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MATISSE: Multi-purpose Advanced Tool for Instruments for the Solar System Exploration

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Abstract

In planetary sciences, design, assemble and launch onboard instruments are only preliminary steps toward the final aim of converting data into scientific knowledge, as the real challenge is the data analysis and interpretation.
Up to now data have been generally stored in "old style" archives, i.e. common ftp servers where the user can manually search for data browsing directories organized in a time order manner. However, as datasets to be stored and searched become particularly large, this latter task absorb a great part of the time, subtracting time to the real scientific work.
In order to reduce the time spent to search and analyze data MATISSE (Multi-purpose Advanced Tool for Instruments for the Solar System Exploration), a new set of software tools developed together with the scientific teams of the instruments involved, is under development at ASDC (ASI Science Data Center), whose experience in space missions data management is well known (e.g., [1], [2], [3], [4]).

1. Introduction

MATISSE is the new tool for the Solar System Exploration under development at ASDC. It is thought to allow an easier access and visualization to the data in particular by using:

- Intelligent data archiving (possibility to search for data on the basis of different parameters, such as, for example, geographic coordinates, observation geometries or scientific features);
- 3D and projected data visualization (to rapidly look at data coverage of the studied object)
- tools for data analysis and interpretation (avoiding time loss in processing data)
- tools for data fusion (merge together observations made by several instruments allowing a kind of analysis not achievable be each single instruments alone).

MATISSE is designed as a web tool, accessible via browser and with no need of installing software, in order to make it a really accessible tool.
Although the Intelligent Archive features are still to be fully implemented (this work is planned to be performed in the next year) the tool is already online and its modular structure allows to upgrade it with time and to quickly integrate other mission and other targets. In particular, the strong collaborations with the scientific teams of the instruments involved, makes it possible to develop ad hoc algorithms to better analyze the data.
During the first year of development MATISSE is mainly devoted to the ESA Rosetta mission [5], in particular to OSIRIS (NAC and WAC) [6], VIRTIS [7] and GIADA [8] (i.e., the instruments with the largest Italian participation) and to observations of the asteroid 21 Lutetia and for the planned visit to comet 67P Churyumov/Gerasimenko.

2. Current features

At the present time MATISSE can display observations acquired during the 21 Lutetia flyby projected over the 3D shape model of the asteroid, obviously taking into account the privacy policy of each database (thus allowing differentiating access for every registered user).
It is possible to select the geographic area to display and the color tables to visualize the data (Fig. 1).
Once the visualization is made it is possible to interact using the mouse, zooming or rotating the target object to better show the data (Fig. 2), while planned upgrades include the possibility of visualize spectra and other data by clicking on the surface.

3. Future developments

Thanks to its modular structure MATISSE can be already extended to other mission and other targets, such as larger asteroids (e.g., Vesta) and planets.
After the Intelligent Archive features will be fully available the use of MATISSE would largely facilitate the accessibility to planetary exploration data, favoring the data fusion and enlarging the scientific capabilities of every mission, likely increasing the scientific production.

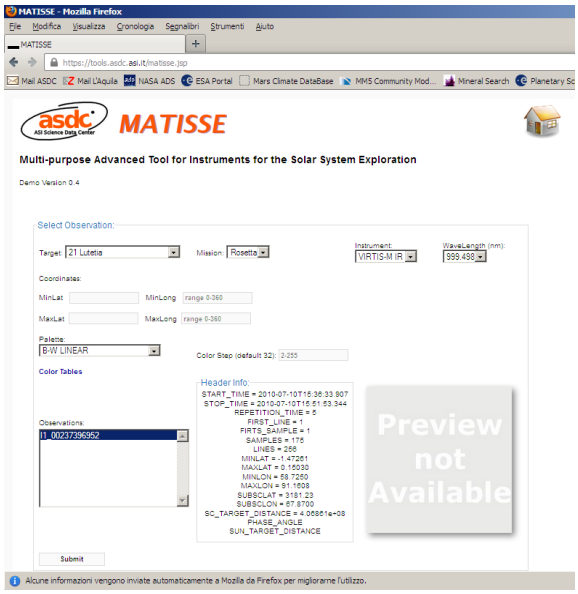

Figure 1: The homepage of the MATISSE webtool.

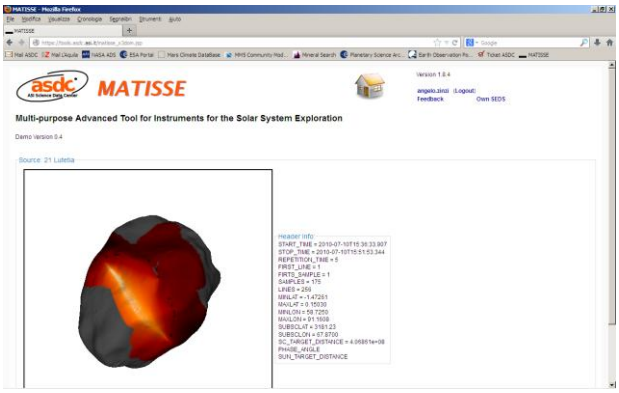

Figure 2: An ESA Rosetta VIRTIS-M observation superimposed to the shape model of 21 Lutetia.

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