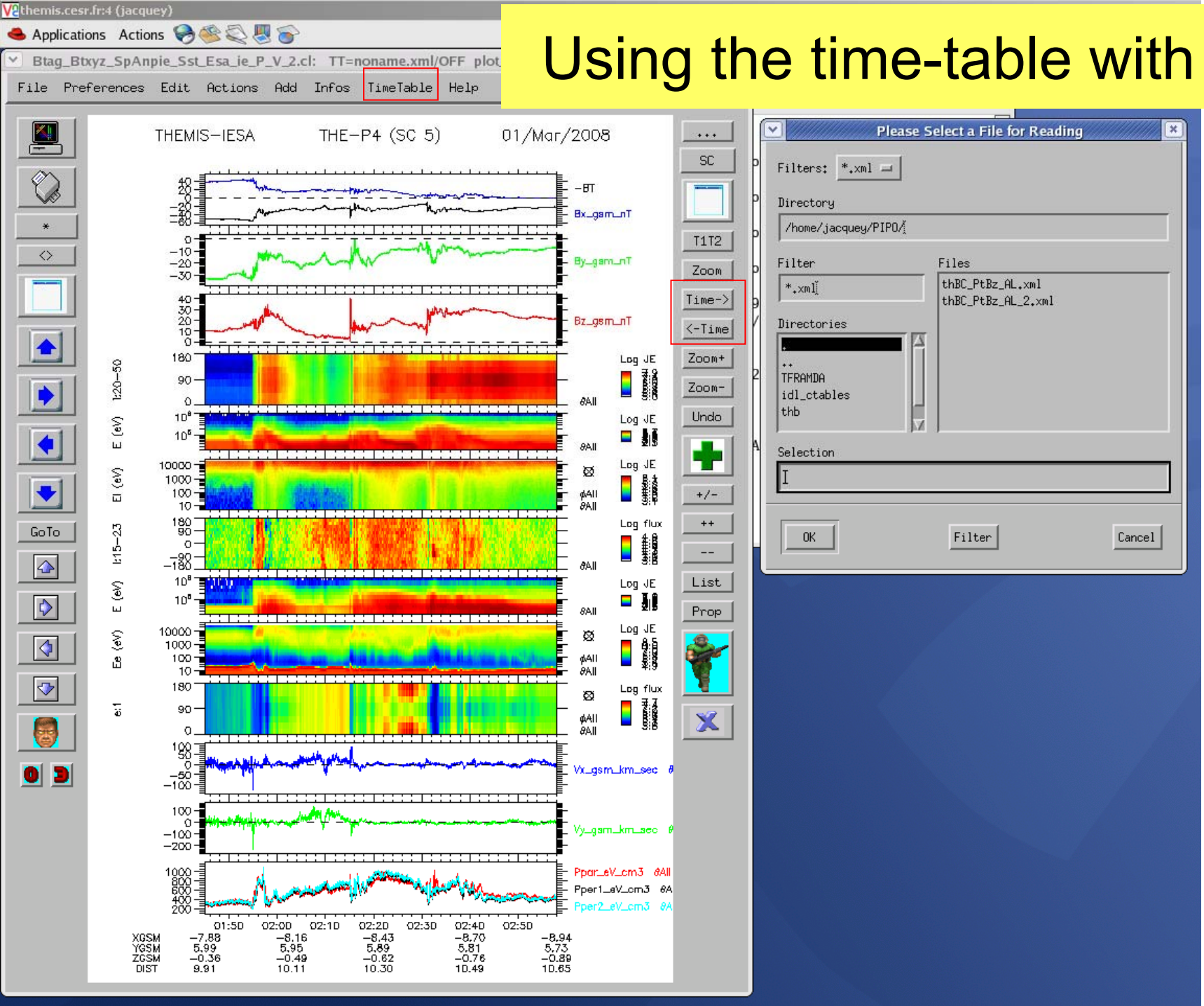
  Collaboration CDPP/CAA/QSAS/CL: VOtable
  http://cdpp2.cesr.fr/twiki/bin/view/AMDA/AmdaTimeTableFormat

