

CDPP web-based tools for solar-terrestrial physics and space weather

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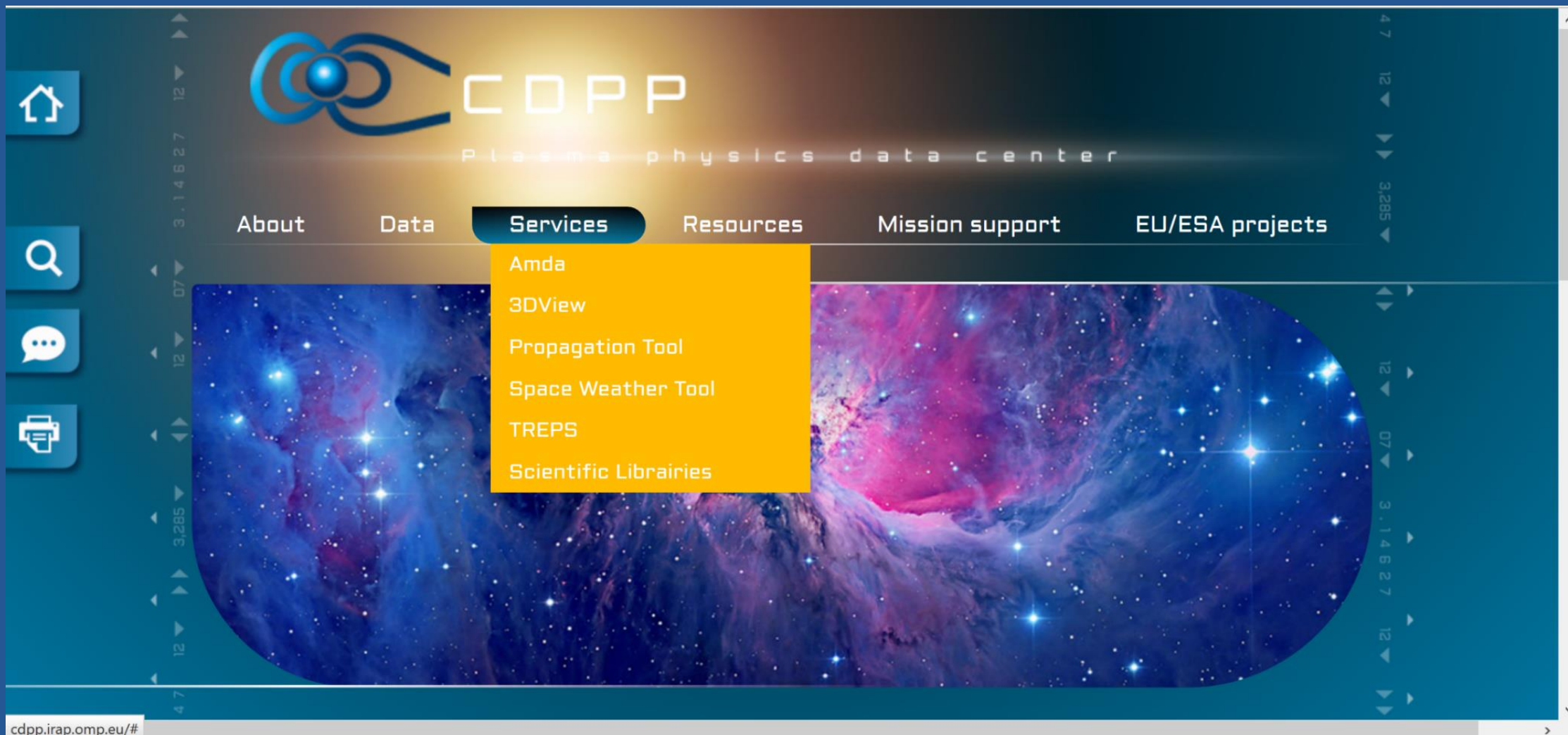
² CNES, Toulouse, France

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⁴ INETUM, Toulouse, France

- General presentation of CDPP and its services
- Overview of the capabilities of some of the tools
 - Propagation Tool
 - AMDA
 - 3D View
- Summary

- Created in 1998 by the French space agency (CNES) and National Science research Council (CNRS).
- Mostly hosted at IRAP in Toulouse. CNES (Toulouse) and LESIA (Observatoire de Paris) also host CDPP members. Contractors contribute to developments and coding.
- The primary purpose of the CDPP is to assure long-term preservation of data relevant to the physics of naturally occurring plasmas in the Solar System, especially data from experiments which are either French or have a strong French participation.
- The data archived and rendered accessible at CDPP have been obtained for more than 40 years onboard satellites or from ground observatories, from or around the Earth, planetary environments or the solar wind.
- CDPP develops **tools and services** helping data and numerical models exploitation. The CDPP is also involved in the development of interoperability efforts and virtual observatories.





Multi dataset visualisation and download
Event search and data mining
Catalogue generation and exploitation
Access to data, model and image centres via VO tools

3D visualisation of spacecraft position, data and models
Access to data, model and image centres via VO tools



Propagation of CME, CIR and SEP
Comparison to STEREO data (J maps)

Reconstruction of magnetic flux ropes and prediction of
IMF/SW and geomagnetic indices



Reference frames and coordinate systems transformations

Propagation Tool
⌵ □ ✕

Start time

2022-01-30T00:00:00

2022-02-02T09:28:50

START : SUN
CR2253 SDO HMI ML

90°
45°
0°
-45°
-90°

0°
90°
180°
270°
360°

Long : Lat :

Extent (°)

45

Source (°)

120

Carrington map
V Plot
Flux Plot

Start : SUN
Start Time

2022-01-30T00:00:00

500

+/- 0

129

RADIAL Propagation

Drag Model

Inner Boundary (Rs)

3

Ambiant Speed (km/s)

500

Drag Parameter (10⁻⁷/km)

1.9

End : EARTH

2022-02-02T09:28:50

0

0

133.2

Coordinate system : HEE

0 27 54 81 hrs

0 0.3 0.7 1 AU

Radial Propagation
J-map: Carrington/InSitu

Corotation
J-map: Catalogue of fits

SEP Propagation
J-map: Click to fit

Radial Interface

Arrival Times Catalogue

J-Map Interface

Helloviewer

Table of Arrival Times

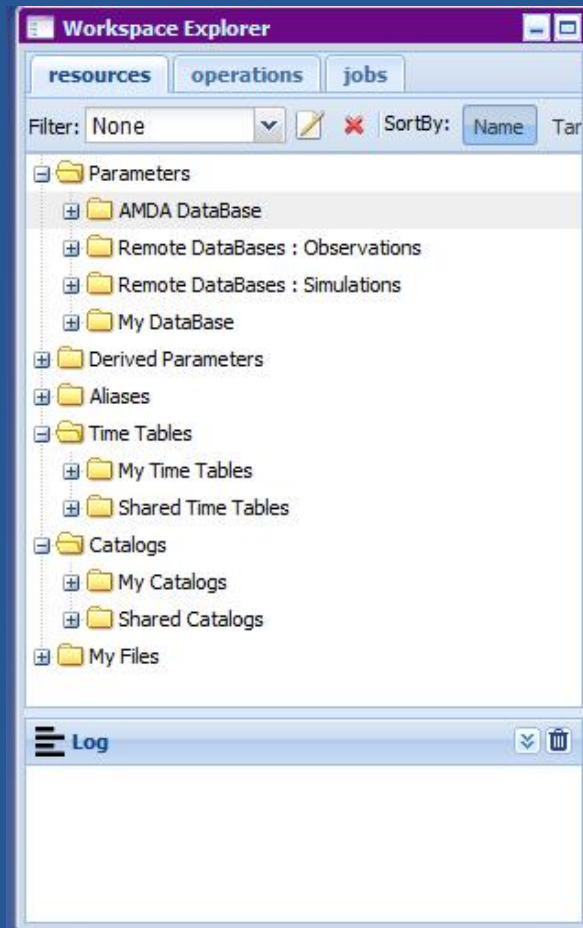
CDPP Interface

APIS Interface

SAMP Client Monitor

Automated Multi Dataset Analysis (AMDA)

<http://amda.cdppp.eu>



Start

Workspace Explorer

5:03 PM

Automated Multi Dataset Analysis (AMDA)

<http://amda.cdppp.eu>



Automated Multi Dataset Analysis (AMDA)

