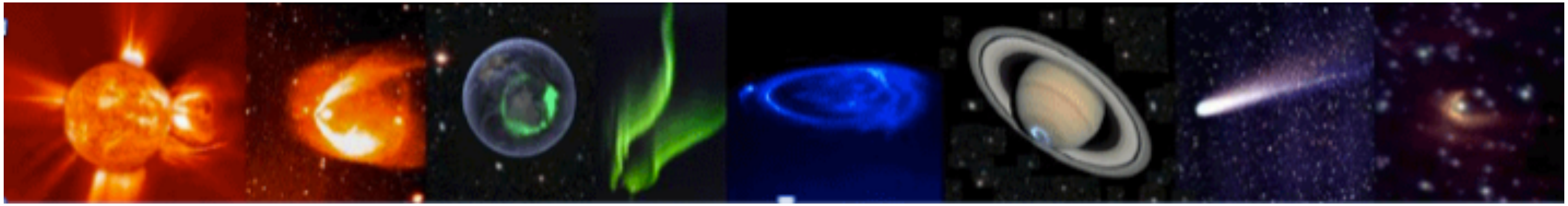


Training sessions by EuroPlaNet H2020/VESPA

IVOA INTEROP, Shanghai , China, May 2017

OVERVIEW

- On line tutorials
- VESPA Training sessions at EPSC and EGU
- Two examples of tutorial:
  - MGS data with LatHyS/AMDA/TopCat
  - CRISM data with TopCat/Aladin/TAPHandle
- Future plans with Python ...
- Conclusion

VESPA online tutorials

- Use cases with various software tools
  - CDPP AMDA , 3DView (Planetary data analysis and visualization)
  - LathyS from LATMOS (simulations)
  - TopCat, Aladin

  with the EPN-TAP protocol (mostly version 2)
- Official VESPA Web page:
  http://www.europlanet-vespa.eu/tutos.shtml
- Project Web page:
  https://voparis-confluence.obspm.fr/display/VES/va-t6-tutorials
- GitHUB
  - Tutorials are written with MarkDown
  - With simply a link on the Project Web page

VESPA tutorials

Text + images

- Aladin & planetary surfaces
- APIS
- CRISM cubes in TOPCAT and Aladin
- Atmospheric profiles
- Connection of HELIO with AMDA and 3Dview
- Exoplanets
- ExPRES
- EPN-TAP services: Using TopCat as a client
- EPN-TAP services: VIRTIS-VENUS EXPRESS
- Cassini Titan fly-by
- Magnetospheric region identification with AMDA and TopCat
- Mars Global Surveyor plasma data compared with models

+ **IMPEx tutorials** : compare planetary observations with simulations

Video tutorials

Tracking asteroids, Auroral processes on Saturn, Analysing Pluto's surface …

Training sessions in conferences

- Bi annual training sessions

  Organized on a regular basis at the two main conferences for the solar and planetary sciences community

  - European Geophysical Union (EGU) April
  - European Planetary Sciences Congress (EPSC) September/October

  With the aims of

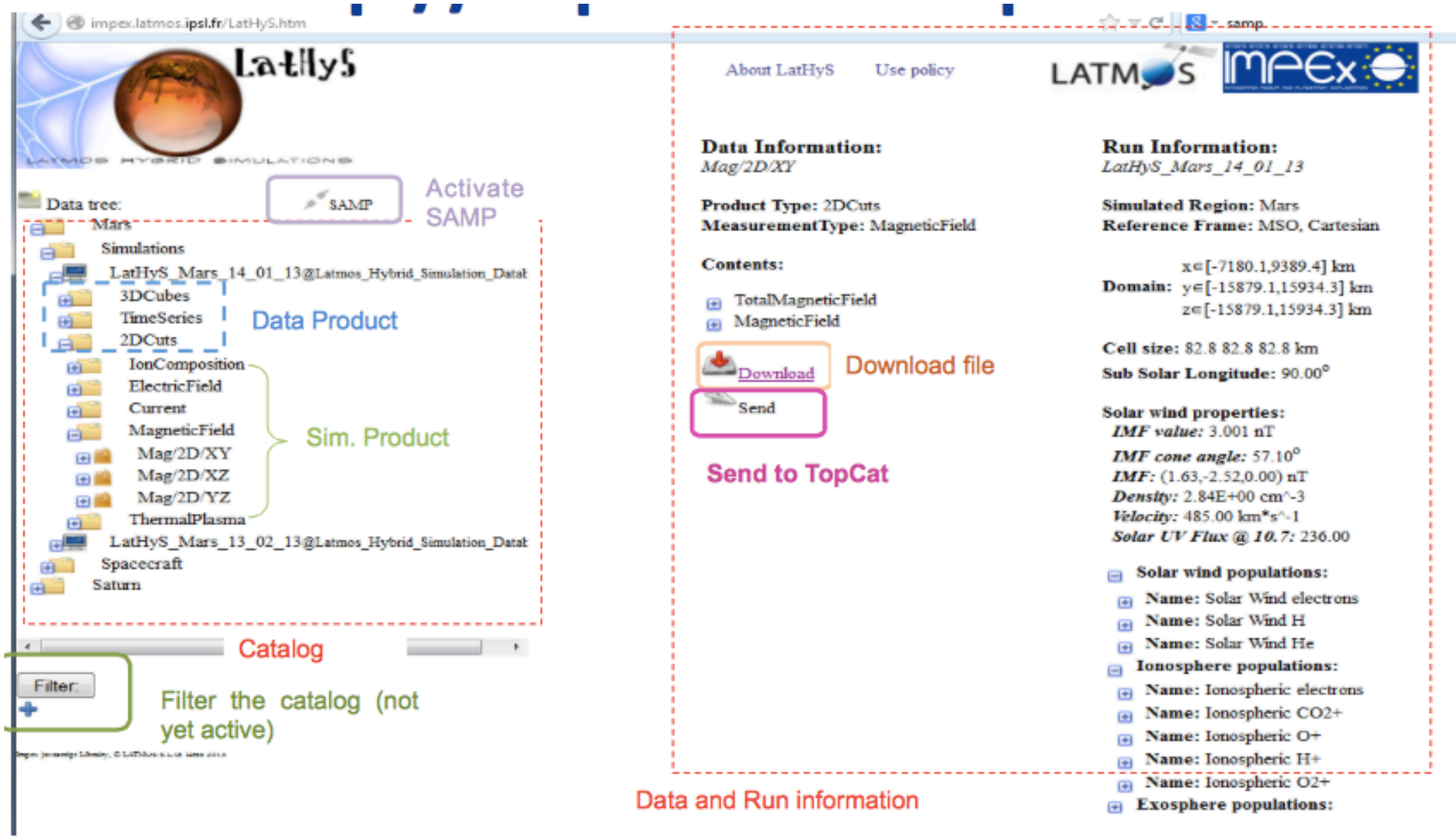
  - Showcase the VESPA infrastructure
  - Train the community
  - Get new users
  - Collect feedback

