IHDEA #4 – 0ct. 2020

SPASE implementation in CDPP archive and AMDA database

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CDPP – Plasma Physique Data Centre

- Established in 1998 from a CNES/CNRS collaboration for natural plasma data distribution and archiving
- The archive gives access to 21 various missions (with french partnership): magnetosphere, ionosphere, planetary, comets. The oldest dated 1980 (GEOS)

  -> in continuous progress

- Data Format -> native for old missions, CDF ISTP/IACG for newer ones
- The metadata is based on an old model (defined in 2005)

  -> SPASE

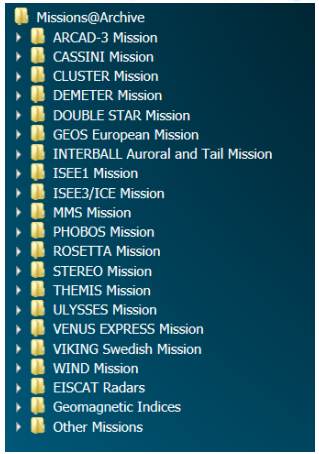
  -> DOI

- SIPAD archiving system is used for data managing, archiving and dissemination : cdpp-archive.cnes.fr

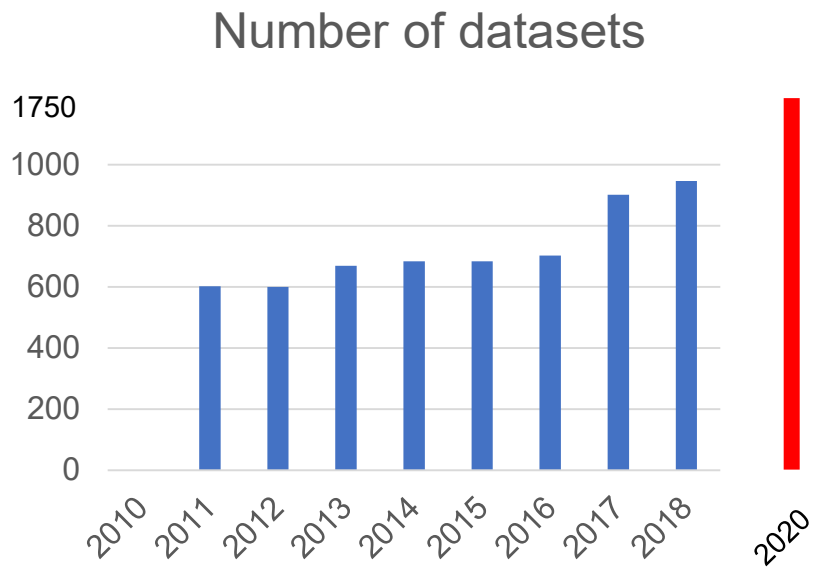
  -> new REGARDS

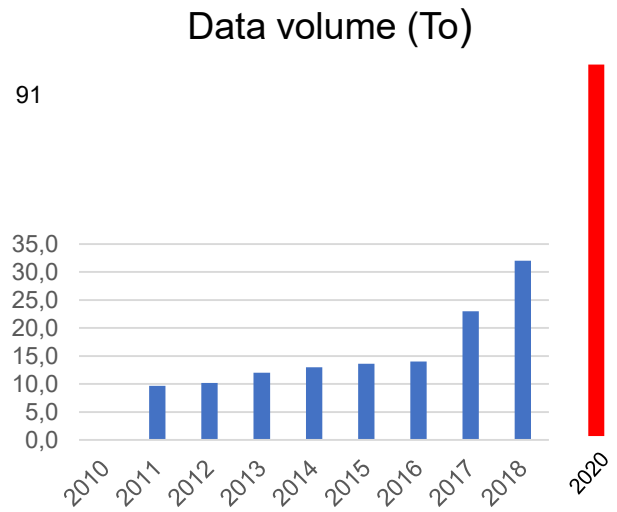
- The storage system (StorageTek magnetic cartridges robot) will also evolve

  -> Datalake (on-line, near-line storage)



CDPP Data: some figures





CDPP: SPASE (meta)data model

CDPP Data Model

TODAY

- **A large number of attributes equal to SPASE (but with differences between lists on both sides): Data Set (Data set description, instrument Description (measurement type, instrument type …)**
- **List of attributes to be adapted: physical parameter …**
- **A few attributes are CDPP specific (experiment …)**