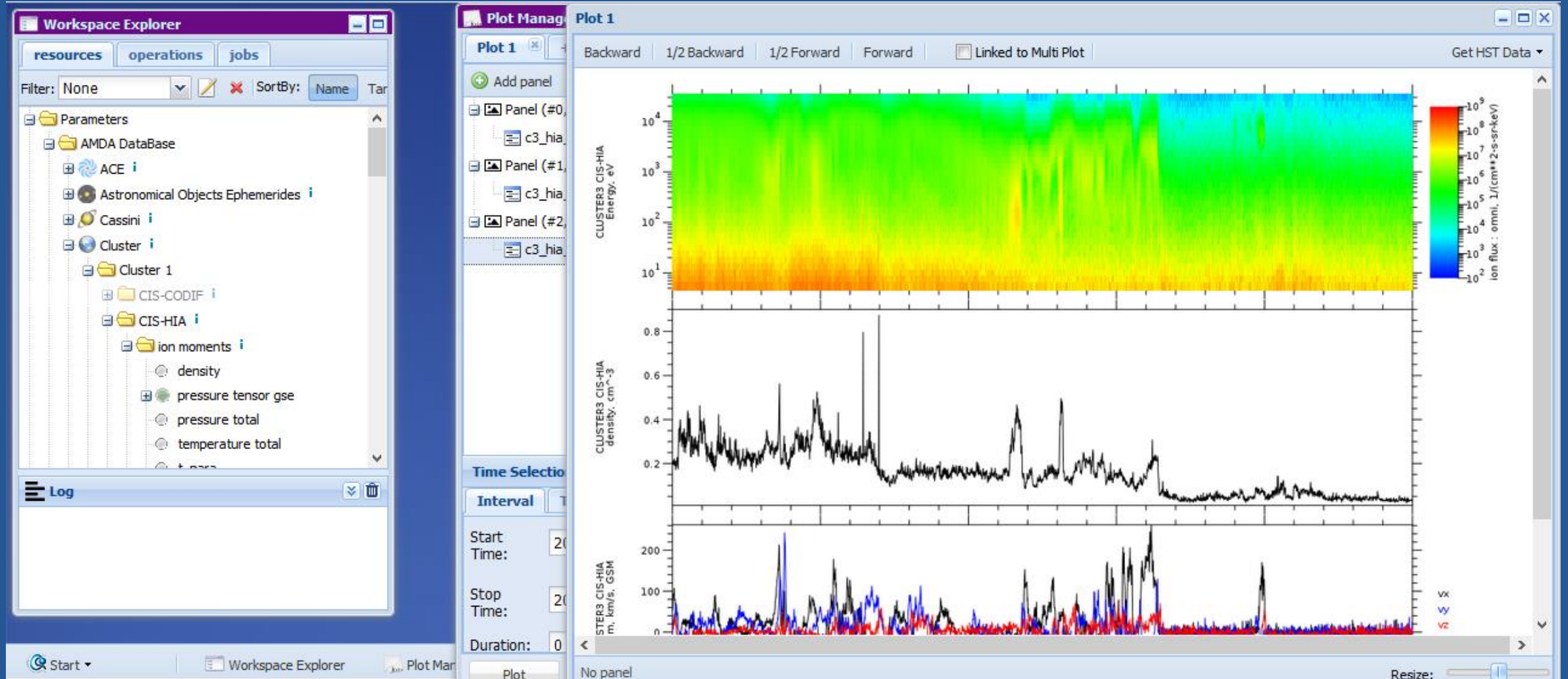
<http://amda.cdpp.eu>

The screenshot displays the AMDA software interface with two main panels:

- Workspace Explorer:** Shows a hierarchical tree of resources. Under 'Parameters', there is an 'AMDA DataBase' folder containing 'ACE', 'Astronomical Objects Ephemerides', 'Cassini', and 'Cluster'. 'Cluster' contains 'Cluster 1', which includes 'CIS-CODIF' and 'CIS-HIA'. 'CIS-HIA' contains an 'ion moments' folder with sub-items: 'density', 'pressure tensor gse', 'pressure total', and 'temperature total'.
- Plot Manager:** Shows a 'Plot 1' window with three panels:
 - Panel (#0, Time Plot): $c3_hia_pad_omni = f(t)$, Spectro, Y Left
 - Panel (#1, Time Plot): $c3_hia_dens = f(t)$, Serie, Y Left
 - Panel (#2, Time Plot): $c3_hia_v_gsm = f(t)$, Serie, Y LeftThe right side of the Plot Manager contains configuration options:
 - Selected element options:** Arguments (Dim. 1: All), Drawing type (Serie), Y axis (Left), Min/Max thresholds, Colored Parameter (Drop a parameter), Lines (checked, Style: Plain, Width: 1, Color: auto), Symbols (unchecked).
 - Output options:** File format (PNG), File output (Interactive mode), File prefix, One file per interval (unchecked), Request name.
 - Time Selection:** Interval (selected), Time Table or Catalog, Start Time (2006/09/23 00:00:00), Stop Time (2006/09/23 05:00:00), Duration (0, 5, 0, 0).

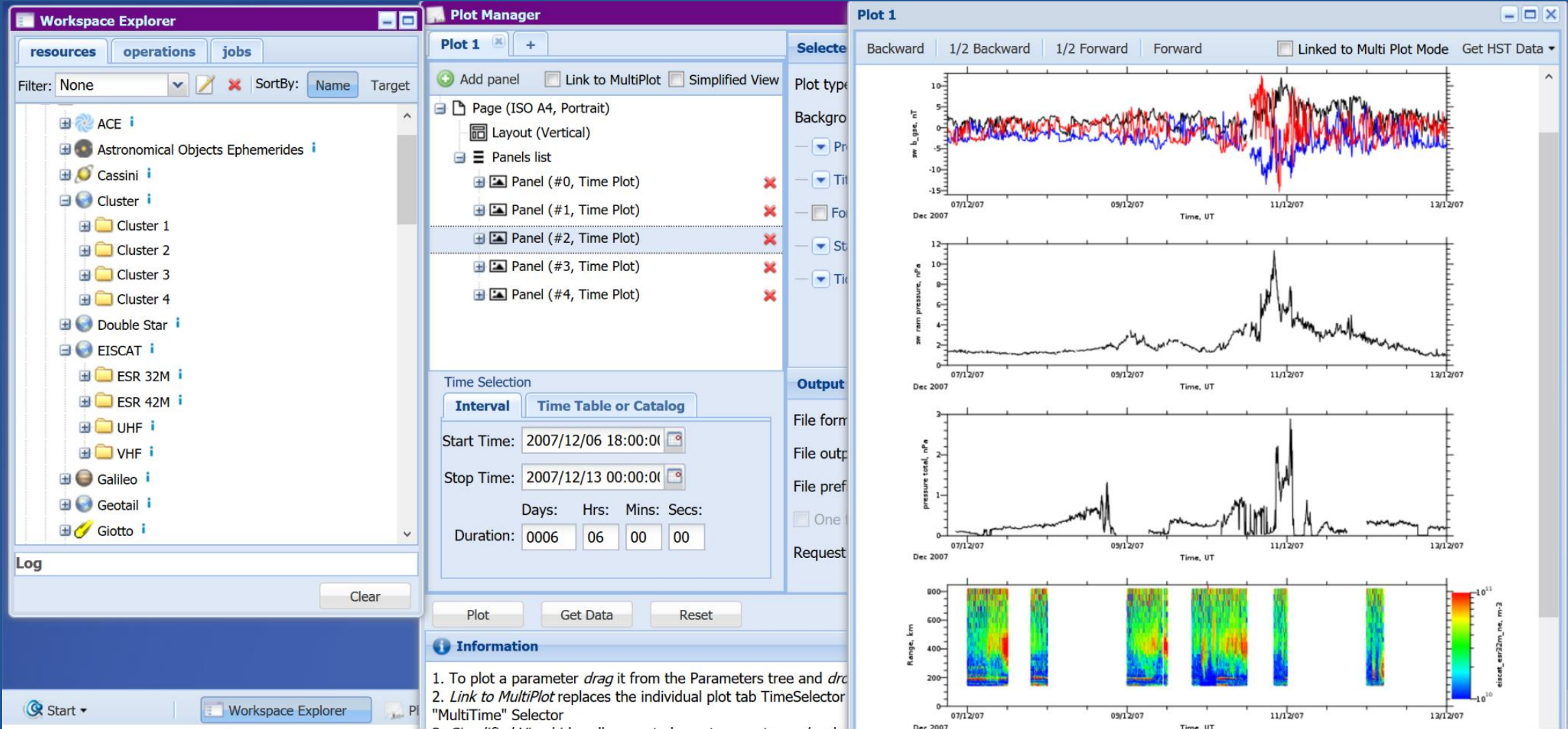
Automated Multi Dataset Analysis (AMDA)