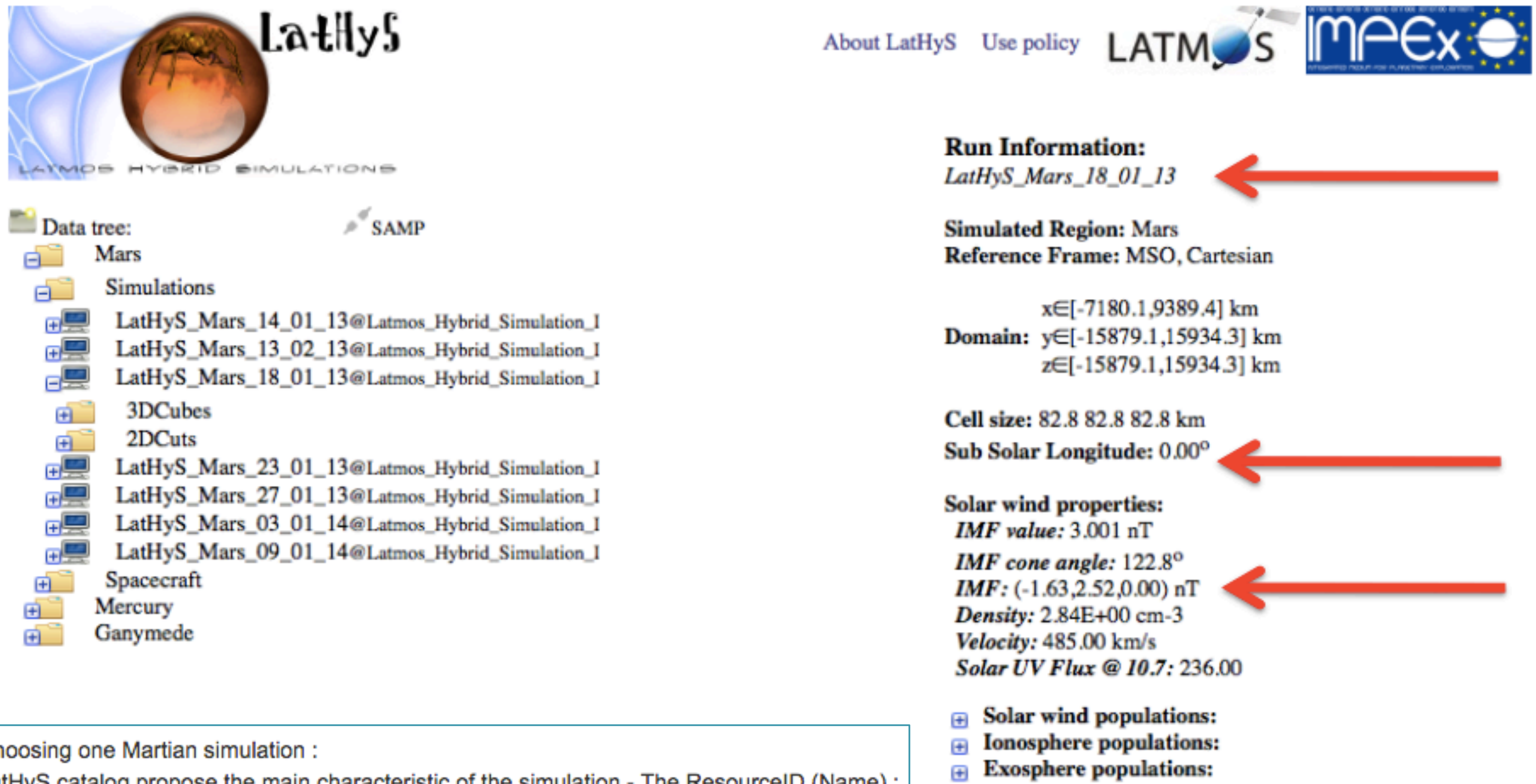
- Need to better advertise the sessions to increase the audience (about 10 at EGU2016, 12 at EPSC/DPS, only 1 at EGU 2017)

Tutorial example 1

Mars **G**lobal **S**urveyor plasma data compared with HYBRID simulations using AMDA

Data analysis and Visualization tools : AMDA, TopCat
LATMOS simulation results database : LatHyS





Choosing one Martian simulation :

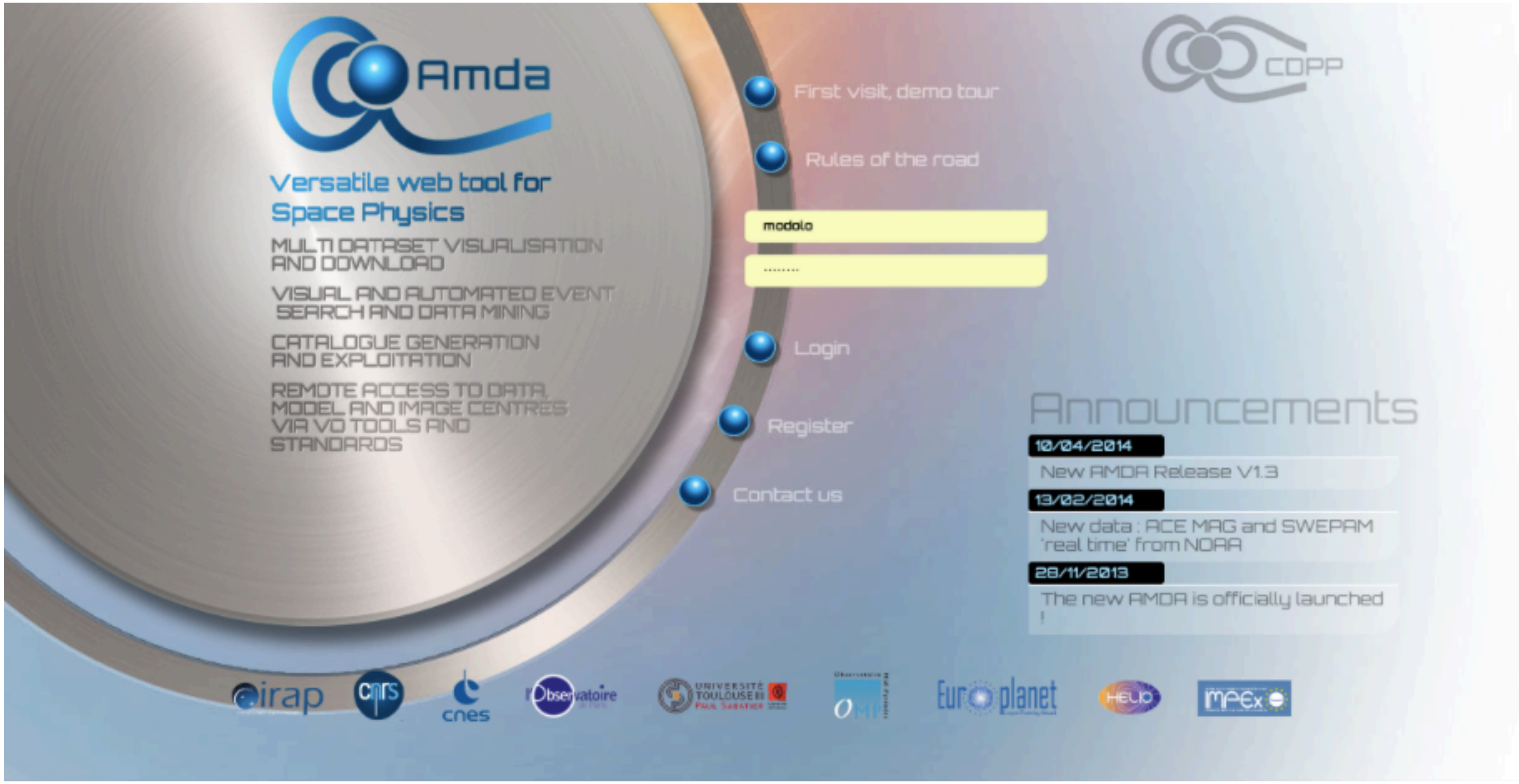
LatHyS catalog propose the main characteristic of the simulation - The ResourceID (Name) :