SPASE is richer

Migration (tools, adaptations)

New CDPP Data Model

TOMORROW

SPASE Data Model

- **Fully compliant with SPASE Numerical Data (Resource Header, Instrument ID, Measurement Type …), Instrument …**
- **All mandatory attributes present**
- **Lists updated**
- **Optional attributes added**

Regards Data Model

Specific attributes kept (search function)

CDPP Data Model migration

- One part can be done in an automatic way (set of tables and scripts)
- Another must be done manually, with knowledge on a technical part and of the experiment from the scientist
- Period of double exploitation, old and new Data Model in parallel

CDPP : SPASE (meta)data model

On the user side:

-> to be able to understand the data
-> To be able to see the metadata on the Regards GUI
-> To access and get the xml SPASE metadata

On the SPASE community side:

-> Repository SPASE, taking into account CDPP archive and AMDA (homogeneous and distincts)

Github : http://github.com/hpde

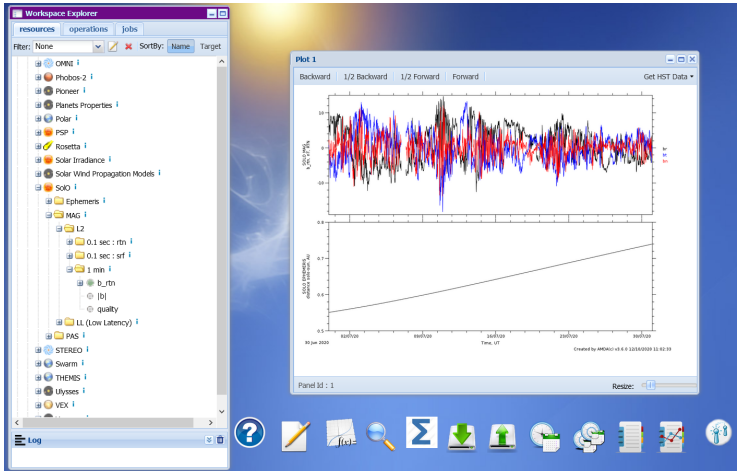
CNES
Numerical Data
- CDPP-archive
- CDPP-AMDA

