



*Heliophysics
Integrated
Observatory*

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Data Evaluation Service

(DES)

User Manual

Version 0.1

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Acronyms

AMDA	Automated Multi Dataset Analysis
CXS	Context Service
DES	Data Evaluation Service
GUI	Graphical User Interface
HFE	HELIO Front End (Main GUI interface of HELIO)
IVOA	International Virtual Observatory Alliance
SOAP	Simple Object Access Protocol
VO	Virtual Observatory

Introduction

The purpose of this document is to provide a vision of what we are trying to achieve within the HELIO DES web service.

About the DES

DES is Data Evaluation Service. Allows the user to create an auxiliary event list based on a newly-derived parameter, etc.

The capabilities provided by the DES are required because it is not possible to detect all events in advance; some will need to be generated on demand.

The DES allows the user to generate new (derived) parameters from time series data and use them to detect (as yet unspecified) events; the service needs to be able to include time series data from both inside and outside of HELIO.

An additional capability of the DES could be to manipulate the results from searches of a number of event lists to conduct joins, etc.; this capability is needed where the lists are external to HELIO and the type of “join” is not well defined.

Heritage:

The DES could be viewed as a generalization of the capabilities provided by AMDA (created by UPST/IRAP). The principle is certainly the same, but the DES covers a wider range of data from throughout the Solar System.

How to Access the DES

DES can be accessed several ways. The easiest for human beings is the GUI. Software programmes can connect through a Web-service.

The Graphical User Interface

At the moment being the DES interface allows the download of the results of the HELIO Processing Service through the HTTP interface (http://manunja.cesr.fr/Amda-Helio/WebServices/TEST_N/testDes.html)

SEARCH INTERFACE

StartTime EndTime *Date format: YYYY-MM-DDTHH:MM

Mission Parameter

Function

Average/Sampling time resolution to be used(sec)

Your condition >

DES CONTEX SERVICE(PLOTS)

StartTime EndTime *Date format: YYYY-MM-DDTHH:MM

Mission ACE WIND Ulysses STEREO-A STEREO-B

Fig. 1: DES interface

The HQI Interface

DES allows SOAP as well as HTTP-GET (REST) requests on the AMDA should be through a HELIO Query Interface (HQI) <http://helio.i4ds.technik.fhnw.ch/Helio-dev/> Queries are submitted using simple parameters and keywords that follow the requirements of the IVOA Parameterized Query Language (PQL).

Other Interfaces

The DES functionalities are also accessible through SOAP protocol using the WSDL present at <http://manunja.cesr.fr/Amda-Helio/WebServices/HelioLongQueryService.wsdl>.

How to use the DES Query form

This section focuses on the use of the DES GUI Query form, which provides a very wide range of possibilities to query the DES, and which is probably the most usable at first for the users.

Overview

The query interface is based contains two part: data mining and plots of predefined layouts.

Data mining

The first part of DES interface allows execute the conditional search in AMDA based on predefined functions.

The screenshot shows a web form titled "SEARCH INTERFACE" enclosed in a dashed border. It contains the following fields and controls:

- StartTime:
- EndTime: *Date format: YYYY-MM-DDTHH:MM
- Mission: (dropdown)
- Parameter: (dropdown)
- Function: (dropdown)
- Average/Sampling time resolution to be used(sec):
- Your condition: >
- REQUEST:

Fig. 2: Data mining interface

Inputs:

- START_TIME (one or more)
- END_TIME (one or more)
- MISSIONS (one or more)
- FUNCTION
- PARAMETER
- CONDITION

Output:

- VOTable including URL of result file and URL of plot of functions with time

intervals

Parameters

Most of functions can be calculated for a following parameters:

- Velocity magnitude
- Ion density
- Magnetic field magnitude

Functions

Following predefined functions are implemented for helio DES service:

Parameter Derivative (DERIV)

$PARAM(t+dt) - PARAM(t) < (>) DELTAF; dt = AVERAGETIME * 2$

Parameters: **V*, N, B, BX, BY, BZ**

Arguments: **DELTAF, AVERAGETIME**

Compound argument: **DELTAT = AVERAGETIME*2**

Parameter Sign Change (SIGN)

$PARAM(t+dt) / PARAM(t) < 0; dt = AVERAGETIME * 3$

Parameters: **BX, BY, BZ**

Arguments: **AVERAGETIME**

Parameter Variance in Running Window (VAR)

Parameters: **V*,N, BX, BY, BZ**

Arguments: **DELTAF, TIMEWINDOW (TW), AVERAGETIME**

Parameter Value (VALUE)

$PARAM < (>) DELTAF$

Parameters: **V*, N, B, BX, BY, BZ**

Arguments: **DELTAF, AVERAGETIME**

** Parameter "V" is absent for Ulysses*

Data Plots

DES CONTEX SERVICE(PLOTS)

StartTime EndTime *Date format: YYYY-MM-DDTHH:MM

Mission ACE WIND Ulysses STEREO-A STEREO-B

Fig. 3: Data plot interface

Plots are realised to predefined layouts.