LatHyS_Mars-18_01_13@...

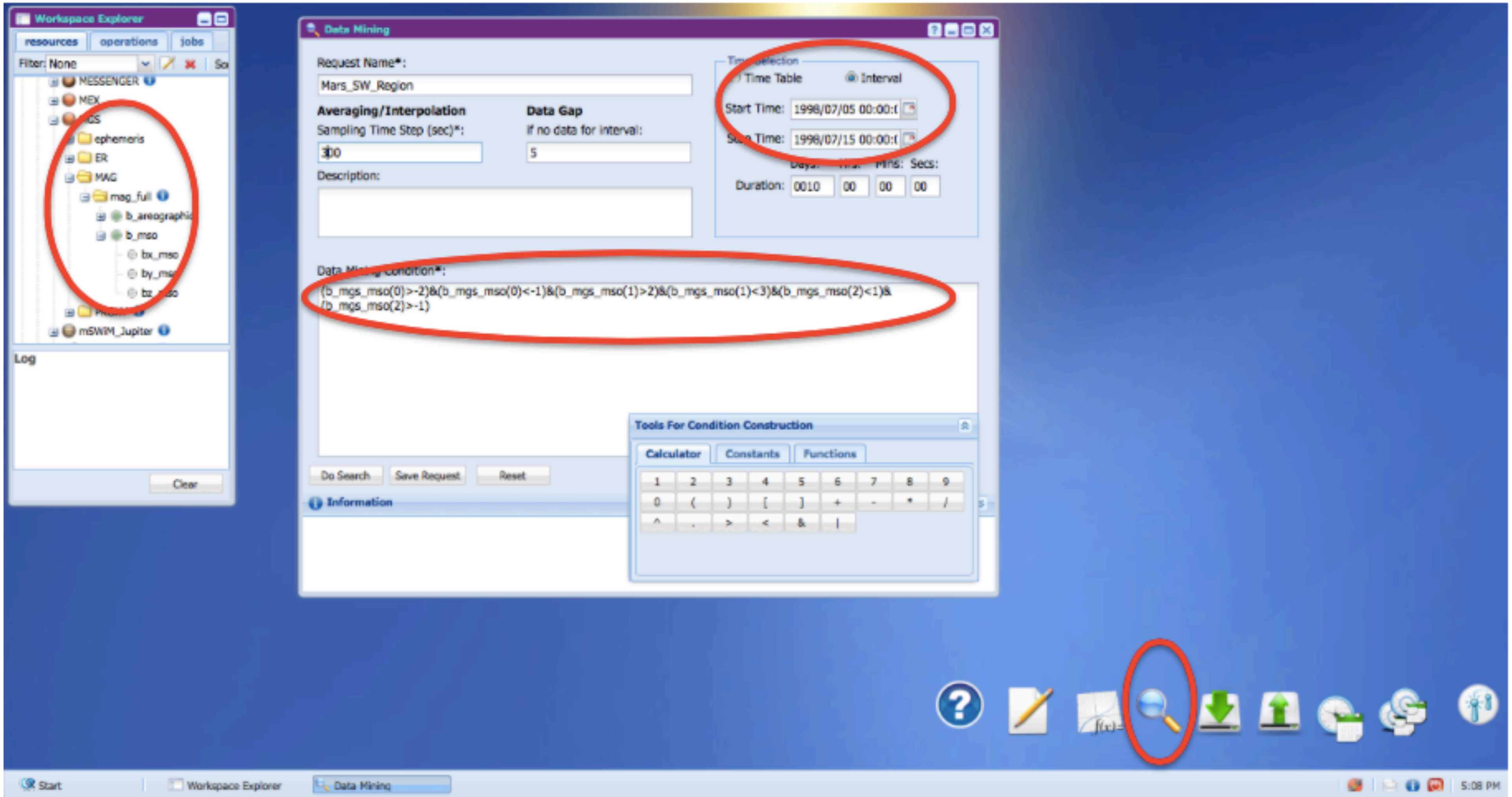
- IMF values : (-1.63, 2.52, 0.0) nT
- Sub Solar Longitude : 0 degree (main crustal field on the nightside)