Display Data
- CDPP-archive
- CDPP-AMDA

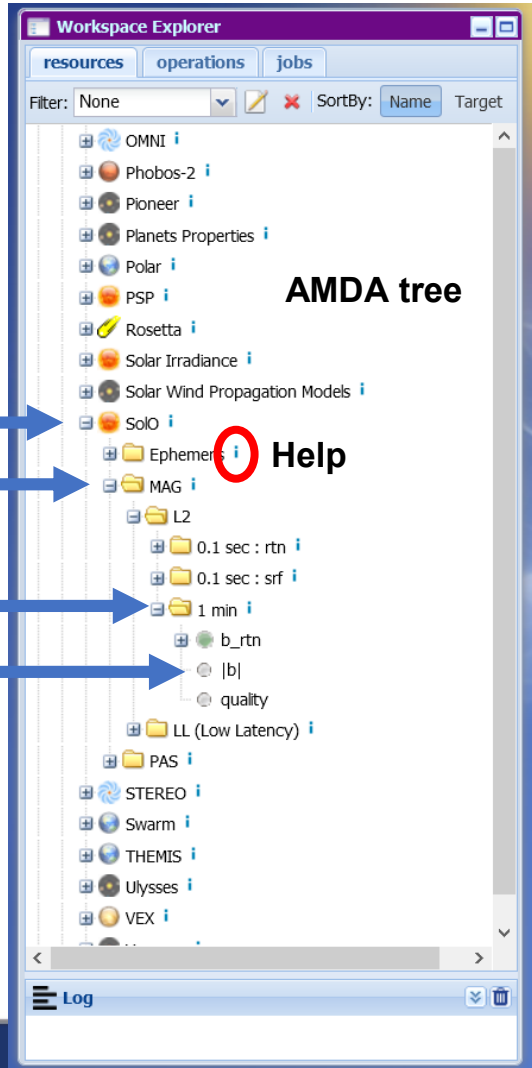
Instrument …
Observatory …
Contact …

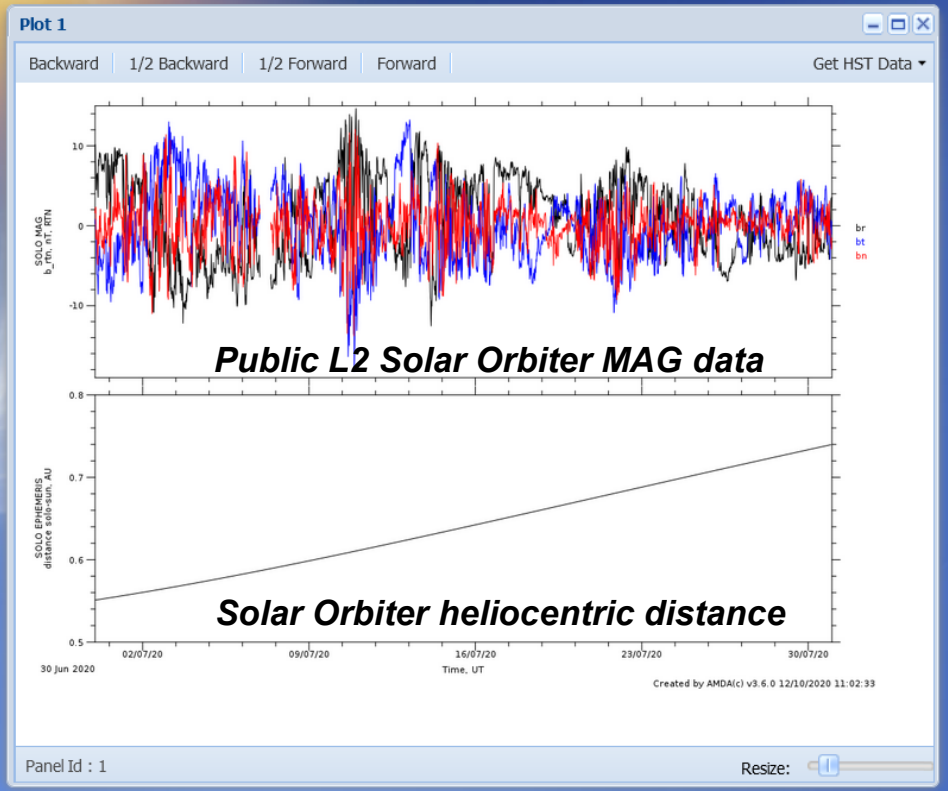
AMDA in brief

- http://amda.cdpp.eu/
- In operation since 2005
- Helio and Planeto missions; also includes radar, indices, simulations and models
- In a web session, the user can access, plot, combine, mine and download data
- Registered users can store their online work
- SPASE is used at all levels of data description