Data plots are available to all the parameters used in functions.

Inputs parameters:

- START_TIME (one or more)
- END_TIME (one or more)
- MISSIONS (one or more)

Output parameters:

- VOTable including plots URLs in png format and URLs of data in ascii format.

Functionality

Details of the SOAP and Restful interfaces along with parameters are detailed in the Interface Specification. Below is a brief summary of the SOAP interface. The parameters below can also be used on the Restful services.

Long Running Jobs

AMDA must handle long running jobs such as a long query must implement this interface. This interface for the most part is simple because it only deals with one parameter a jobid. Services that decide to make the request a long running job returns a job id back to the client. The client then can take the jobid and call one of the interface methods below.

/phase?jobid=##### -- Returns the status or phase the job is in such as QUEUED, PENDING, COMPLETED, ERROR, others?

/result?jobid=#### -- Returns results of this job.

/estimate?jobid=#### -- Tries to give an estimate of when the job will start and maybe finish.

/abort?jobid=#### -- Abort the job. not implemented yet in helio side (implemented in Amda-Helio)

Long Time Query

Common time query frequently used on the DES.

Inputs (taken from 2.6 of Interface Specification)

- STARTTIME - ISO8601 input Start Time and End Time.
- YYYY-MM-dd['T'HH:mm:ss[SSS]]
- ENDTIME - ISO8601 input Start Time and End Time.
- YYYY-MM-dd['T'HH:mm:ss[SSS]]
- Both start time and end time can have one or array of values; the output response will have data for multiple time(includes start time and end time). Remember MAXRECORDS value is applicable for each pair of start and end time. For example MAXRECORDS=10 and start and end time has 2 pair of value. Votable returned will have 2 tables having 10 records each.
- **FROM** – Mission name to query on, one or many missions can be queried; each mission name should be separated by comma.

Long Query

'LongQuery' interface part of the HQI allows more complex queries, it contains all the inputs as a 'LongTimeQuery' with the added inputs of:

Inputs

- SELECT – specify the returned columns. See section 2.7.2 of the Interface Specification.
- WHERE – See section 2.7.3 of the Interface Specification Document.

DATA RECOVERY

AMDA could provide the following conditional data for next missions:

MISSION	FUNCTION	PERAMETERS	START DATA	END DATA	Implement in DES
<u>AMDA local data base</u>	DERIV, SIGN, VAR, VALUE				
MEX/ASPERA					Waiting data validation
ACE		V, N	04-02-1998	30-04-2010	YES
		B, BX. BY, BZ	02-09-1997	06-08-2011	YES
WIND		V, N	17-11-1994	10-08-2011	YES
		B, BX. BY, BZ	16-11-1997	29-07-2011	YES
STEREO-A		V, N	01-03-2007	01-05-2011	YES
		B, BX. BY, BZ	07-11-2006	29-06-2011	YES
STEREO-B		V, N	01-04-2006	01-03-2011	YES
		B, BX. BY, BZ	07-11-1997	29-06-2011	YES
ULYSSES		N	18-11-1990	30-06-2009	YES
		B, BX. BY, BZ	25-10-1990	27-06-2011	YES

VOTable

Outputs of the HQI service including DES and AMDA CXS will contain a IVOA Votable format to describe the returned data. VOTable specification can be found here: <http://www.ivoa.net/Documents/VOTable/20091130/>

All interfaces to the HQI receive a VOTable format that is normally parsed to be more pleasing to the end-user, though the passing between services is typically a VOTable.

See Helio Query Interface Specification (sections 2.9 and 2.10) for more detailed description of the response of the HQI interface.

Sample

Below is versions of the Restful Votable result for mining DES service and CXS AMDA service.