Searching MGS data with similar IMF properties

Open AMDA http://amda.cdpp.eu

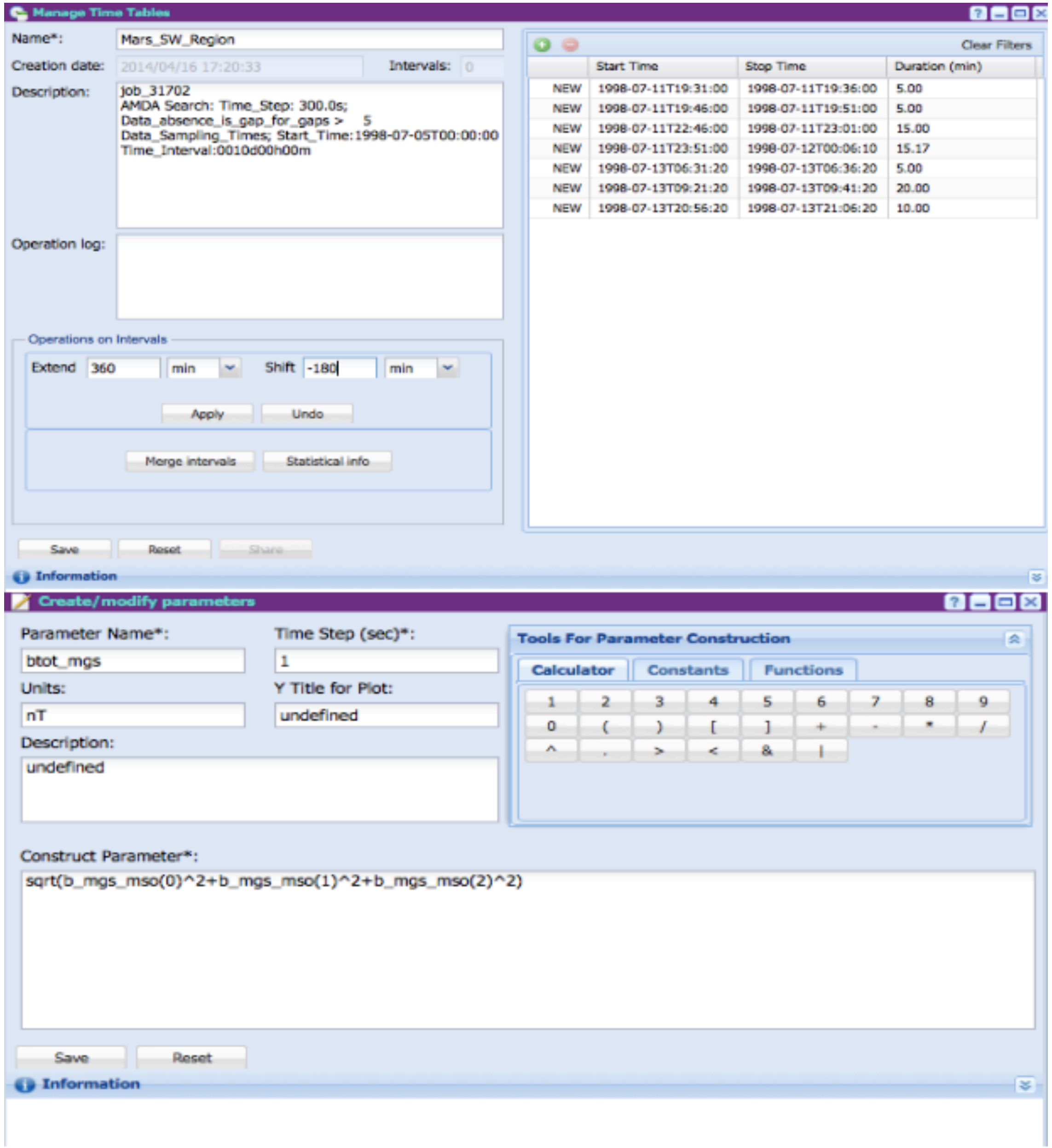


Report the conditions found in LathyS to AMDA
Simulations IMF values   -2< Bx<-1 2<By<3 -1<Bz<1
Set *sampling* and *time span*



