



Integrated Medium for Planetary Exploration (IMPEX)

*Hand's on LATMOS simulation database and Visualization tools (AMDA,
3Dview, TopCat)*

Comparison between MGS observations and Hybrid simulation results

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Presentation of LatHyS

<http://impex.latmos.ipsl.fr>

The screenshot displays the LatHyS web interface. On the left, a 'Data tree' shows a hierarchy for Mars simulations. A 'SAMP' button is highlighted with a purple box and labeled 'Activate SAMP'. A dashed red box encloses the 'Data tree' and the right-hand 'Data and Run information' panel. The 'Data tree' includes folders for 'Simulations', 'Spacecraft', and 'Saturn'. Under 'Simulations', there are two main entries: 'LatHyS_Mars_14_01_13@Latmos_Hybrid_Simulation_Dat...' and 'LatHyS_Mars_13_02_13@Latmos_Hybrid_Simulation_Dat...'. The first entry is expanded to show sub-folders: '3DCubes', 'TimeSeries', '2DCuts', 'IonComposition', 'ElectricField', 'Current', 'MagneticField', 'Mag/2D/XY', 'Mag/2D/XZ', 'Mag/2D/YZ', and 'ThermalPlasma'. A blue box highlights the '2DCuts' folder, labeled 'Data Product'. A green bracket groups the 'MagneticField' and 'Mag/2D' sub-folders, labeled 'Sim. Product'. At the bottom left, a 'Filter:' button is highlighted with a green box, labeled 'Filter the catalog (not yet active)'. The right-hand panel, titled 'Data and Run information', contains several sections: 'About LatHyS' and 'Use policy' links; 'LATMOS' and 'IMPEx' logos; 'Data Information' (Mag/2D/XY); 'Product Type: 2DCuts' and 'MeasurementType: MagneticField'; 'Contents' (TotalMagneticField, MagneticField); 'Run Information' (LatHyS_Mars_14_01_13); 'Simulated Region: Mars' and 'Reference Frame: MSO, Cartesian'; 'Domain' coordinates (x, y, z); 'Cell size: 82.8 82.8 82.8 km' and 'Sub Solar Longitude: 90.00°'; 'Solar wind properties' (IMF value, IMF cone angle, IMF, Density, Velocity, Solar UV Flux); and 'Solar wind populations' (Solar Wind electrons, Solar Wind H, Solar Wind He); 'Ionosphere populations' (Ionospheric electrons, CO2+, O+, H+, O2+); and 'Exosphere populations'. A 'Download' button is highlighted with an orange box and labeled 'Download file'. A 'Send' button is highlighted with a purple box and labeled 'Send to TopCat'.

Data and Run information



Data tree: SAMP

- Mars
 - Simulations
 - LatHyS_Mars_14_01_13@Latmos_Hybrid_Simulation_I
 - LatHyS_Mars_13_02_13@Latmos_Hybrid_Simulation_I
 - LatHyS_Mars_18_01_13@Latmos_Hybrid_Simulation_I
 - 3DCubes
 - 2DCuts
 - LatHyS_Mars_23_01_13@Latmos_Hybrid_Simulation_I
 - LatHyS_Mars_27_01_13@Latmos_Hybrid_Simulation_I
 - LatHyS_Mars_03_01_14@Latmos_Hybrid_Simulation_I
 - LatHyS_Mars_09_01_14@Latmos_Hybrid_Simulation_I
 - Spacecraft
 - Mercury
 - Ganymede

Filter:



Run Information:

LatHyS_Mars_18_01_13



Simulated Region: Mars
Reference Frame: MSO, Cartesian

Domain: x \in [-7180.1,9389.4] km
y \in [-15879.1,15934.3] km
z \in [-15879.1,15934.3] km

Cell size: 82.8 82.8 82.8 km
Sub Solar Longitude: 0.00°



Solar wind properties:
IMF value: 3.001 nT
IMF cone angle: 122.8°
IMF: (-1.63,2.52,0.00) nT
Density: 2.84E+00 cm⁻³
Velocity: 485.00 km/s
Solar UV Flux @ 10.7: 236.00