<http://amda.cdpp.eu>



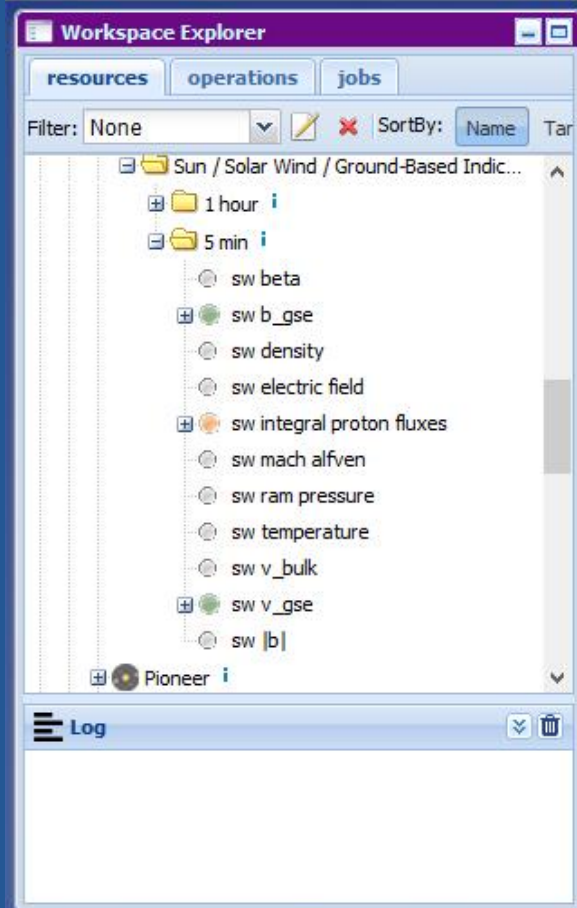
Automated Multi Dataset Analysis (AMDA)

<http://amda.cdpp.eu>



Data mining with AMDA

<http://amda.cdpp.eu>



Data mining with AMDA

<http://amda.cdpp.eu>

The screenshot displays the AMDA Data Mining interface. On the left, the 'Workspace Explorer' shows a tree view with folders for 'Finished Jobs / Results', 'Jobs in Progress', and 'Statistics'. The main 'Data Mining' window is configured with the following details:

- Request Name*:** HighSWdens
- Averaging/Interpolation:** Sampling Time Step (sec)*: 300
- Data Gap:** if no data for interval: 5
- Time Selection:** Start Time: 2017/01/01 00:00:00, Stop Time: 2018/01/01 00:00:00, Duration: 365 0 0 0
- Data Mining Condition*:** `omni5_sw_n>50`

A 'Tools For Condition Construction' dialog is open, featuring a calculator with buttons for numbers 0-9, mathematical operators (+, -, *, /), and logical symbols (&, |, ^, >, <). Below the dialog, an 'Information' section provides instructions on how to construct conditions using AMDA parameters.

Information

To construct a condition for data mining *drag* one of the AMDA parameters from the parameter tree and *drop* onto the panel.

1. Use **FLOAT numbers** in math expressions
2. **Enclose** your expression in **brackets** - $(1./2.*imf(0)) > 0$
3. Use **&** as AND and **|** as OR and **enclose** every logical block in **brackets** - $(imf(0) > 0) \& ((5.*imf(1)) < -5)$

Data mining with AMDA

<http://amda.cdpp.eu>

Workspace Explorer

resources operations jobs

Filter: None

- Finished Jobs / Results
 - Plot
 - Download
 - Data Mining
 - datamining_1537865759
- Jobs in Progress
 - Plot
 - Download
 - Data Mining
 - Statistics

Log

25-09-2018 11:32:04: Data Mining datamining_1537864089 completed

25-09-2018 11:31:04: Data Mining datamining_1537864089 created

Manage Time Tables

Name*: Please no spaces!

Creation date: 2018/09/25 08:55:57 Intervals: 21

Description: Time Table generated by AMDA @ CDPP
Condition: omni5_sw_n>50

Operation log: AMDA Data Mining: Sampling: 300s; Data Gap: 5*300s;
Input Interval: 2017-01-01T00:00:00.000 - 2018-01-01T00:00:00.000

Operations on Intervals

Extend min Shift min

Apply Undo

Merge intervals Statistical info

Save Reset

Information

To edit a time table **double click** one of your time tables from the Time Tables tree or use context menu (**right click** at Workspace Explorer).

	Start Time	Stop Time	Duration (min)
0	2017-01-18T03:17:30	2017-01-18T03:57:30	40.00
1	2017-01-18T04:22:30	2017-01-18T04:27:30	5.00
2	2017-05-14T08:32:30	2017-05-14T09:17:30	45.00
3	2017-05-14T09:52:30	2017-05-14T10:42:30	50.00
4	2017-05-14T10:52:30	2017-05-14T11:07:30	15.00
5	2017-05-15T09:02:30	2017-05-15T09:07:30	5.00
6	2017-05-27T20:47:30	2017-05-27T20:52:30	5.00
7	2017-06-16T07:07:30	2017-06-16T07:32:30	25.00
8	2017-06-16T07:42:30	2017-06-16T07:52:30	10.00
9	2017-06-16T07:57:30	2017-06-16T08:12:30	15.00
10	2017-08-31T06:12:30	2017-08-31T06:27:30	15.00
11	2017-08-31T06:37:30	2017-08-31T07:02:30	25.00
12	2017-09-14T14:32:30	2017-09-14T14:42:30	10.00
13	2017-09-27T05:22:30	2017-09-27T05:37:30	15.00
14	2017-09-27T05:47:30	2017-09-27T06:17:30	30.00
15	2017-09-27T06:27:30	2017-09-27T06:52:30	25.00
16	2017-09-27T06:57:30	2017-09-27T07:07:30	10.00
17	2017-10-24T10:57:30	2017-10-24T11:07:30	10.00
18	2017-11-07T04:22:30	2017-11-07T04:32:30	10.00

Statistics with AMDA

<http://amda.cdpp.eu>



The screenshot displays the AMDA software interface. On the left, a 'Workspace Explorer' window is open, showing a hierarchical tree structure under the 'resources' tab. The tree includes folders for 'Parameters', 'AMDA DataBase', 'ACE', 'Astronomical Objects Ephemerides', 'Cassini', 'Cluster', and 'Cluster 1'. Under 'Cluster 1', there are sub-folders for 'CIS-CODIF', 'CIS-HIA', and 'ion moments', with the latter containing items like 'density', 'pressure tensor gse', 'pressure total', and 'temperature total'. A 'Log' window is visible at the bottom of the explorer. The main desktop area features a blue background with a glowing white nebula. The taskbar at the bottom contains several icons, including a question mark, a notepad, a magnifying glass, a 'Statistics' icon with a summation symbol (Σ), and other utility icons. The taskbar also shows the 'Start' button, open windows for 'Workspace Explorer', 'Plot Manager', and 'Plot 1', and the system tray with the time '11:03 AM'.

Workspace Explorer

resources operations jobs

Filter: None SortBy: Name Target

- CIS-HIA
 - ion moments
 - density
 - pressure tensor gse
 - pressure total
 - temperature total
 - t_para
 - t_perp
 - v_gse
 - v_gsm
 - |v|
 - pitch-angle/energy distribution
- EFW
 - electric field
 - 2D isr2
 - 3D gse
 - ez_error

Log

23-09-2018 14:45:05: Statistics statistics_1537706483 completed

23-09-2018 14:44:05: Statistics statistics_1537706483 created

Statistics

Select Parameter & Apply Function

	Parameter Name	function	
1	c1_hia_dens	mean	✖
2	c1_hia_vtot	mean	✖
3	c1_btot	mean	✖
4	c1_etot	mean	✖

Additional Information

Catalog Name:
Please no spaces!