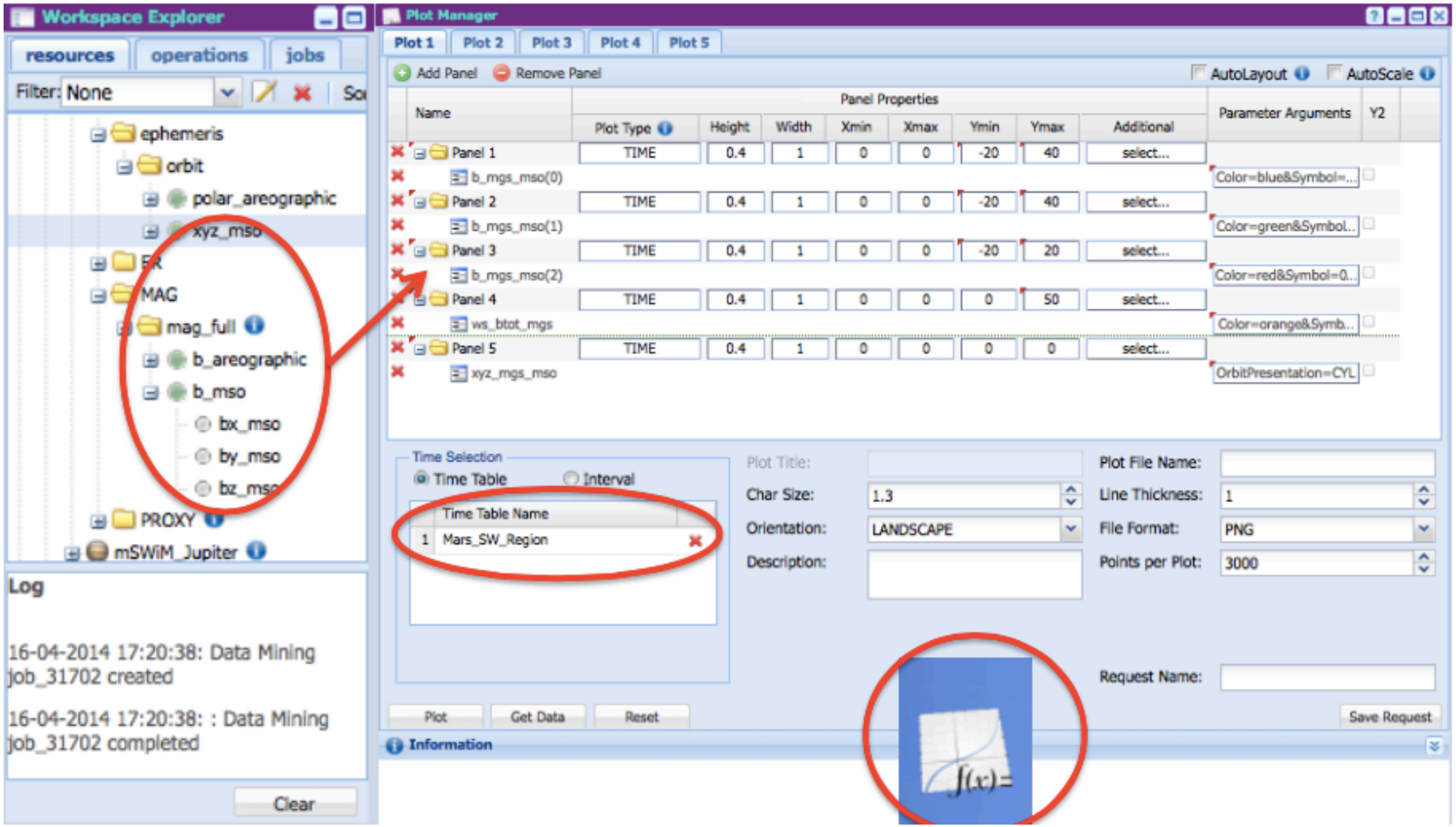
The result is an Event (Time) Table

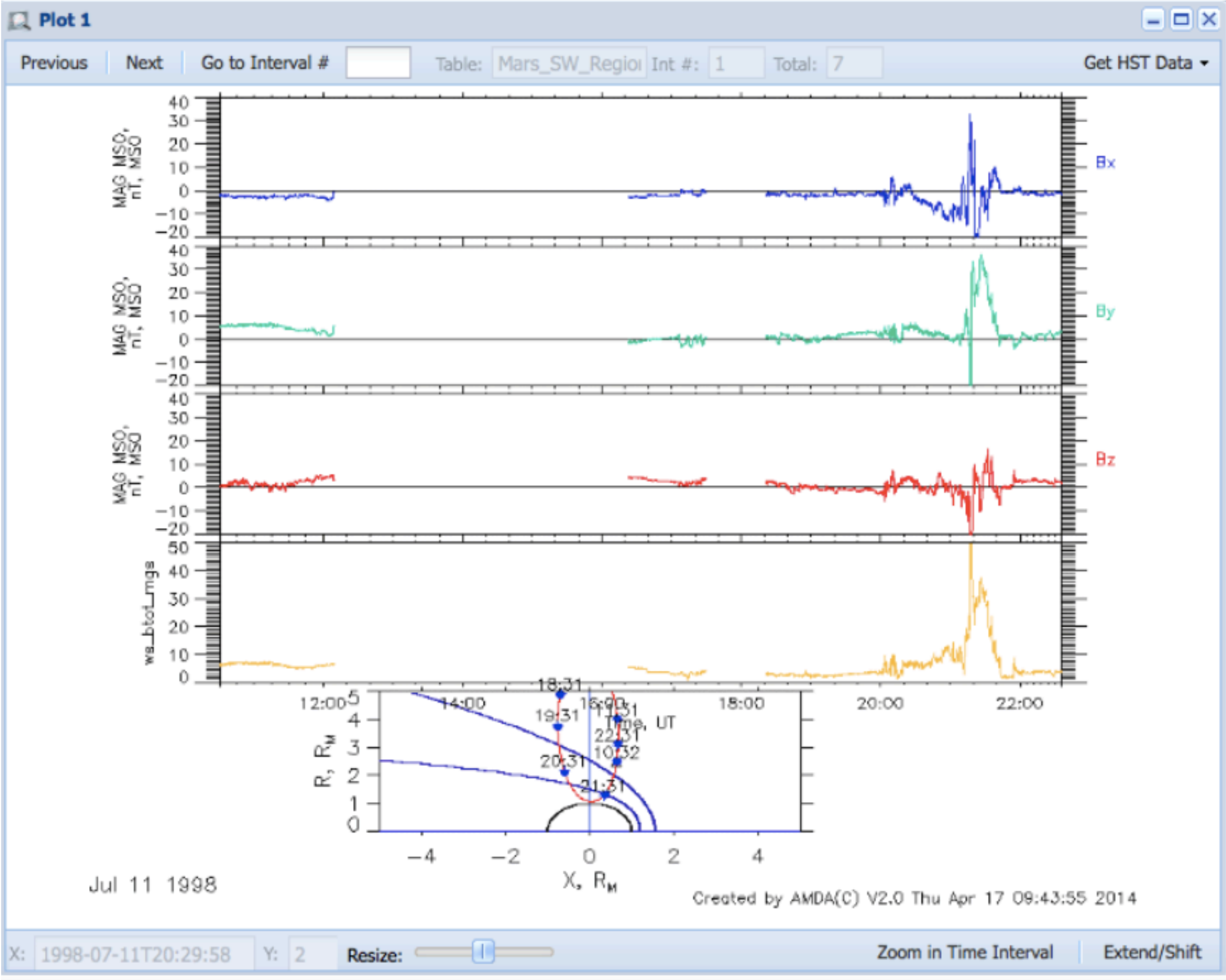
Create a new parameter : Total B field



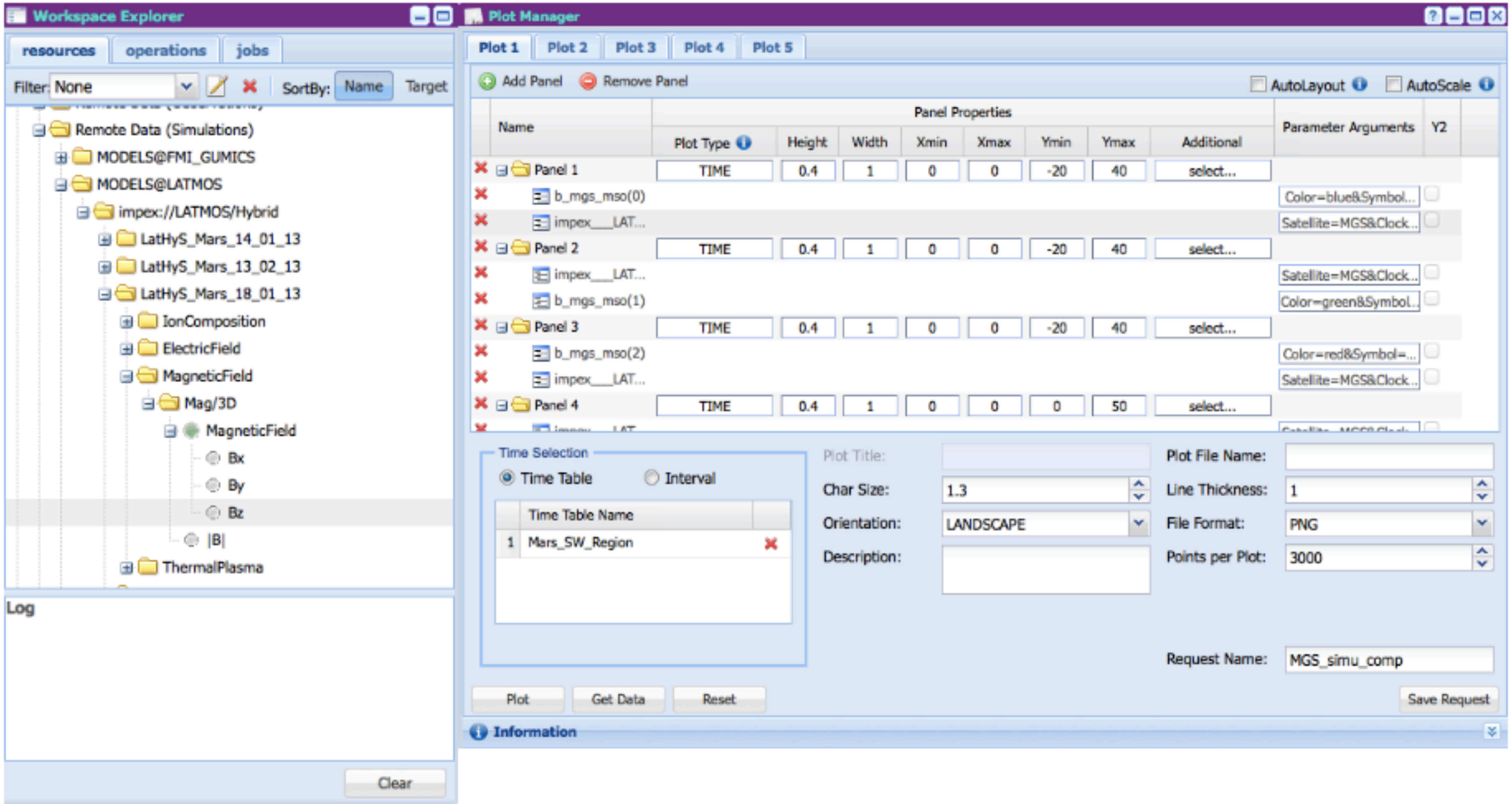
Plot : select Data and Event Table

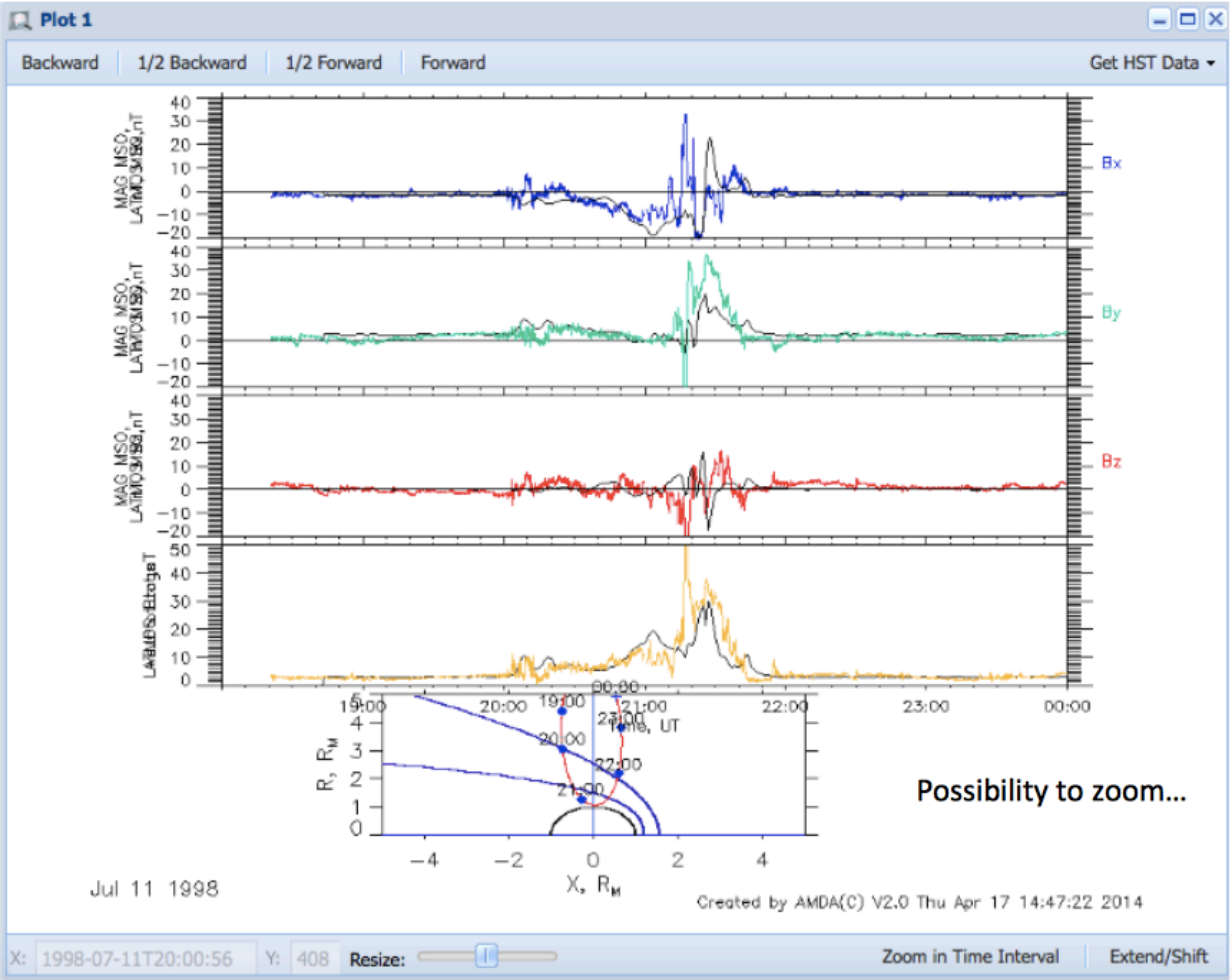
Choose one colour per component




Plot 1
Previous
Next
Go to Interval #
Table: Mars_SW_Regioi
Int #: 1
Total: 7
Get HST Data
MAG MSO, nT, MSO
Bx
By
Bz
ws_btot_mgs
12:00
14:00
16:00
18:00
20:00
22:00
Time, UT
18:31
19:31
20:31
21:31
22:31
10:32
R, R_M
X, R_M
Jul 11 1998
Created by AMDA(C) V2.0 Thu Apr 17 09:43:55 2014
X: 1998-07-11T20:29:58
Y: 2
Resize:
Zoom in Time Interval
Extend/Shift