DES Restful Sample

```
<?xml version="1.0"?>
<VOTABLE xmlns="http://www.ivoa.net/xml/VOTable/v1.2" version="1.2">
  <DESCRIPTION>Time Table generated by AMDA @ CDPP</DESCRIPTION>
  <RESOURCE>
    <DESCRIPTION>Time Table generated by AMDA @ CDPP</DESCRIPTION>
    <INFO name="CreationDate" value="2012-07-17T09:53:48+00:00"
ucd="time.creation"
      xtype="iso8601" utype="helio:time.time_creation"/>
    <INFO name="Instrument" value="SWEPAM" ucd="meta.code"
utype="helio:instrument"/>
    <INFO name="SearchFunction" value="ACE_DERIV_V"/>
    <INFO name="FunctionDescription" value="V(t+dt) - V(t) LT 100; dt =
AVERAGETIME * 2 "/>
    <INFO name="FunctionDefinition" value="(shiftT_(sw(1),1200) - sw(1)) LT 100"/>
    <INFO name="TIME_RANGE" value="FROM:2003-10-10T11:00 TO:2003-10-
15T11:00"/>
    <LINK title="PNG_Plot" value="http://manunja.cesr.fr/MDES/HQ50239_0.png"/>
    <TABLE name="ACE_DERIV_V">
      <FIELD arraysize="*" datatype="char" name="time_start" ID="TimeIntervalStart"
ucd="time.start" xtype="iso8601" utype="helio:time_period.time_start">
        <DESCRIPTION>time tag for beginning of interval</DESCRIPTION>
      </FIELD>
      <FIELD arraysize="*" datatype="char" name="time_end" ID="TimeIntervalStop"
ucd="time.end" xtype="iso8601" utype="helio:time_period.time_end">
        <DESCRIPTION>time tag for end of interval</DESCRIPTION>
      </FIELD>
    <DATA>
      <TABLEDATA>
```

```
<TR>
  <TD>2003-10-10T11:20:00</TD>
  <TD>2003-10-12T09:30:10</TD>
</TR>
<TR>
  <TD>2003-10-12T09:40:10</TD>
  <TD>2003-10-12T11:10:20</TD>
</TR>
<TR>
  <TD>2003-10-12T11:20:20</TD>
  <TD>2003-10-12T14:30:20</TD>
</TR>
<TR>
  <TD>2003-10-13T12:50:30</TD>
  <TD>2003-10-13T14:20:30</TD>
</TR>
<TR>
  <TD>2003-10-13T15:40:30</TD>
  <TD>2003-10-15T11:00:40</TD>
</TR>
</TABLEDATA>
</DATA>
</TABLE>
</RESOURCE>
</VOTABLE>
```

CXS AMDA Restful Sample

```
<?xml version="1.0"?>
<VOTABLE xmlns="http://www.ivoa.net/xml/VOTable/v1.2" version="1.2">
  <RESOURCE>
    <DESCRIPTION>Velocity_magnitude, ion_density,
magnetic_field_magnitude_vector and
    magnetic_field_magnitude plots generated by AMDA @ CDPP</DESCRIPTION>
    <INFO name="CreationDate" value="2012-07-17T12:14:27+00:00"
ucd="time.creation"
      xtype="iso8601" utype="helio:time.time_creation"/>
    <INFO name="TIME_RANGE" value="FROM:2001-01-01T00:00 TO:2001-01-
10T00:00"/>
    <INFO name="TIME_RANGE" value="FROM:2002-01-01T00:00 TO:2002-01-
10T00:00"/>
    <TABLE name="ACE,WIND PLOT(S)">
      <FIELD datatype="char" name="url" arraysize="*" ucd="meta.ref.url">
        <DESCRIPTION>URL of the DES PLOT file</DESCRIPTION>
      </FIELD>
      <FIELD datatype="char" name="data" arraysize="*" ucd="meta.ref.data">
        <DESCRIPTION>URL of the DATA</DESCRIPTION>
      </FIELD>
      <DATA>
        <TABLEDATA>
          <TR>
            <TD>http://manunja.cesr.fr/MDES/HP27161_0.png</TD>
            <TD>http://manunja.cesr.fr/MDES/HP27161data_0.asc</TD>
          </TR>
          <TR>
            <TD>http://manunja.cesr.fr/MDES/HP27161_1.png</TD>
            <TD>http://manunja.cesr.fr/MDES/HP27161data_1.asc</TD>
          </TR>
        </TABLEDATA>
      </DATA>
    </TABLE>
  </RESOURCE>
</VOTABLE>
```