Description:

Time Selection

Interval Time Table or Catalog

	Time Table or Catalog Name	
1	Mid-alt_cusp_crossings_sc1_(2001-2...	✖

Generate Catalog Reset

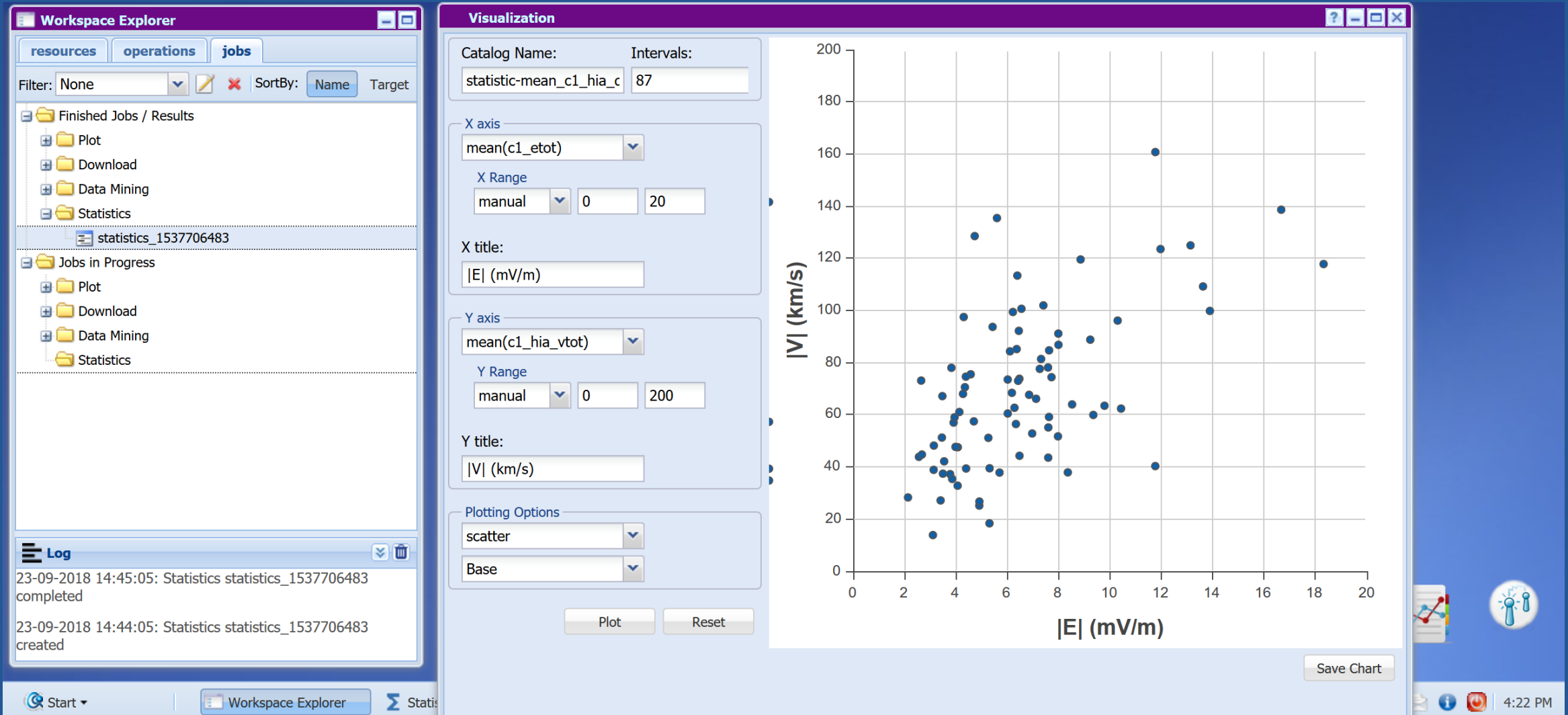
Information

1. To calculate a statistics on *any type* of parameter *drag* it from the Parameters tree and *drop* onto the panel
2. After dropping the parameter select function to apply (*click to select!!!* to open the menu)
3. Statistics can be calculated on Time Interval or TimeTable/Catalog intervals

Manage catalogs

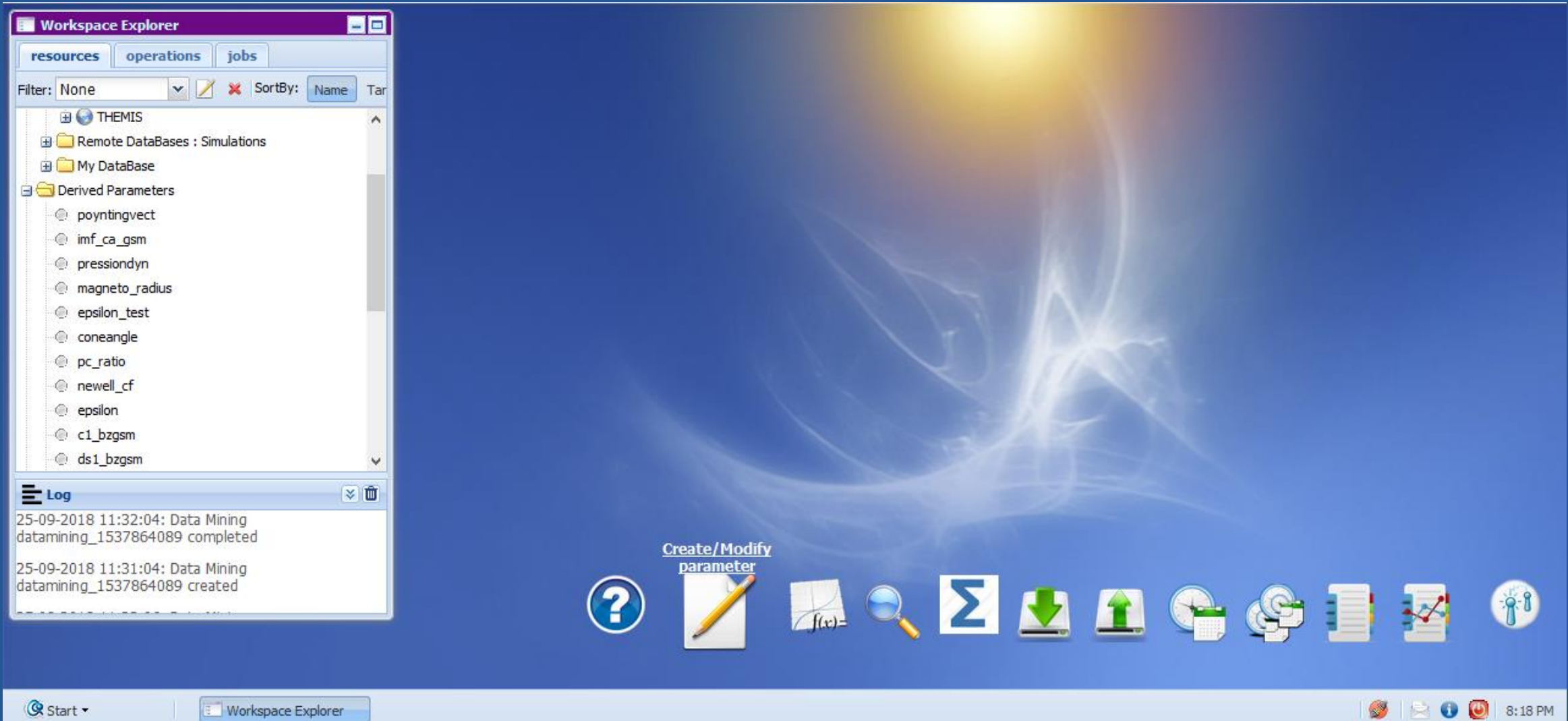
The screenshot displays the AMDA software interface. On the left, the 'Workspace Explorer' window shows a tree view with folders for 'Finished Jobs / Results' and 'Jobs in Progress', each containing sub-folders for 'Plot', 'Download', 'Data Mining', and 'Statistics'. A specific job 'statistics_1537706483' is selected under the 'Statistics' folder. Below the tree is a 'Log' window showing two entries: '23-09-2018 14:45:05: Statistics statistics_1537706483 completed' and '23-09-2018 14:44:05: Statistics statistics_1537706483 created'. The main 'Manage catalogs' window shows the details for a catalog named 'statistic-mean_c1_hia_dens-mean_c1_hia_vtot'. It includes fields for 'Name', 'Creation date' (2018/09/23 12:41:12), 'Intervals' (87), and a 'Description' (Generated by CDPP/AMDA Statistic Module). Below these fields are buttons for 'Save', 'Reset', 'Share', and 'Visualize', along with a 'Create New Catalog' button. On the right side of the 'Manage catalogs' window, a table displays a list of data points with columns for 'Start Time', 'Stop Time', 'mean...', 'Flag', 'mean...', 'Flag', and 'me'. The table contains 21 rows of data.