Add now the simulation results to the plot

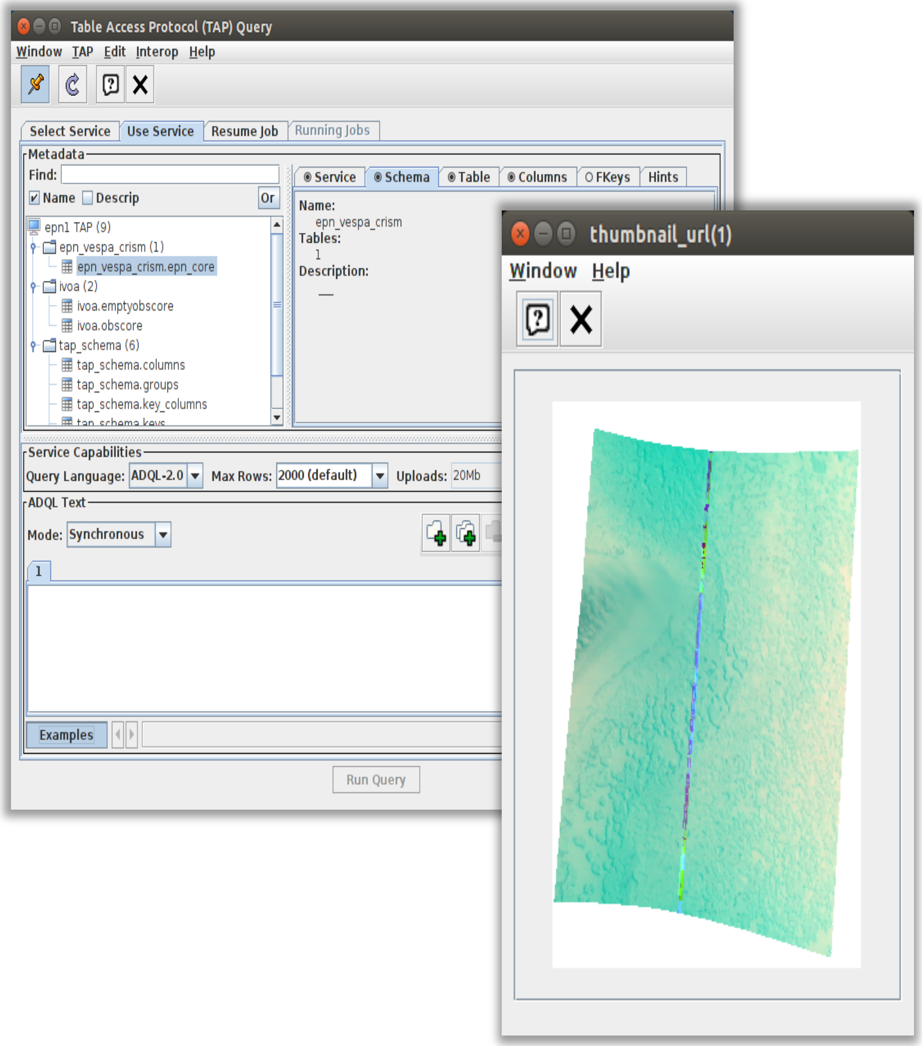




Possibility to zoom...

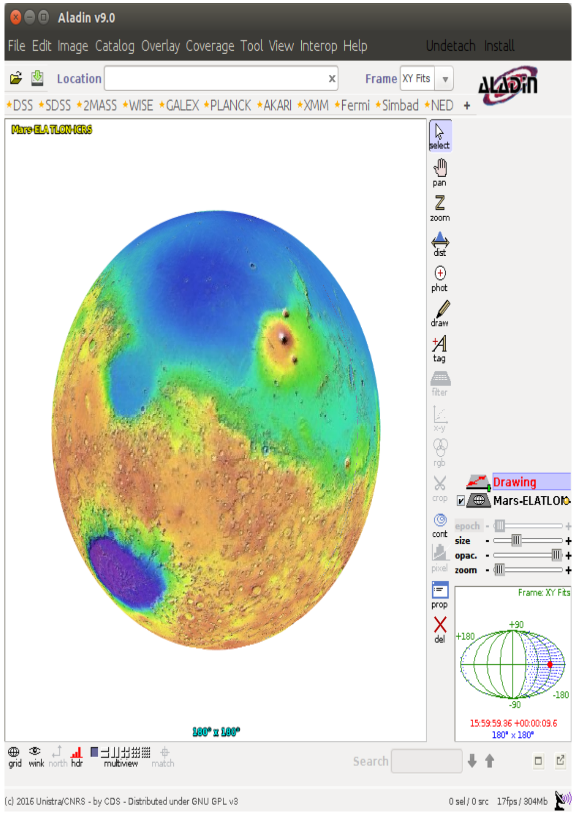
Tutorial Example 2 on MRO/CRISM data
VESPA/TOPCAT/Aladin/TapHandle/CASSIS

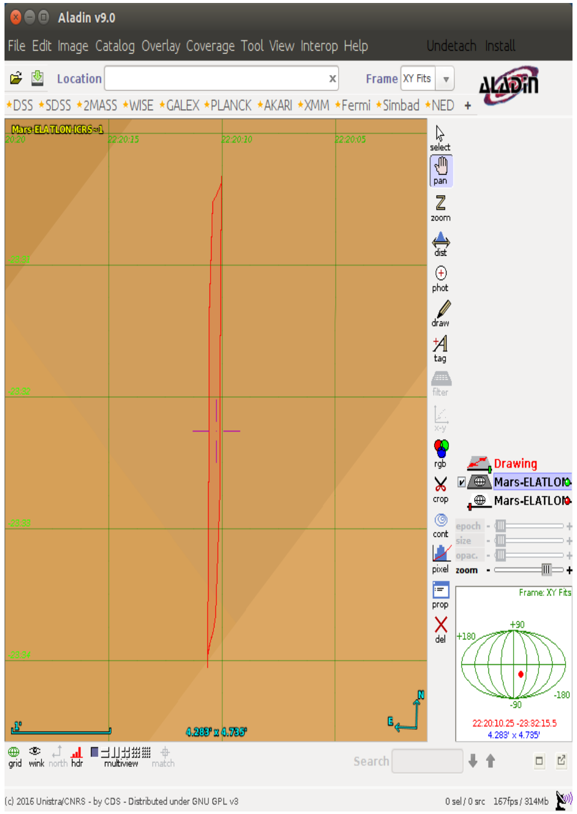
- Deals with spectral cubes from MRO (Mars Reconnaissance Orbiter) / Compact Reconnaissance Imaging Spectrometer (CRISM)
  https://github.com/epn-vespa/tutorials/blob/master/jra-t4-EPN1-CRISM/jra-t4-EPN1-CRISM-Tutorial.md
- Data distributed by EPN-TAP service from Jabobs Uni, Bremen, with DaCHS
  http://epn1.epn-vespa.jacobs-university.de/tap
- EPN-TAP service includes thumbnails for quick inspection