AMDA in brief





Activities

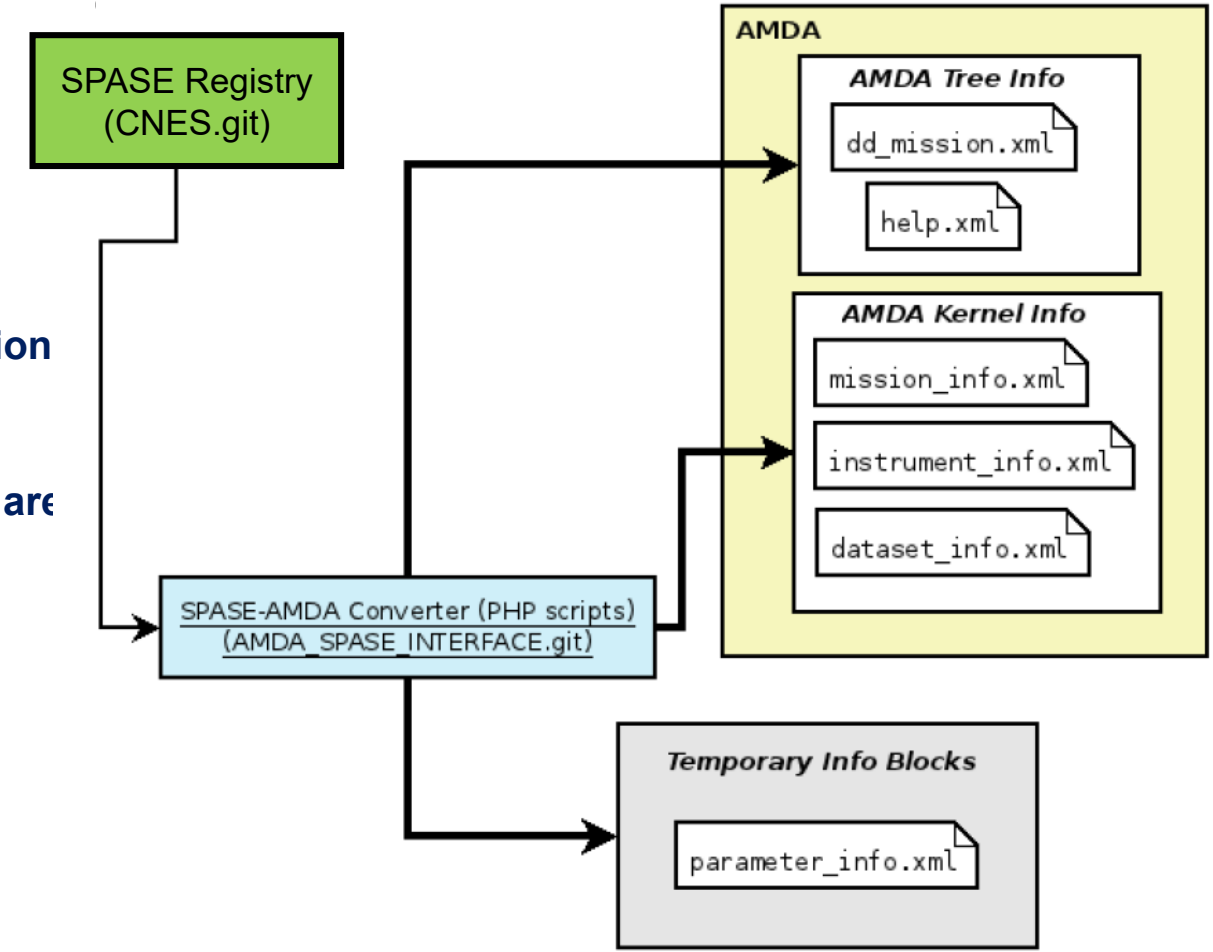
Constructing AMDA tree from SPASE registry

From

- **SPASE registry**
- **AMDA internal parameter description**

By SPASE-AMDA converter XML files are filled at level

- ***mission***
- ***instrument***
- ***dataset*** **(down to** ***parameter*****)**
- ***help***



http://amda-registry.irap.omp.eu/amda-registry/explorer/

SPASE

Resource

- CNES
  - Instrument
  - NumericalData
  - NumericalOutput
  - Observatory
    - CDPP-AMDA
      - ACE
      - AMPTE
      - AMPTE
      - Bepi
      - Cassini
      - Cluster
      - Cluster1
      - Cluster2
      - Cluster3