	Start Time	Stop Time	mean...	Flag	mean...	Flag	me
0	2001-07-14T01:32:00	2001-07-14T01:47:00	53.24...	0.703...	74.40...	0.703...	^
1	2001-08-06T20:38:00	2001-08-06T20:53:00	11.85...	0.911...	60.48...	0.911...	
2	2001-08-14T00:21:00	2001-08-14T00:31:00	3.827...	0.927...	86.81...	0.927...	
3	2001-08-21T04:12:00	2001-08-21T04:40:00	14.44...	0.786...	57.001	0.786...	
4	2001-08-25T21:53:00	2001-08-25T22:09:00	31.64...	0.767...	63.45...	0.767...	
5	2001-08-28T03:19:00	2001-08-28T03:33:00	6.500...	0.924...	42.14...	0.924...	
6	2001-09-04T06:58:00	2001-09-04T07:03:00	9.672...	0.763...	73.50...	0.763...	
7	2001-09-06T19:25:00	2001-09-06T19:30:00	4.537...	0.986...	128.5...	0.986...	
8	2001-09-09T05:13:00	2001-09-09T05:28:00	4.292...	0.991...	43.85...	0.991...	
9	2001-09-11T13:42:00	2001-09-11T13:51:00	26.84...	0.794...	37.23...	0.794...	
10	2001-09-13T18:34:00	2001-09-13T18:50:00	11.86...	0.896...	37.41...	0.896...	
11	2001-09-18T17:05:00	2001-09-18T17:19:00	16.349	0.962...	27.14...	0.962...	
12	2001-09-20T21:53:00	2001-09-20T22:33:00	22.14...	0.752...	73.81...	0.752...	
13	2001-09-23T11:10:00	2001-09-23T11:21:00	23.91...	0.716...	138.62	0.716...	
14	2001-10-12T12:00:00	2001-10-12T12:09:00	9.121...	0.882...	63.965	0.882...	
15	2001-10-21T21:10:00	2001-10-21T21:24:00	50.58...	0.701...	160.73	0.701...	
16	2002-07-29T13:25:00	2002-07-29T13:37:00	11.89...	0.790...	73.10...	0.790...	
17	2002-08-13T01:00:00	2002-08-13T01:06:00	6.492...	0.989...	70.55...	0.989...	
18	2002-08-17T18:47:00	2002-08-17T18:55:00	7.736...	0.991...	32.80...	0.991...	
19	2002-08-20T04:03:00	2002-08-20T04:10:00	6.604...	0.990...	99.81...	0.990...	
20	2002-08-22T09:03:00	2002-08-22T09:11:00	9.288...	0.884...	38.87...	0.884...	
21	2002-08-24T22:26:00	2002-08-24T22:50:00	15.10...	0.888...	56.44...	0.888...	



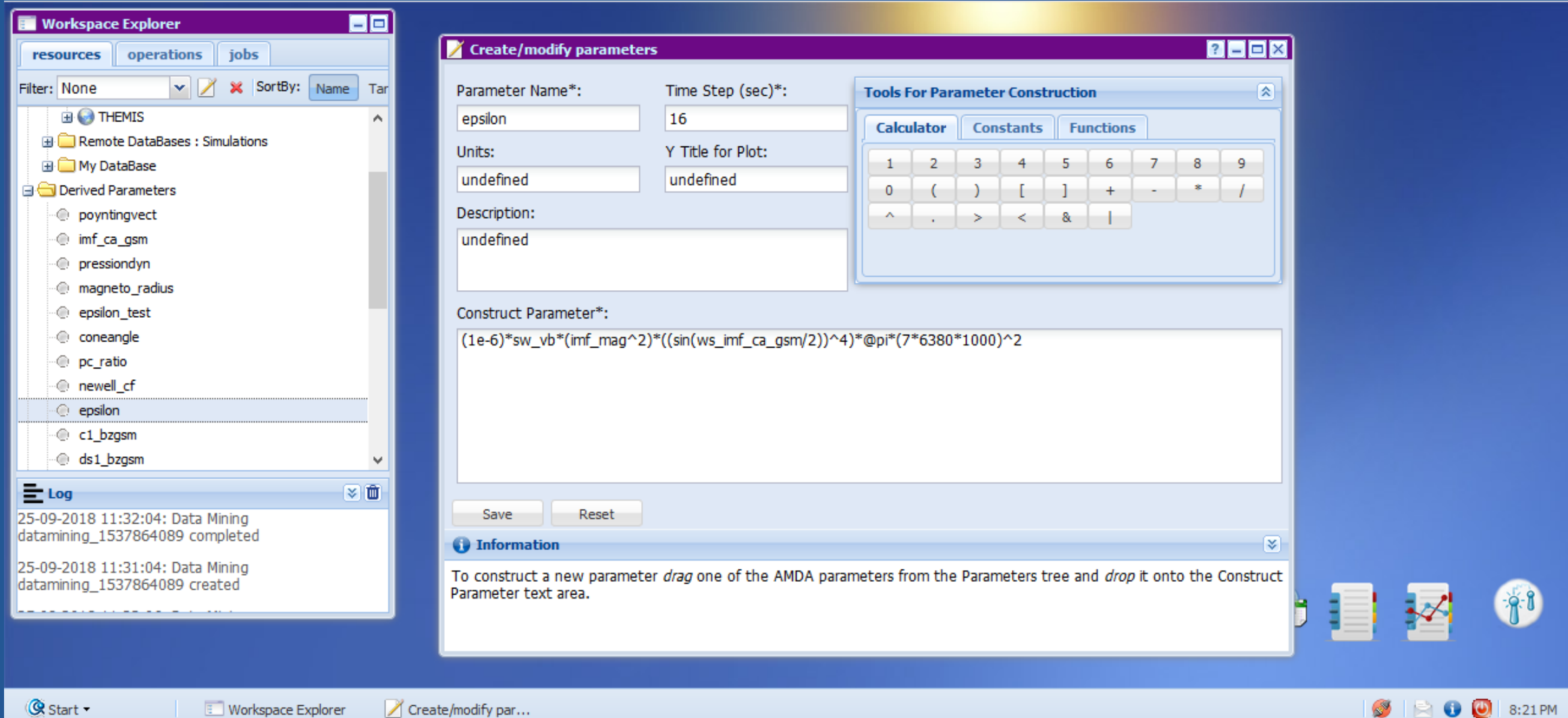
Creating new parameters with AMDA

<http://amda.cdpp.eu>



Creating new parameters with AMDA

<http://amda.cdpp.eu>



Workspace Explorer

resources operations jobs

Filter: None SortBy: Name Tar

- THEMIS
 - Remote DataBases : Simulations
 - My DataBase
 - Derived Parameters
 - poyntingvect
 - imf_ca_gsm
 - pressiondyn
 - magneto_radius
 - epsilon_test
 - coneangle
 - pc_ratio
 - newell_cf
 - epsilon**
 - c1_bzgsm
 - ds1_bzgsm

Log

25-09-2018 11:32:04: Data Mining datamining_1537864089 completed

25-09-2018 11:31:04: Data Mining datamining_1537864089 created

Create/modify parameters

Parameter Name*: epsilon Time Step (sec)*: 16

Units: undefined Y Title for Plot: undefined

Description: undefined

Construct Parameter*:
 $(1e-6)*sw_vb*(imf_mag^2)*((\sin(ws_imf_ca_gsm/2))^4)*@pi*(7*6380*1000)^2$