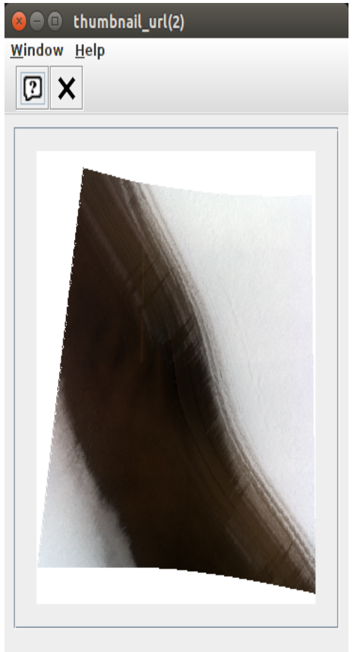


Tutorial Example 2 on MRO/CRISM data
VESPA/TOPCAT/Aladin/TapHandle/CASSIS

Displaying CRISM footprints on Aladin





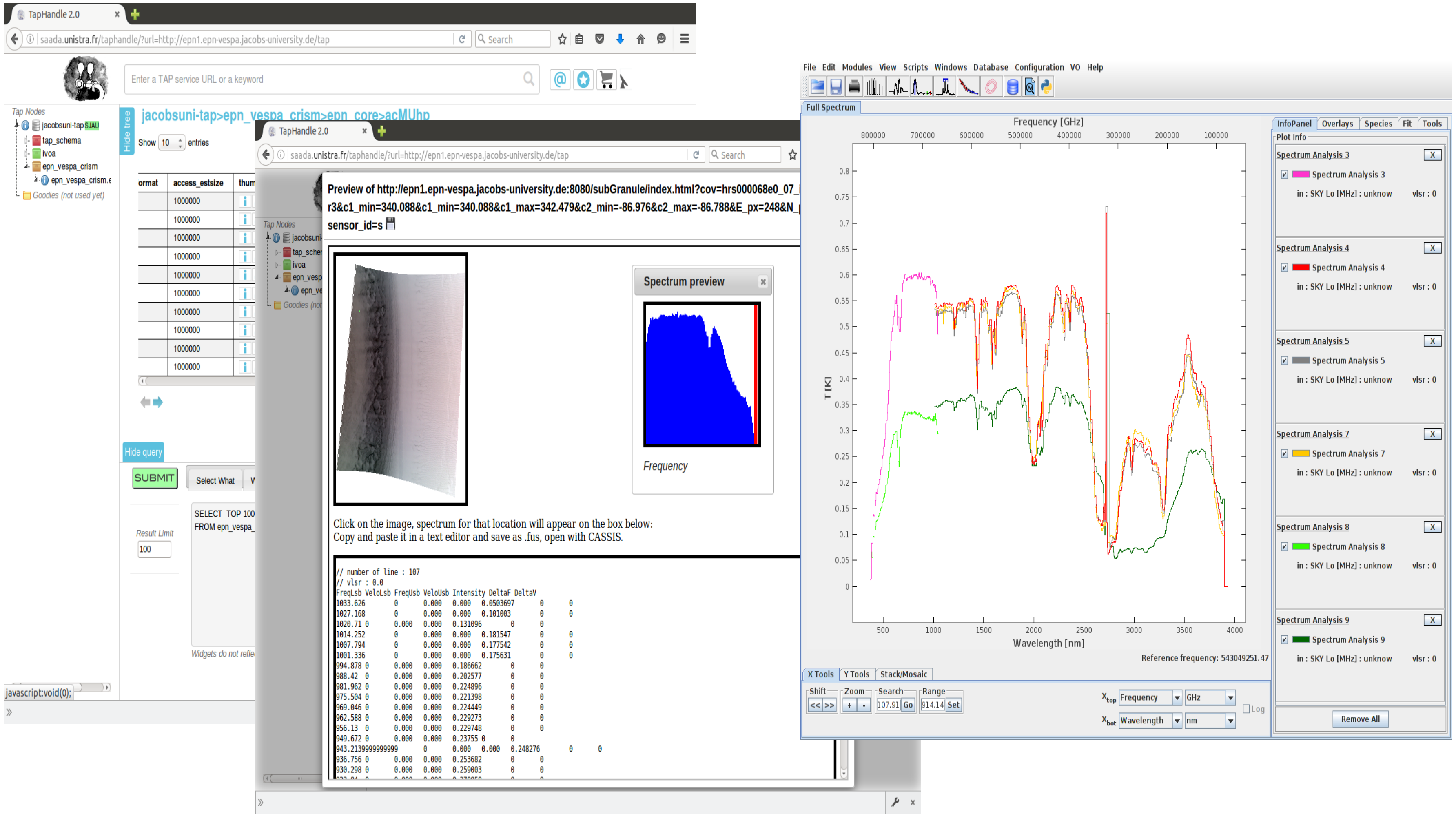


Using HiPS Mars surface from
http://epn1.epn-vespa.jacobs-university.de:8080/marsmola/Mars-ELATLON-ICRS.hpx

Tutorial Example 2 on MRO/CRISM data
VESPA/TOPCAT/Aladin/TapHandle/CASSIS

TapHandle ➔ CASSIS using *custom cutout* service (sub-granule)

(question: datalink in the future?)



Future plans for tutorials with Python Notebook

During a recent *VESPA/GIS* workshop, a tutorial was drafted to connect VESPA (from web portal, using SAMP) with Jupyter Notebook (using astropy.io.samp), and process with GIS python modules.

Very easy to set up, work ongoing to build a tutorial.

Open a SAMP Hub

In [1]:
```
from astropy.vo.samp import SAMPHubServer
hub = SAMPHubServer()
hub.start()
```

[…]

NB: GIS = Geographic Information System
(developed for earth, extended to planetary surface)

Transform s_region to « footprint GIS » (wkt)

In [12]:
```
def getParts(sRegion):
    lon=sRegion.split(' ')[2:][0::2]
    lon=np.asarray([float(i) for i in lon])
    if (lon.max()-lon.min()) > 180:
        lon = [[x, x-360][x>180] for x in lon]
    lat=sRegion.split(' ')[2:][1::2]
    parts = [[360-float(lon[i]),float(lat[i])] for i
    if not (parts[0]==parts[-1]): parts.append(parts
    return [parts]

def s_region_to_wkt(coded_s_region):
    q = getParts(re.sub(r'Polygon UNKNOWNFrame ', ''
    return 'POLYGON (('+','.join([' '.join([str(x) f

v_s_region_to_wkt = np.vectorize(s_region_to_wkt)
```

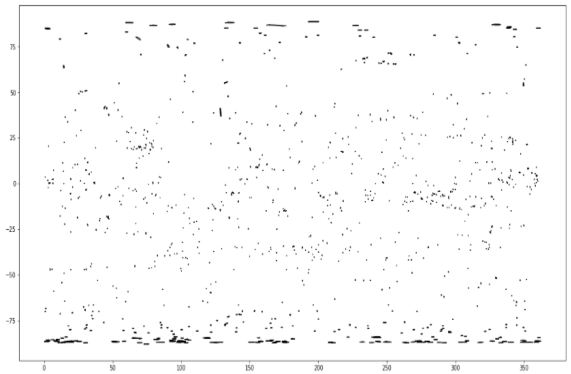
Define the crs, get the Table ad `Pandas.DataFrame` and define the geometry as list of `shapely.wkt` Polygon objects.

[…]

Display the CRISM catalog with GIS plot (geopandas python module)

In [14]:
```
gdf.plot(figsize=[20,10])
```

Out[14]: <matplotlib.axes._subplots.AxesSubplot at 0x109fcb090>



Some zooming in to show the footprints.

Conclusion

Coordination with other groups within IVOA ?