MATISSE v1.5 user manual
7th May 2018

MATISSE (Multi-purpose Advanced Tool for the Instruments for the Solar System Exploration) is a web based tool to access and visualize data from planetary exploration instruments.
In this document the main functionalities of MATISSE v1.5 will be illustrated.

New in version 1.5

In this version we deeply upgraded the 3D online visualization method, by substituting the X3DOM javascript with the new found VTK.js (https://kitware.github.io/vtk-js/).
As a consequence now high-resolution 3D online visualization is available also for objects larger that the 67P comet.

New in version 1.4

The main upgrade in this version is the addition of 1 and 2 micron spectral parameters for VIR-Dawn observation of Vesta, following the work by Longobardo et al., (2014).
These parameters can be accessed by selecting the instrument "VIR spectral parameters" with target equal 4 Vesta. After selecting one of the observations from the query result table in the Wavelength field it will be possible to select the desired spectral parameter.

The generation of the FITS and GeoTIFF files have been upgraded so that they are now compliant with more robust standards and can be better used.

New in version 1.3

The main new implementation in this MATISSE version is the connection between the Planetary Virtual Observatory VESPA. More detailed info about it can be found on the dedicated User Manual.

After the observations related to bigger objects, such as 1 Ceres and the Moon, increased in MATISSE the 3D online visualization for these objects has been removed: the shape models / DTMs used for this purpose where, in fact, at very low resolution in order to not need excessive time to display them.
For these objects the 3D visualization is only available after downloading the high resolution vtp file to be opened with Paraview.

Accessing the tool

To access public data present on MATISSE go to the MATISSE home page (https://tools.asdc.asi.it/matisse.jsp) and perform the desired search.
In order to be able to access the MATISSE private datasets it is fundamental to be registered, going to the MATISSE home page and requesting a new user account. After this procedure has been completed send an email to angelo.zinzi@ssdc.asi.it specifying the username chosen and the science team of association.

Once able to access the tool click on the “Settings” link on the upper right corner and select which types of observation you would be able to view (if you are part of a scientific team you will likely be only interested in the private observations of that instrument, if available). At the end of the procedure click “Submit” and the “Back” to return to the MATISSE home page.

The selection form

Prior to proceed to the query it is mandatory to select a target and at least one associated mission: up to now six targets (1 Ceres, 21 Lutetia, 67P Churyumov-Gerasimenko 4 Vesta, Mercury and Moon) and five missions (Rosetta, Dawn, Chang’E-1, Chang’E-2 and MESSENGER) are present.
After this preliminary selection it is possible to choose multiple instruments that observed the target and fill the form to perform the query. At the present time the parameters that can be searched for are: longitude, latitude, range to target, acquisition time, incidence, phase and emission angles.
All the parameters are complimentary and, if not filled, the whole range of the specific parameter will be used for the query. This is not valid for MESSENGER data, as they are searched through the PDS online database: in order to not send a too big query, latitude and longitude ranges are limited to 20°.
In addition we suggest you to perform small geographical queries for Dawn and Chang’E high resolution data (2°x2° maximum), since data are extremely large and a bigger search could end with a “Memory Error”.
To perform the query just click “Search”.

GIADA parameters

By selecting 67P Churyumov-Gerasimenko as target also the GIADA parameters will appear: these ones are not used for the query, but only for the data processing and visualization.
For what concerns GIADA parameters, “Start date” and “Stop date” will be set as minimum and maximum value of the “Acquisition time” query parameter: if not set, they will be filled with the minimum and maximum value to respect to the query result.
Differently for what happens for the other instruments the time selection is used also for the output page (i.e., only the time interval chosen will be shown).
The “Time step” parameter expresses the time interval at which points has to be plotted and “Int Time” the integration time of the measurement.

Observation section

In the “Observation” section it is possible to choose the wavelength (where applicable) and the colorscale properties (palette and number of colors). It is obviously possible to select the desired observation.
Default displayed columns in the output query can be changed by using the “Show/hide column” button.
By clicking on “Submit” the single observation chosen will be processed.
The multi-observation functionality can be used by clicking on “Next” after selecting one observation (it is important to click “Next” also for the last observation needed): only when the “Submit” button is clicked the data analysis starts.

For this functionality you can choose the type (“Average”, “Ratio” or “RGB”) and the colorscale properties (not applied for RGB) in the dedicated section before clicking “Submit”.
At the moment this function is not applicable to Mercury.

The output page

It is possible to navigate through the target by using the mouse. In particular by:

- maintaining the left button pressed and moving the mouse it is possible to rotate the object
- pressing the right button and moving produces a zoom in and out (also the scroll wheel has zoom functionalities but is slower)
- double clicking the left button the rotation point is changed

For the multi-instrument version the value of the data in the left-clicked area is also shown.

Two bidimensional projected maps are present (in png format) and a compressed archive with data to be downloaded.
In this file up to six files are present, depending on the selected target and instrument:

- Two files to be read by using ITT ENVI tool: these are the IMG and hdr files and contains latitude, longitude and values.
- A GeoTIFF file projected on the corresponding ellipsoid (Moon, Mercury and Vesta), to be used with a desktop GIS software: to have the exact distance in meter it is recommended to activate the “on the fly” projection.
- A vtp file to be open with the Paraview software.

Use cases

Some use cases have been described in dedicated blog posts, such as:

- New MATISSE tasks: PlanetServer queries and VIR-Vesta advanced data
- MATISSE
- MATISSE, the ASDC web-tool for the planetary exploration

Known bugs

Even if the JavaScript used for MATISSE is multi-browser, we encourage you to use Google Chrome, or Mozilla Firefox. However, for old PCs, also these browsers will automatically exclude some graphic capabilities of the tool software.
In order to force Firefox to visualize all the components of MATISSE write about:config in the address bar, proceed and turn to TRUE the values of webgl.force-enabled and layers.acceleration.force-enabled.
For what concerns Chrome go to chrome://flags and turn ON these ones:

- Override software rendering list
- GPU compositing on all pages
- Threaded compositing
- GPU Accelerated SVG Filters

Make these changes at your own risk, as the system can crash.

Contacts

The tool is always under development, therefore you are encouraged to contact Angelo Zinzi (angelo.zinzi@ssdc.asi.it) for every suggestion regarding MATISSE.
You can learn more about MATISSE by reading the paper on Astronomy and Computing (here for ArXiv).