Save Reset

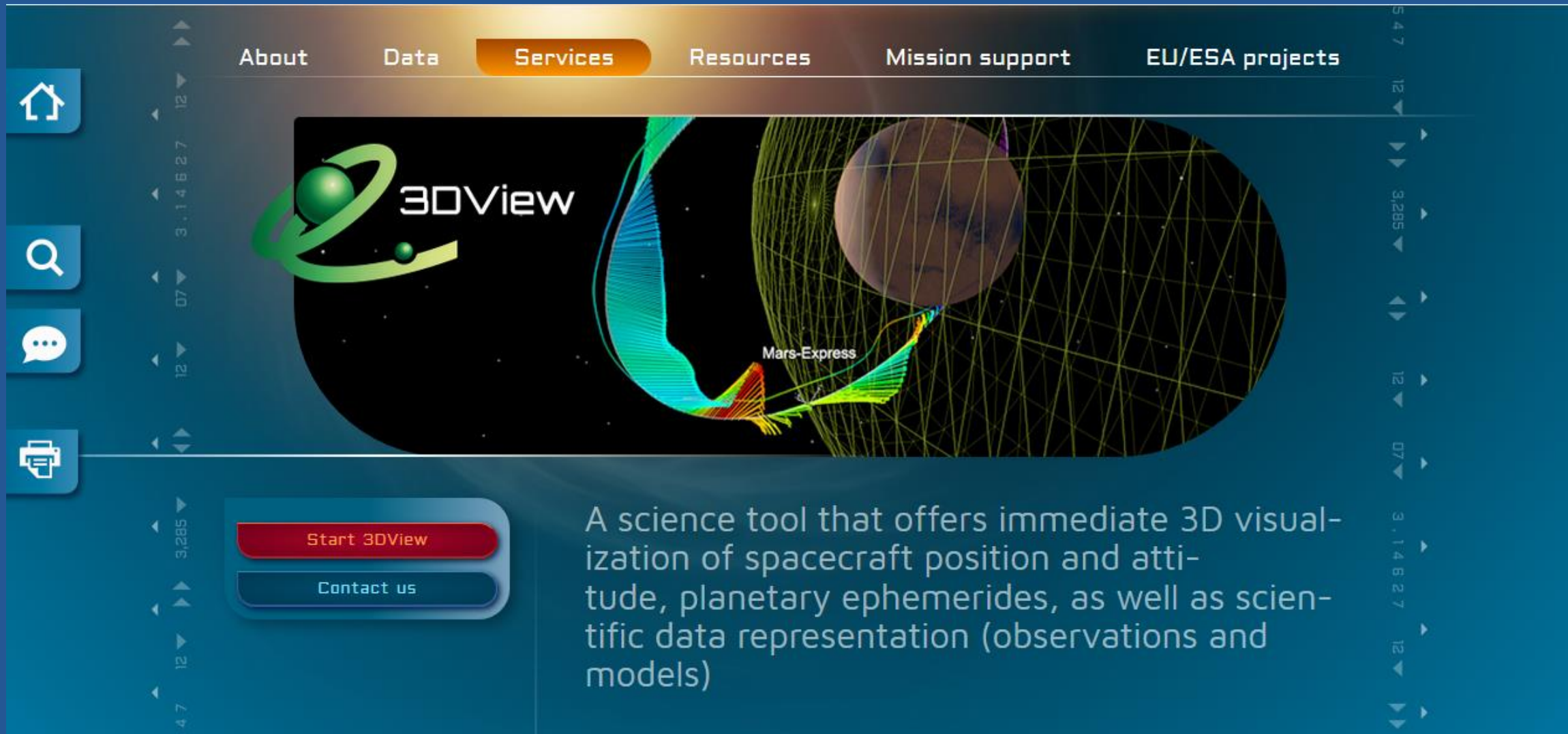
Information

To construct a new parameter *drag* one of the AMDA parameters from the Parameters tree and *drop* it onto the Construct Parameter text area.

Tools For Parameter Construction

Calculator Constants Functions

1	2	3	4	5	6	7	8	9
0	()	[]	+	-	*	/
^	.	>	<	&				



About Data **Services** Resources Mission support EU/ESA projects

3DView

Mars-Express

[Start 3DView](#)

[Contact us](#)

A science tool that offers immediate 3D visualization of spacecraft position and attitude, planetary ephemerides, as well as scientific data representation (observations and models)

Manage scene

Start time: 2018/09/18 07:00:00 ... Coordinate system: J2000 Center: Sun

Stop time: 2018/09/25 07:00:00 ... Step: 1212 seconds Stars: No star

Spacecraft | Ground based facilities | Natural bodies | Small bodies

Available spacecraft

Spacecraft	Range	File list	Time shift	Select
ACE	1997-08-27T00:00:00 - 2016-10-09T00:12:00	Details	Set	<input type="checkbox"/>
Akebono	2012-08-30T09:36:00 - 2017-03-31T22:56:00	Details	Set	<input type="checkbox"/>
Alouette1	1965-01-01T00:20:00 - 1972-09-25T00:00:00	Details	Set	<input type="checkbox"/>
Alouette2	1966-01-27T00:10:00 - 1975-07-31T00:00:00	Details	Set	<input type="checkbox"/>
AMPTE-CCE	1984-08-16T16:15:00 - 1989-07-31T23:55:00	Details	Set	<input type="checkbox"/>
AMPTE/IRM	1984-09-12T00:12:00 - 1986-08-30T08:00:00	Details	Set	<input type="checkbox"/>
ARASE	No_data	Details	Set	<input type="checkbox"/>
Cassini	2003-08-31T23:58:55 - 2017-09-21T23:58:52	Details	Set	<input type="checkbox"/>
Cassiope	2013-10-07T00:15:00 - 2017-03-28T00:00:00	Details	Set	<input type="checkbox"/>
CHAMP	2000-11-09T00:10:00 - 2010-10-10T00:00:00	Details	Set	<input type="checkbox"/>
Chandra-1	1999-08-07T07:31:04 - 2016-06-13T00:00:00	Details	Set	<input type="checkbox"/>
CLUSTER1	2000-08-22T00:18:30 - 2022-01-01T00:02:30	Details	Set	<input type="checkbox"/>
CLUSTER2	2000-08-22T00:18:30 - 2019-12-31T23:44:30	Details	Set	<input type="checkbox"/>
CLUSTER3	2000-08-22T00:18:30 - 2019-12-31T23:44:30	Details	Set	<input type="checkbox"/>
CLUSTER4	2000-08-22T00:18:30 - 2019-12-31T23:44:30	Details	Set	<input type="checkbox"/>