- Solar wind populations:
- Ionosphere populations:
- Exosphere populations:

Choosing one Martian simulation :

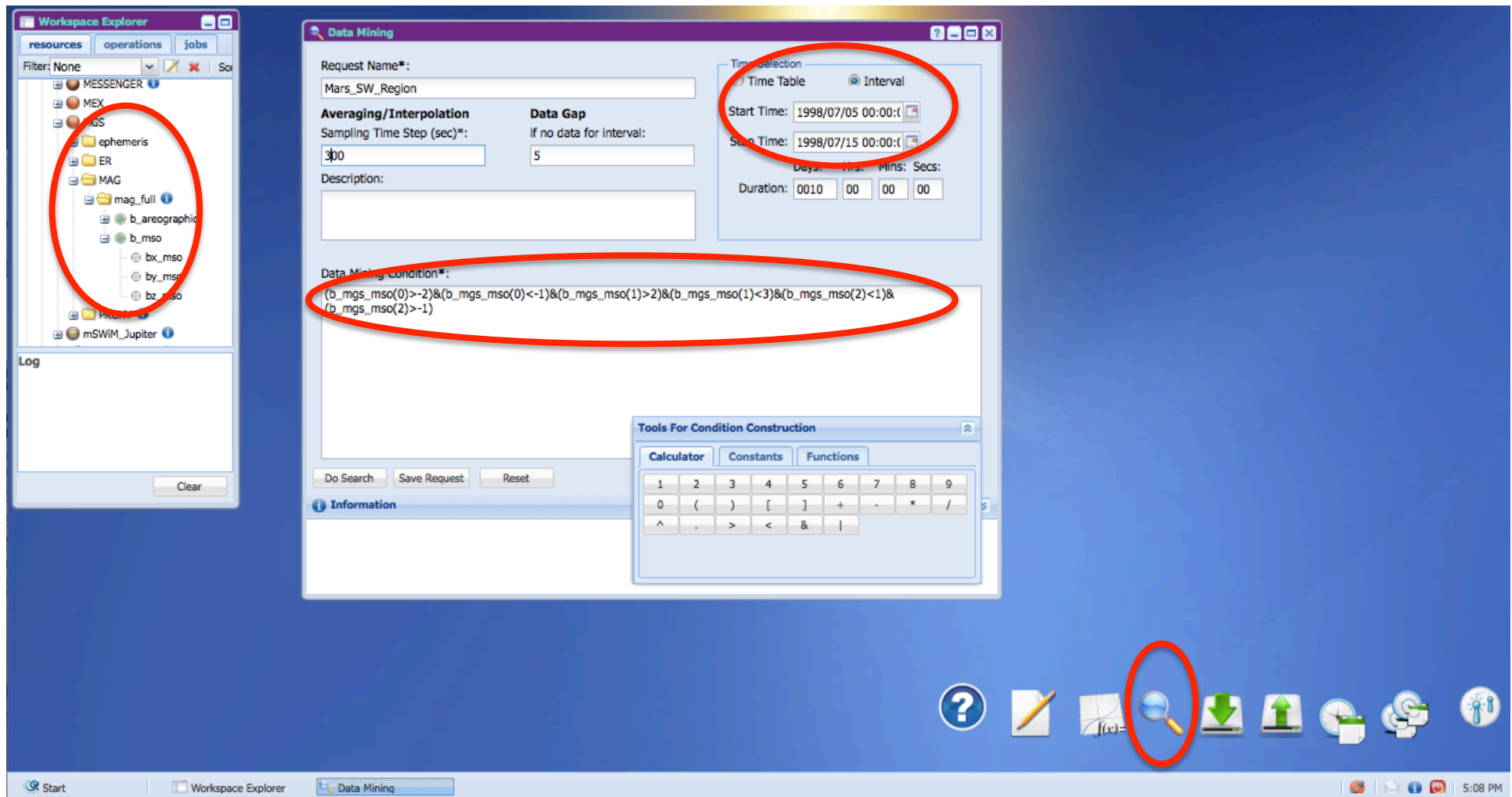
LatHyS catalog propose the main characteristic of the simulation