- An interface for reading the standardised time-table

- A web interface module for skipping from one time interval to another one



Using the time-table with CL



Conclusions

%AMDA is a public service, continuously developed with the support of CNES and CNRS

%AMDA: Visualisation, data download, parameter computation,
visual search, automated conditional search, time-table managment

%AMDA is VO (SPASE based) compliant

%AMDA used in european VO projects: **EuroPLANET/IDIS, HELIO**

%Exchanging and exploiting time-tables allows to link data resources, tools and services

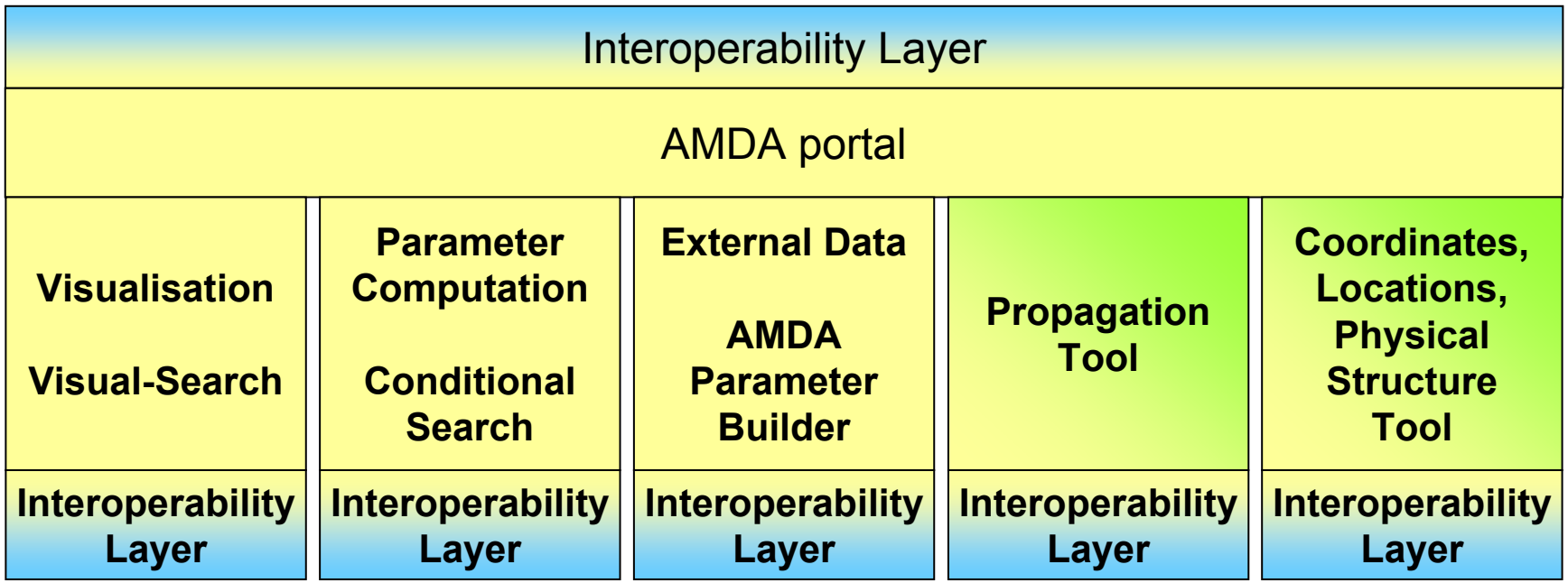
%A Standard for time-table description(CDPP, CAA, QSAS, CL)
http://cdpp2.cesr.fr/twiki/bin/view/AMDA/AmdaTimeTableFormat

%Feedback from users is very welcome.
For any need or comment: amda@cesr.fr

%If you use AMDA or CDPP services for publications, please aknowledge

Envisioned future development of AMDA

- AMDA prototype development
- AMDA (prototype) → AMDA-NG ("industrialised")
  Action funded and piloted by CNES
- AMDA → Interoperable modules:



Interoperability layer:

First priority: SPASE compliant.

Also in view: HELIO, EuroPlaNet RI/IDIS, IVOA(Topcat, Aladin)