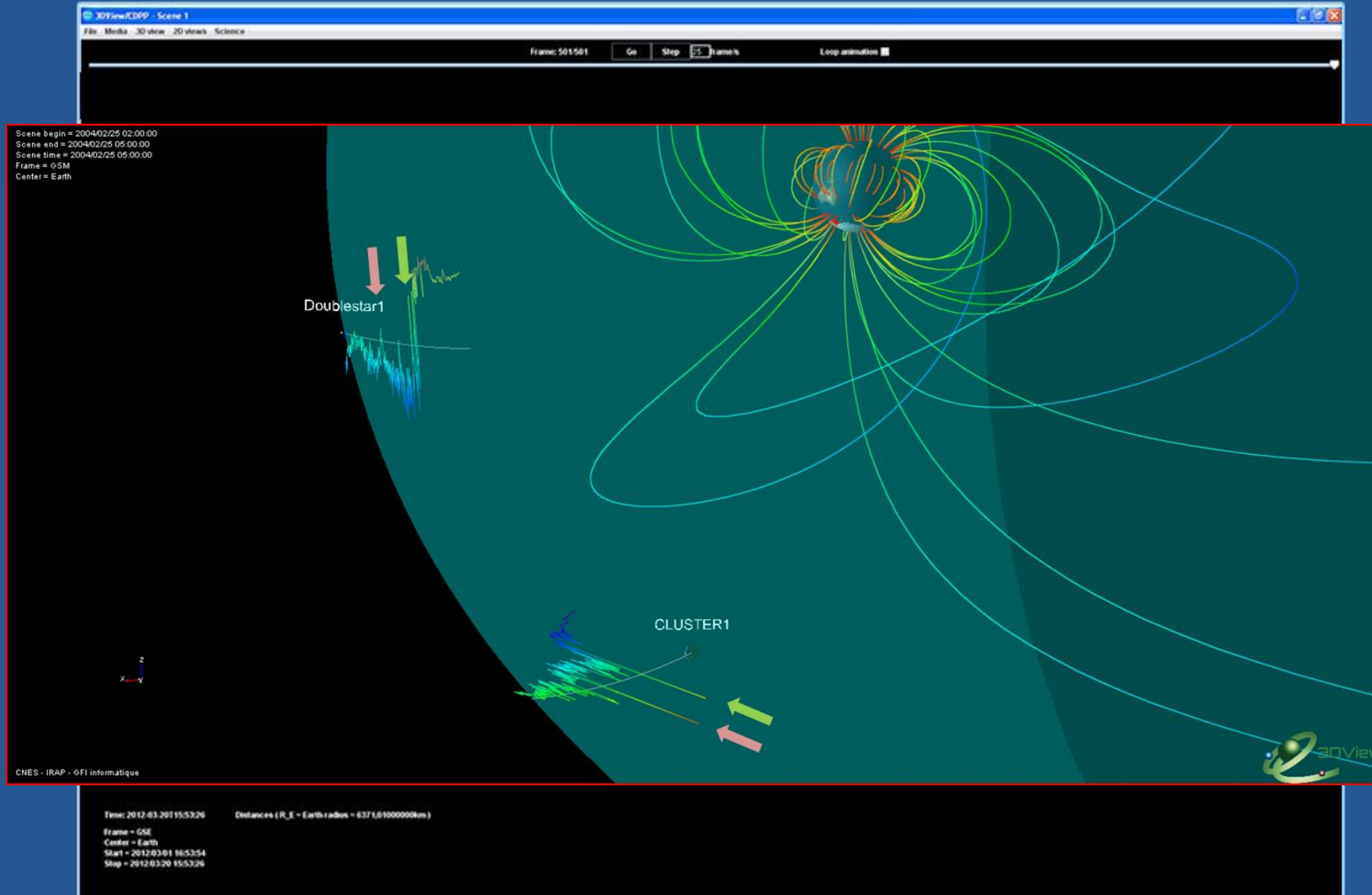
Selected data files

SC	File name	Type	Range	Choice

OK Cancel

Orbits, data and models in 3D

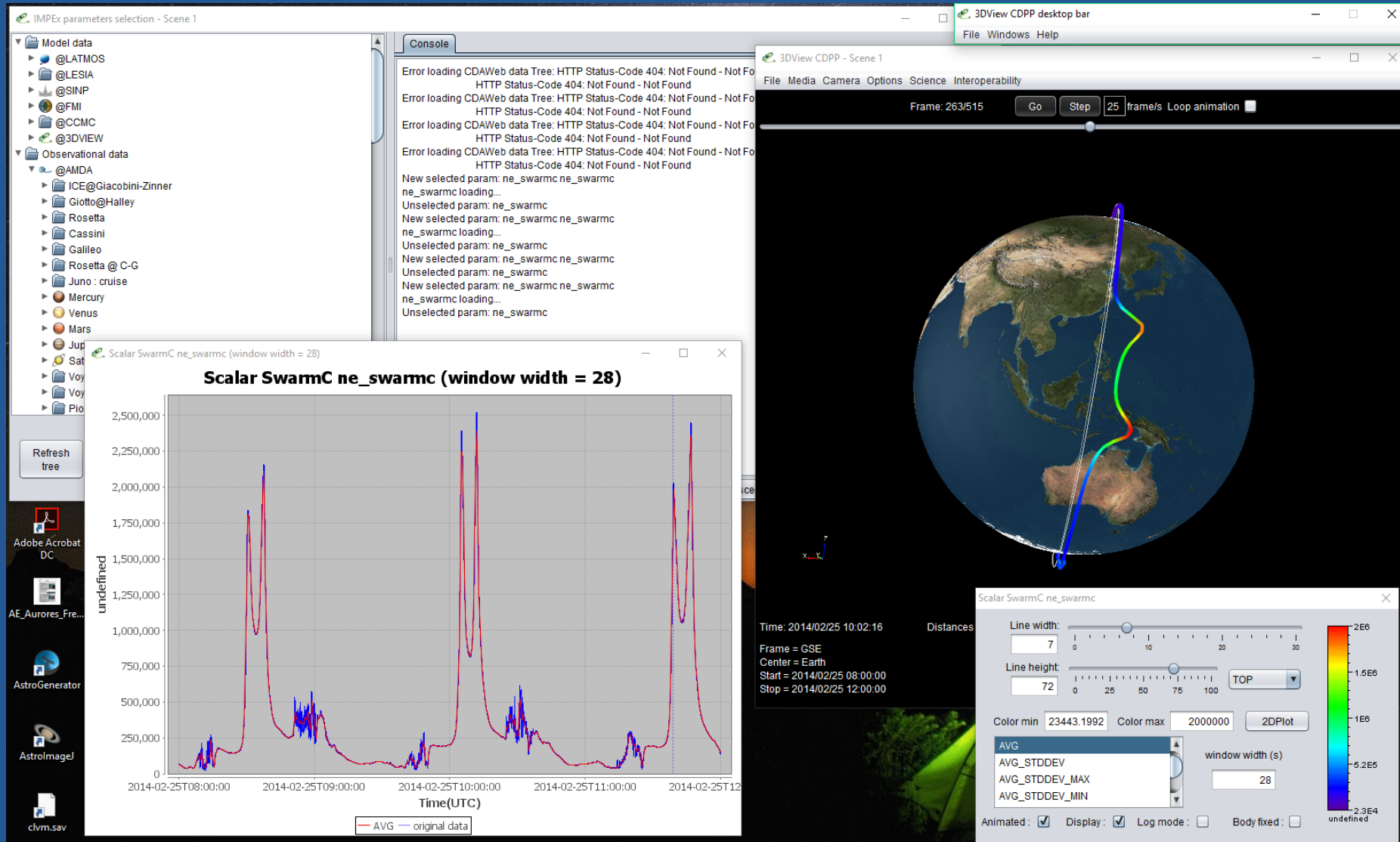
<http://3dview.cdpp.eu>



*United Nations Workshop on the International Space Weather Initiative:
The Way Forward, 26 - 30 June 2023, Vienna*

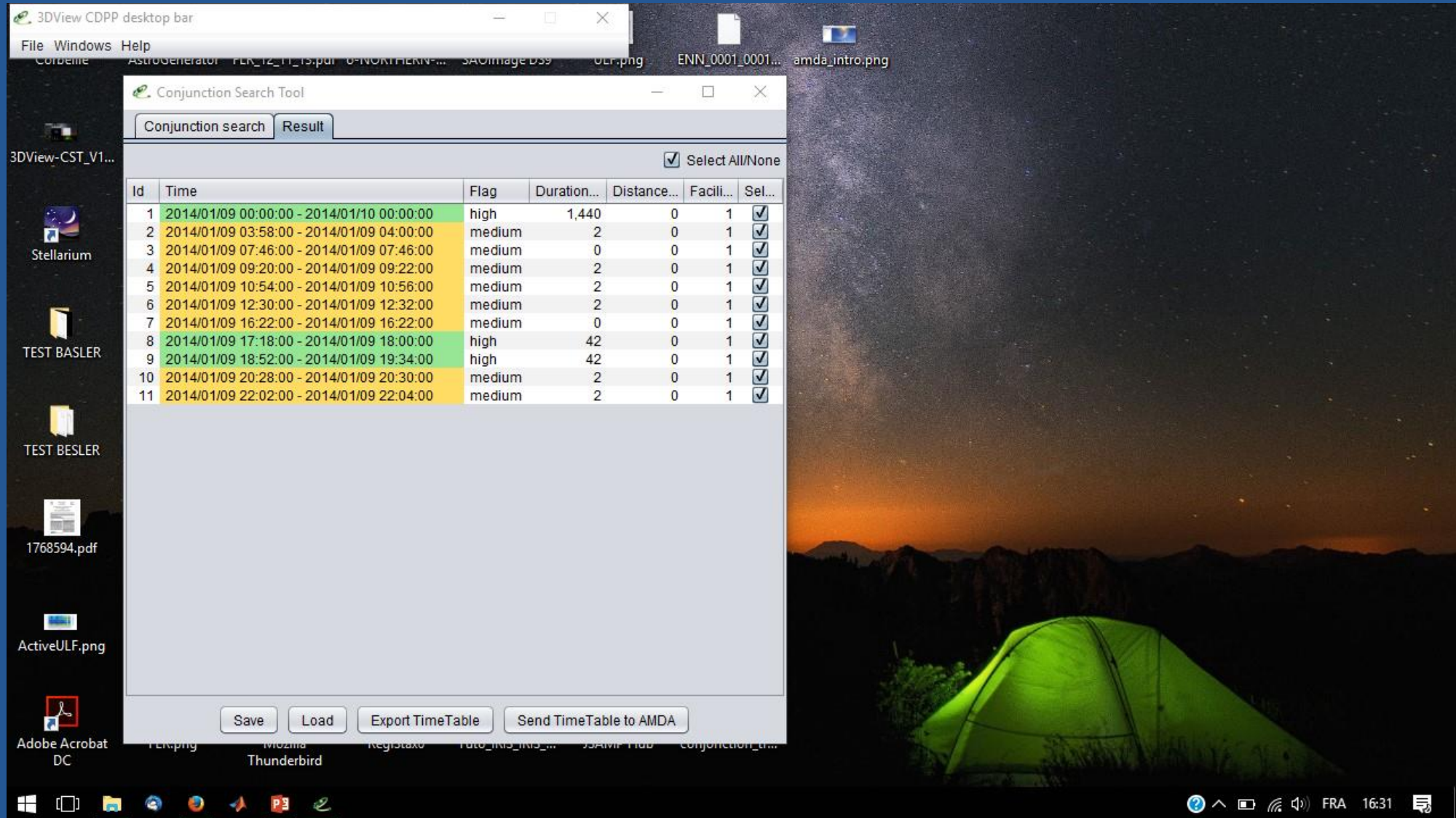
Orbits, data and models in 3D

<http://3dview.cdpp.eu>



3D View: Conjunction Search Tool

<http://3dview.cdpp.eu>



3DView CDPP desktop bar

File Windows Help

Conjunction search Result

Select All/None

Id	Time	Flag	Duration...	Distance...	Facili...	Sel...
1	2014/01/09 00:00:00 - 2014/01/10 00:00:00	high	1,440	0	1	<input checked="" type="checkbox"/>
2	2014/01/09 03:58:00 - 2014/01/09 04:00:00	medium	2	0	1	<input checked="" type="checkbox"/>
3	2014/01/09 07:46:00 - 2014/01/09 07:46:00	medium	0	0	1	<input checked="" type="checkbox"/>
4	2014/01/09 09:20:00 - 2014/01/09 09:22:00	medium	2	0	1	<input checked="" type="checkbox"/>
5	2014/01/09 10:54:00 - 2014/01/09 10:56:00	medium	2	0	1	<input checked="" type="checkbox"/>
6	2014/01/09 12:30:00 - 2014/01/09 12:32:00	medium	2	0	1	<input checked="" type="checkbox"/>
7	2014/01/09 16:22:00 - 2014/01/09 16:22:00	medium	0	0	1	<input checked="" type="checkbox"/>
8	2014/01/09 17:18:00 - 2014/01/09 18:00:00	high	42	0	1	<input checked="" type="checkbox"/>
9	2014/01/09 18:52:00 - 2014/01/09 19:34:00	high	42	0	1	<input checked="" type="checkbox"/>
10	2014/01/09 20:28:00 - 2014/01/09 20:30:00	medium	2	0	1	<input checked="" type="checkbox"/>
11	2014/01/09 22:02:00 - 2014/01/09 22:04:00	medium	2	0	1	<input checked="" type="checkbox"/>