- The ResourceID (Name) : LatHyS_Mars-18_01_13@...
- IMF values : (-1.63, 2.52, 0.0) nT
- Sub Solar Longitude : 0° (main crustal field on the nightside)

Searching if MGS data have similar IMF values

Comparison between MGS observations and Hybrid simulation results using AMDA: <http://amda.cdpp.eu>

The screenshot displays the AMDA web interface. On the left, the AMDA logo is accompanied by the text "Versatile web tool for Space Physics" and a list of features: "MULTI DATASET VISUALISATION AND DOWNLOAD", "VISUAL AND AUTOMATED EVENT SEARCH AND DATA MINING", "CATALOGUE GENERATION AND EXPLOITATION", and "REMOTE ACCESS TO DATA, MODEL AND IMAGE CENTRES VIA VO TOOLS AND STANDARDS". A central navigation bar contains buttons for "First visit, demo tour", "Rules of the road", "modolo", ".....", "Login", "Register", and "Contact us". The "modolo" and "....." buttons are highlighted in yellow. In the top right corner, the CDPP logo is visible. On the right side, an "Announcements" section lists three entries: "10/04/2014 New AMDA Release V1.3", "13/02/2014 New data : ACE MAG and SWEFAM 'real time' from NOAA", and "28/11/2013 The new AMDA is officially launched!". The bottom of the page features a row of partner logos including Airap, CNRS, CNES, Observatoire de Paris, Université Toulouse III Paul Sabatier, Observatoire Midi-Pyrénées, Europlanet, HELIO, and IMEx.



Use Data Mining tool (Magnifying glass)

Construct a data Mining condition by dragging and dropping resources of the workspace explorer (MGS bx_mso => data mining conditions)

The condition mark out the simulation IMF value : $-2 < B_x < -1$, $2 < B_y < 3$, $-1 < B_z < 1$

Specify a sampling time (averaging over 300s), the name of the request and the Time interval
Start Time : 1998/07/05 => Stop Time : 1998/07/15

Then perform the search...

Visualize your Time Table obtained from the search and manipulate it in order to have about one orbit per event

⇒ Extend all time periods by 360 min (6h) and shift them by -180 min (3h) to have new periods of about 6h centered on your searched time results

⇒ Name your Time Table (Mars_SW_Region)



Create a new parameter corresponding to the Total B field (MGS)
Idem by drag and drop

Manage Time Tables

Name*: Mars_SW_Region
 Creation date: 2014/04/16 17:20:33 Intervals: 0
 Description: job_31702
 AMDA Search: Time_Step: 300.0s;
 Data_absence_ls_gap_for_gaps > 5
 Data_Sampling_Times; Start_Time:1998-07-05T00:00:00
 Time_Interval:0010d00h00m

Operation log:

Operations on Intervals
 Extend 360 min Shift -180 min
 Apply Undo
 Merge intervals Statistical info

Save Reset Share

	Start Time	Stop Time	Duration (min)
NEW	1998-07-11T19:31:00	1998-07-11T19:36:00	5.00
NEW	1998-07-11T19:46:00	1998-07-11T19:51:00	5.00
NEW	1998-07-11T22:46:00	1998-07-11T23:01:00	15.00
NEW	1998-07-11T23:51:00	1998-07-12T00:06:10	15.17
NEW	1998-07-13T06:31:20	1998-07-13T06:36:20	5.00
NEW	1998-07-13T09:21:20	1998-07-13T09:41:20	20.00
NEW	1998-07-13T20:56:20	1998-07-13T21:06:20	10.00

Information

Create/modify parameters

Parameter Name*: btot_mgs
 Units: nT
 Description: undefined

Time Step (sec)*: 1
 Y Title for Plot: undefined

Tools For Parameter Construction
 Calculator Constants Functions
 1 2 3 4 5 6 7 8 9
 0 () [] + - * /
 ^ . > < & |