Overview | Bepi

SPASE version 2.3.1

Observatory: BepiColombo

Observatory ID

spase://CNES/Observatory/CDPP-AMDA/Bepi XML

Name

BepiColombo

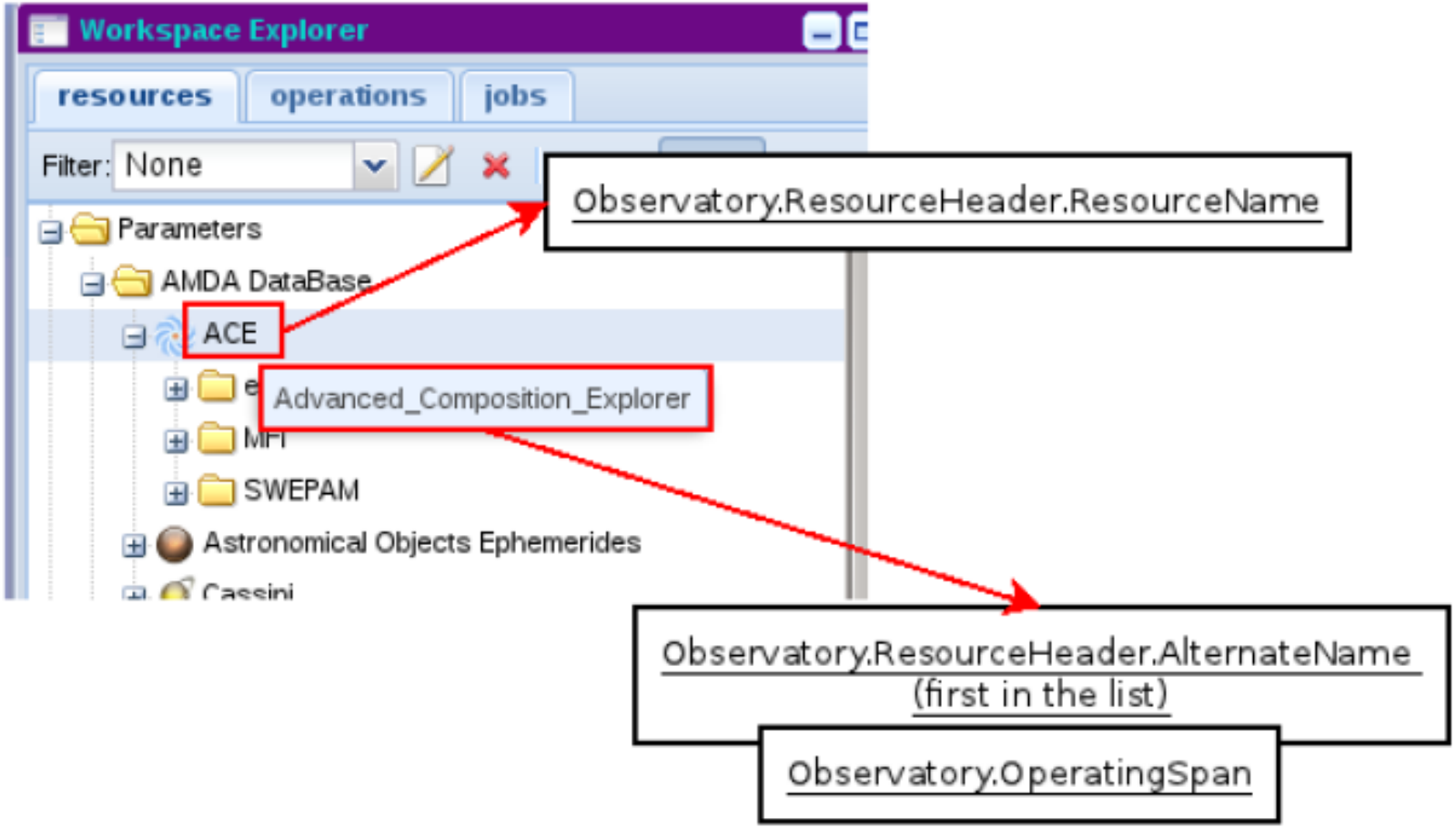
Alternate name

Bepi-Colombo

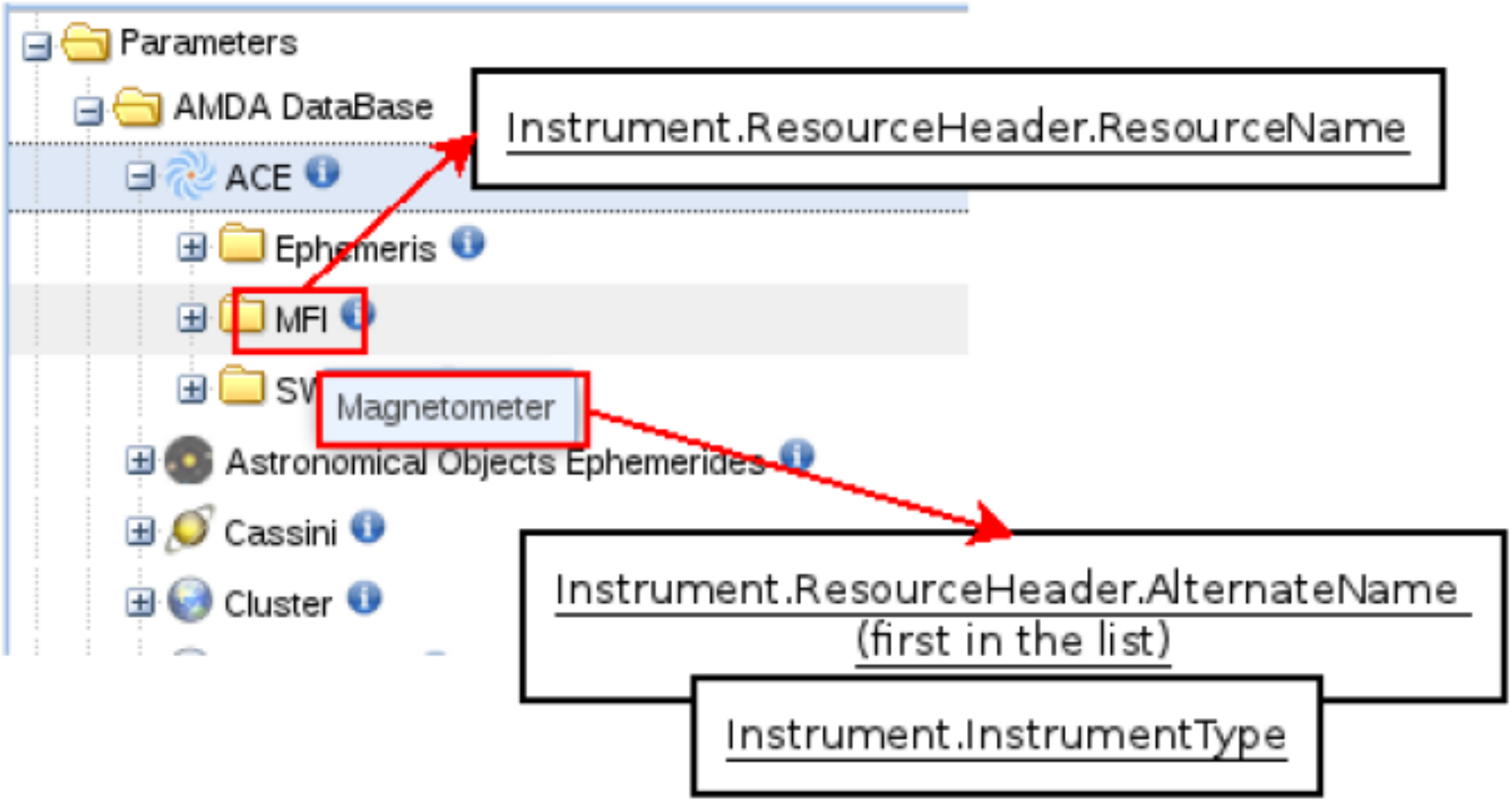
Description

BepiColombo is Europe's first mission to Mercury. It will set off in 2018 on a journey to the smallest and least explored terrestrial planet in our Solar System. When it arrives at Mercury in late 2025, it will endure temperatures in excess of 350 °C and gather data during its 1 year nominal mission, with a possible 1-year extension. The mission comprises two spacecraft: the Mercury Planetary Orbiter (MPO) and the Mercury Magnetospheric Orbiter (MMO). BepiColombo is a joint mission between ESA and the Japan Aerospace Exploration Agency (JAXA), executed under ESA leadership.