Save Load Export TimeTable Send TimeTable to AMDA

1768594.pdf

ActiveULF.png

Thunderbird

FRA 16:31

Orbits, data and models in 3D

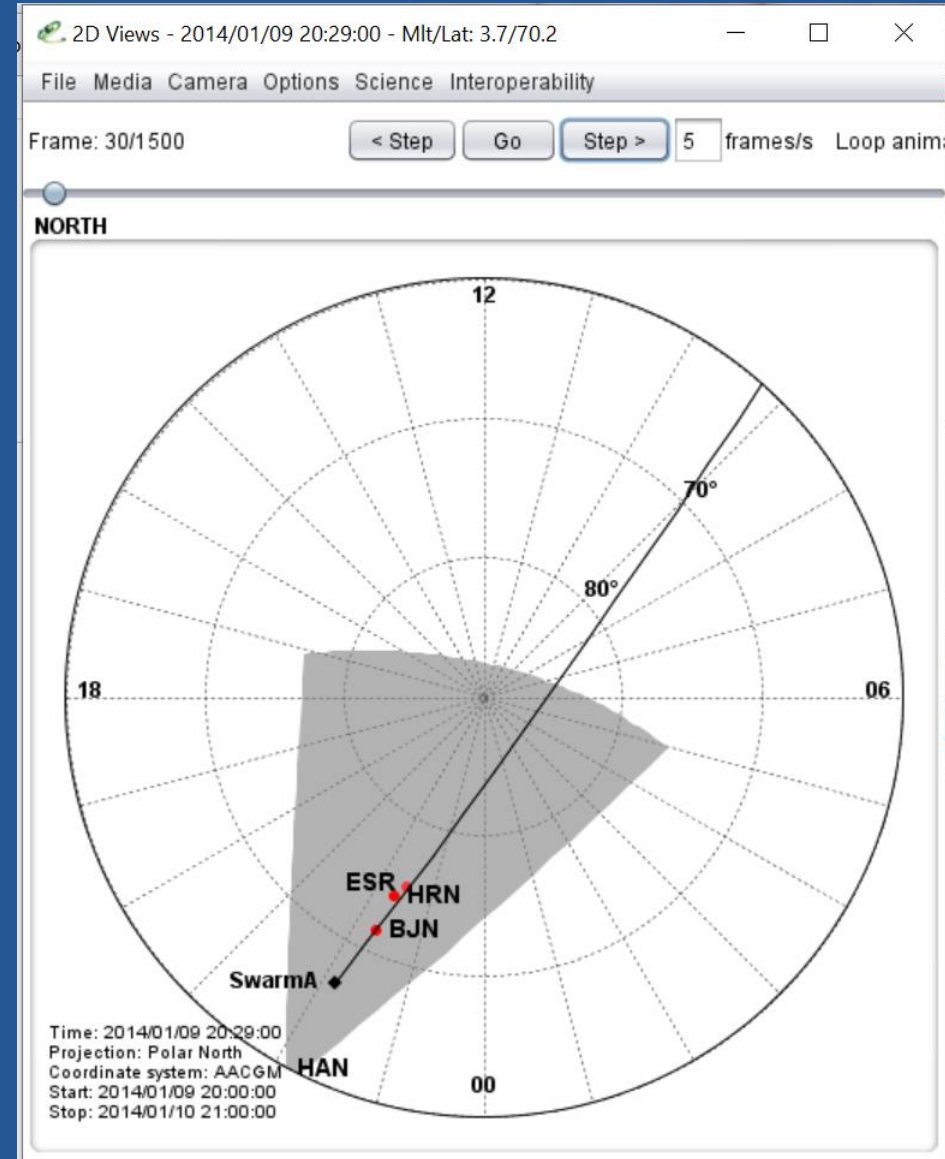
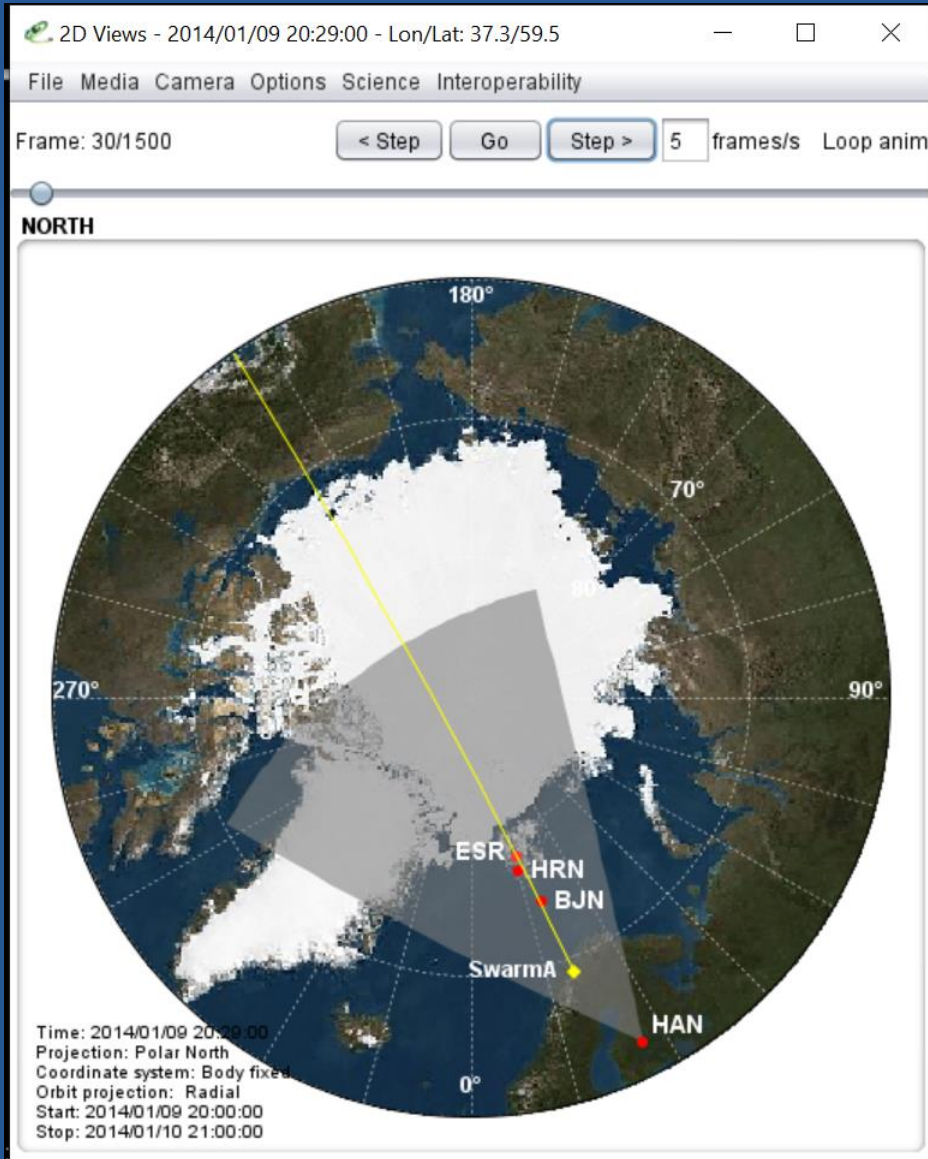
<http://3dview.cdpp.eu>



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3D View: 2D projection with field-line tracing

<http://3dview.cdpp.eu>



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The Way Forward, 26 - 30 June 2023, Vienna*

The French data centre for plasma physics (CDPP) has been developing various web-based services that are designed to, among other things:

- facilitate multi-instrument data access, exploitation and visualisation;
- combine data and models;
- allow data mining;
- find and predict conjunctions between ground-based and space-borne instruments;
- make ready-to-publish figures.

Beyond research, CDPP services are also used for teaching and public outreach.

We need your feedback to improve!