Construct Parameter*:
 $\text{sqrt}(b_mgs_mso(0)^2 + b_mgs_mso(1)^2 + b_mgs_mso(2)^2)$

Save Reset

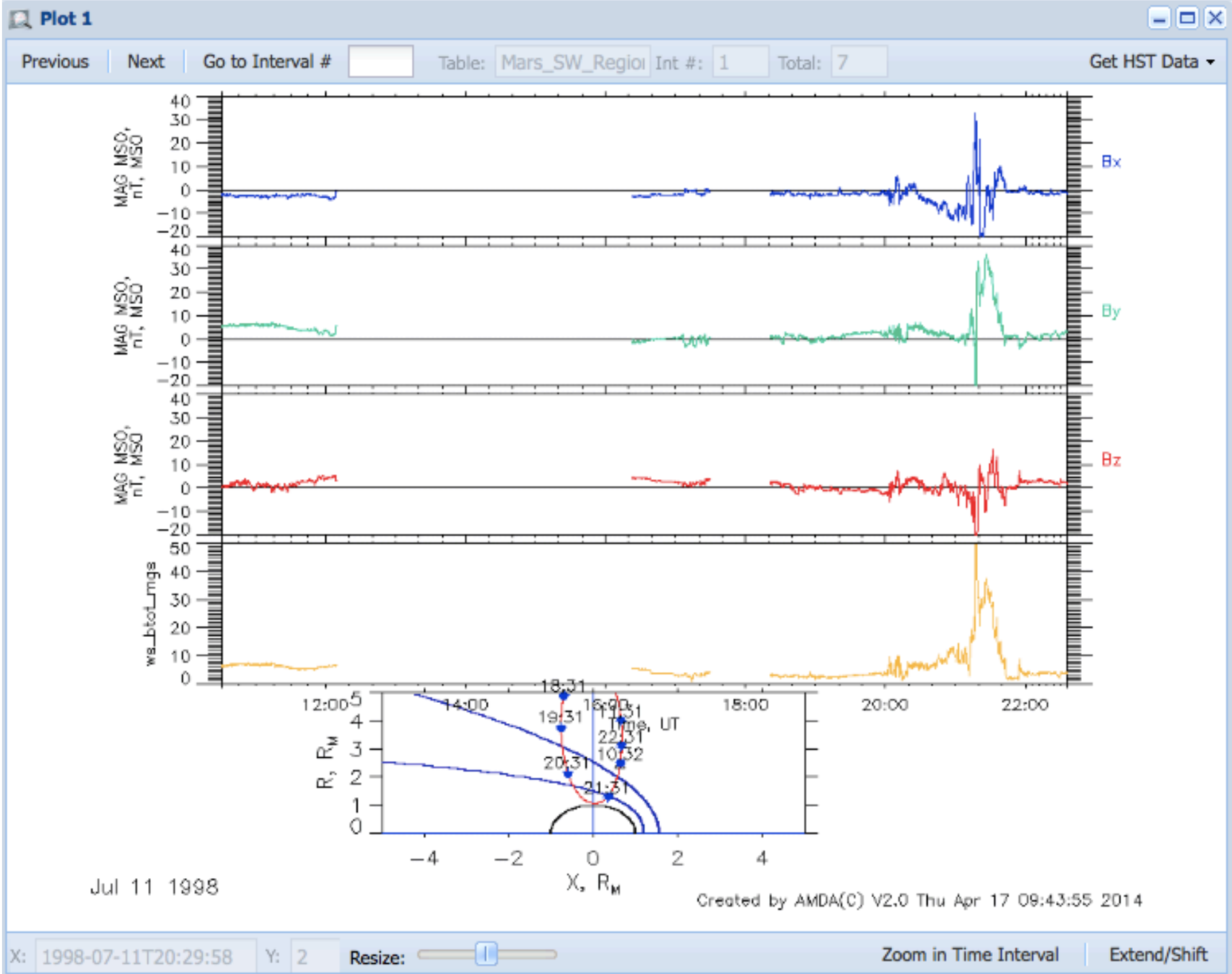
The screenshot displays the software interface with the following components:

- Workspace Explorer:** Shows a tree view of resources. The 'xyz_mso' folder is circled in red, with an arrow pointing to the 'Panel 3' row in the Plot Manager table.
- Plot Manager:** Contains a table of plot panels and a 'Time Selection' section.