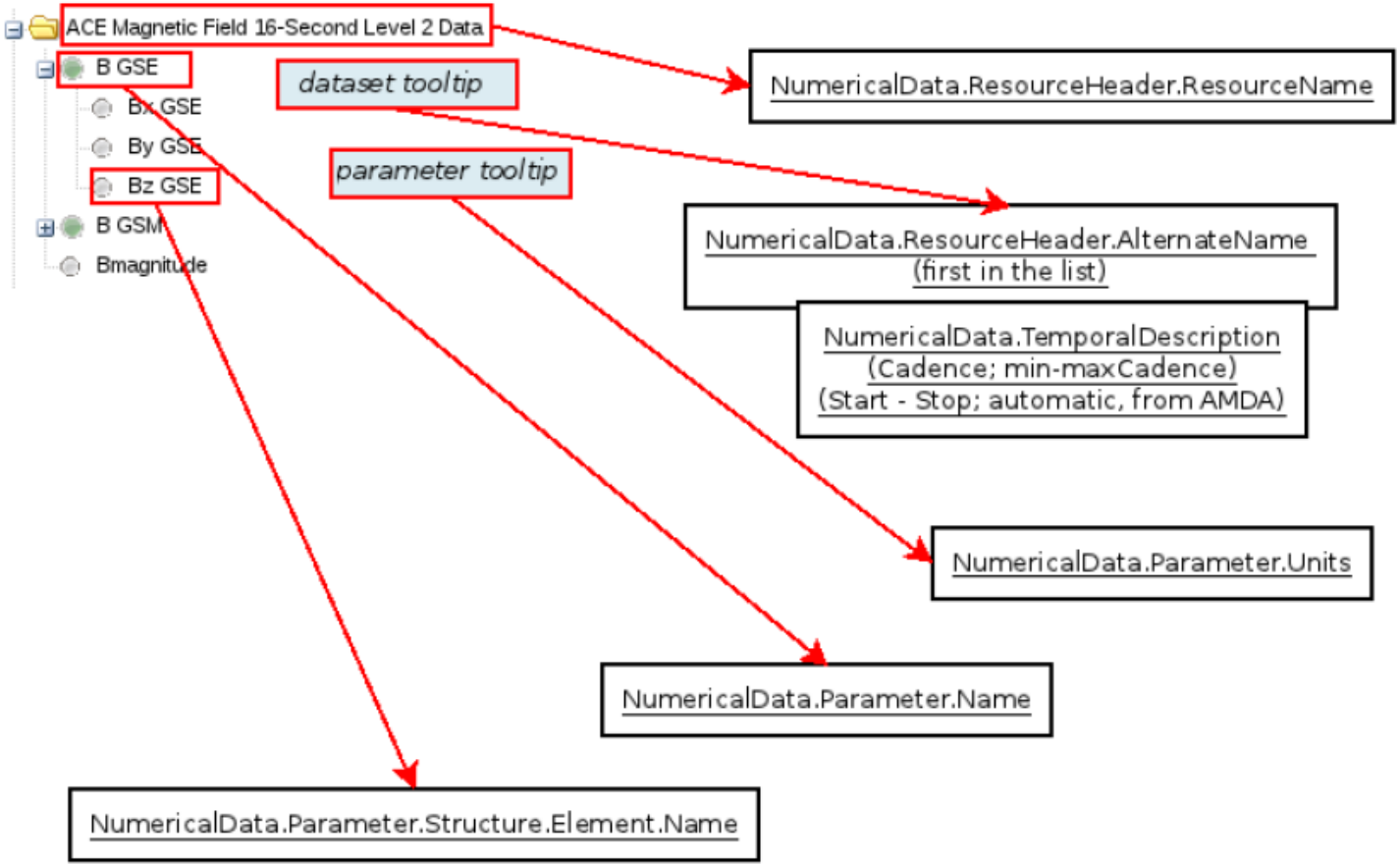
SPASE tags used for the *mission* level



SPASE tags used for the *instrument* level



SPASE tags used to define *Datasets/Parameters/Components* in AMDA tree



Parameter

- **AMDA parameter XML are built from SPASE registry (info) + AMDA specific blocks in 3 fields**
  - **Get**: where to fetch the parameter
  - **Process**: how to compose it
  - **Output**: what to do with it
- **An example is shown :**

```
<param xml:id="solo_step_iflux">
  <info>
    <name>solo_step_iflux</name>
    <short_name>total flux</short_name>
    <components/>
    <units>1/(s cm^2 sr MeV)</units>
    <coordinates_system/>
    <tensor_order/>
    <si_conversion/>
    <table>
            <minMaxTable name="Energy" units="MeV" minName="
        </table>
    <fill_value/>
    <ucd/>
    <dataset_id>so-step-rates</dataset_id>
    <instrument_id>SolO_epd-step</instrument_id>
  </info>
  <get>
    <vi name="so:step:rates">
        <baseParam name="Integral_Flux">
           <clb name="Bins_Low_Energy"/>
           <clb name="Bins_High_Energy"/>
        </baseParam>
    </vi>
  </get>
  <process/>
  <output>
    <plot>
        <timePlot>
                <params>
                        <param id="solo_step_iflux">
                            <spectro yAxis="y-left"/>
                        </param>
                </params>
                <axes>
            </timePlot>
        </plot>
    </output>
</param>
```

AMDA help from SPASE registry

- Here at the *mission* level
- And similarly at the *instrument* and *dataset* levels

ACE

Observatory.ResourceHeader.AlternateName (first in the list)

Advanced Composition Explorer, NASA

Description

Advanced Composition Explorer (ACE) observes particles of solar, interplanetary, interstellar, and galactic origins, spanning the energy range from solar wind ions to galactic cosmic ray nuclei.The Advanced Composition Explorer (ACE) spacecraft carries six high-resolution sensors and three monitoring instruments that sample low-energy particles of solarorigin and high-energy galactic particles with a collecting power 10 to 1000 times greater than past or planned experiments. From a vantage point approximately 1/100 of the [illegible] over a wide range of energy and nuclear mass, under all solar [illegible] s including solar flares.