Name	Plot Type	Height	Width	Xmin	Xmax	Ymin	Ymax	Additional	Parameter Arguments	Y2
Panel 1	TIME	0.4	1	0	0	-20	40	select...	Color=blue&Symbol=...	
Panel 2	TIME	0.4	1	0	0	-20	40	select...	Color=green&Symbol=...	
Panel 3	TIME	0.4	1	0	0	-20	20	select...	Color=red&Symbol=0...	
Panel 4	TIME	0.4	1	0	0	0	50	select...	Color=orange&Symb...	
Panel 5	TIME	0.4	1	0	0	0	0	select...	OrbitPresentation=CYL	

 The 'Time Selection' section shows 'Time Table' selected, with a list containing '1 Mars_SW_Region' circled in red.
- Log:** Shows system messages from 16-04-2014 17:20:38, including 'Data Mining job_31702 created' and 'Data Mining job_31702 completed'.
- Information:** Features a plot icon circled in red, showing a graph with the equation $f(x)=$.

Visualize your data with the 'plotting data' function. Select each component of the MGS magnetic field (MSO) with some color code (bx : blue, by:green, bz : red, btot from 'derived parameter' : orange) + MGS ephemeris (xyz_mso in 'CYL' coordinate system)
 For Time Selection : select 'Time Table' and drag and drop the 'Mars_SW_Region' from 'My_Time_Table'



The image shows the Plot Manager interface with the following components:

- Workspace Explorer (Left):** A tree view showing the directory structure: Remote Data (Simulations) > MODELS@FMI_GUMICS > MODELS@LATMOS > impex://LATMOS/Hybrid > LatHyS_Mars_18_01_13 > MagneticField > Mag/3D > MagneticField > Bz.
- Plot Manager (Right):** A configuration panel for multiple plots (Plot 1 to Plot 5). It includes:
 - Panel Properties Table:**

Name	Plot Type	Height	Width	Xmin	Xmax	Ymin	Ymax	Additional	Parameter Arguments	Y2
Panel 1	TIME	0.4	1	0	0	-20	40	select...		
b_mgs_mso(0)									Color=blue&Symbol=...	
impex__LAT...									Satellite=MGS&Clock...	
Panel 2	TIME	0.4	1	0	0	-20	40	select...		
impex__LAT...									Satellite=MGS&Clock...	
b_mgs_mso(1)									Color=green&Symbol=...	
Panel 3	TIME	0.4	1	0	0	-20	40	select...		
b_mgs_mso(2)									Color=red&Symbol=...	
impex__LAT...									Satellite=MGS&Clock...	
Panel 4	TIME	0.4	1	0	0	0	50	select...		
impex__LAT...									Satellite=MGS&Clock...	
 - Time Selection Dialog:** A sub-panel with 'Time Table' selected. It contains a table:

Time Table Name	
1 Mars_SW_Region	X
 - Configuration Fields:**
 - Plot Title: [Empty]
 - Char Size: 1.3
 - Orientation: LANDSCAPE
 - Description: [Empty]
 - Plot File Name: [Empty]
 - Line Thickness: 1
 - File Format: PNG
 - Points per Plot: 3000
 - Request Name: MGS_simu_comp
 - Buttons:** Plot, Get Data, Reset, Save Request, Clear.

Add simulation result datasets:

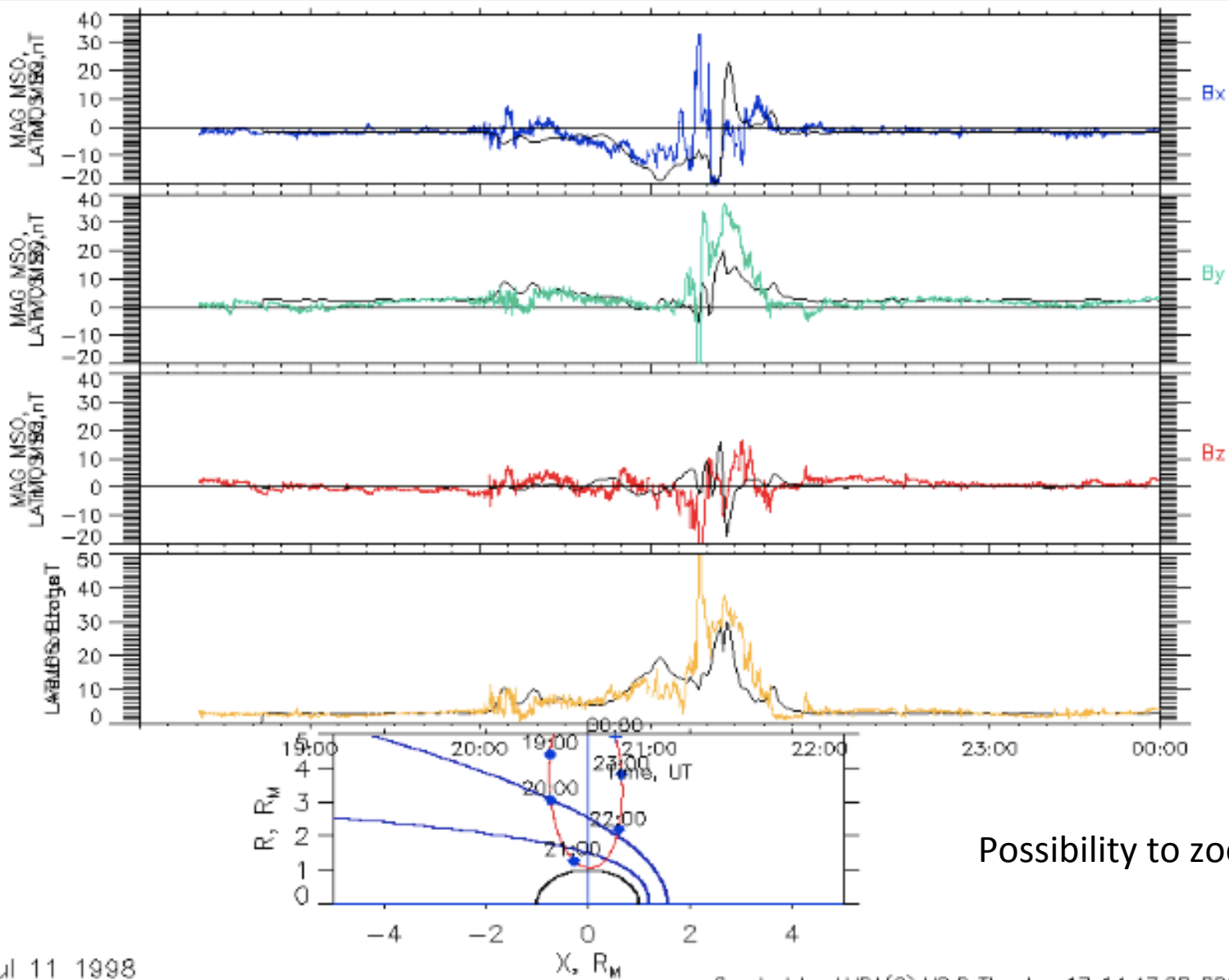
Remote data(Simulations)/MODELS@LATMOS/LatHyS_Mars_18_01_13/Magnetic_field

Drag and drop each B components and select MGS S/C

Plot 1

Backward | 1/2 Backward | 1/2 Forward | Forward

Get HST Data ▾



Possibility to zoom...

Jul 11 1998

Created by AMDA(C) V2.0 Thu Apr 17 14:47:22 2014

X: 1998-07-11T20:00:56

Y: 408

Resize:



Zoom in Time Interval

Extend/Shift