Observatory.ResourceHeader.Description

ACE provides near-real-time solar wind information over short time periods. When reporting space weather, ACE can provide an advance warning (about one hour) of geomagnetic storms that can overload power grids, disrupt communications on Earth, and present a hazard to astronauts.

The prime objective of ACE is to measure and compare the composition of several samples of matter, including the solar corona, the solar wind, and other interplanetary particle populations, the local interstellar medium (ISM), and galactic matter. While there has been great progress addressing these objectives, the changing conditions over the solar cycle present new opportunities. In addition, new observations and theoretical advances, new missions, and the evolving goals of NASA and the Sun-Solar- System Connection (S3C) Theme have introduced new challenges, including the goal of achieving the scientific understanding needed to forecast space weather in the coming years when humans will venture beyond Earth's protective magnetosphere.

Information links

Observatory.ResourceHeader.InformationURL

ACE Home Page
NSSDC's Master Catalog

Operating span

Start date: 1997/08/25 00:00:00

Observatory.OperatingSpan

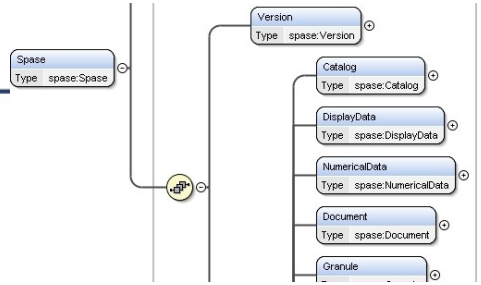
Contacts

Principal Investigator: Prof. Edward C. Stone, Jr.
ecs@srl.caltech.edu - California Institute of Technology

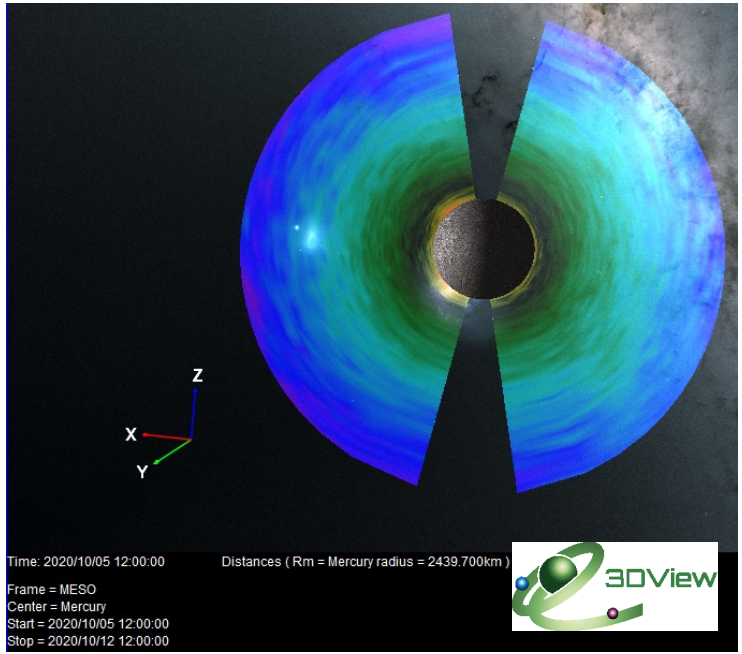
Project Scientist: Dr. Tycho T. Von Rosenvinge
GSFC-Code 661

Observatory.ResourceHeader.Contact

Simulation data model



- **Extension developed during IMPEx project**
- **Version 1 dates from May 2014**
- **Continued during the TEMPETE project**
- **Enables simulations to be easily accessed in**
  - AMDA
  - 3DView
  - Any other SPASE compliant tools
- **See R. Modolo's presentation**



EGM (exospheric) model cut of planetary H around Mercury (from LATMOS) visualized in 3DView

CDPP: Better communication with tools

- **The objective is to offer with REGARDS a unified view of the CNES archive and the AMDA database, to search and to select data on both sides**
  - Using the AMDA web services
  - With more possibilities of research and services
- **Adding value and allowing a better usage of data by offering I/F to CDPP tools (AMDA, 3DView …) and other community tools**
  - thanks to interoperability protocols such as HAPI

PLANNING:

- **2021 Regards for CDPP (1. access to the archive, 2. AMDA view),**
- **2022… interoperability with tools**