GEOLOGICAL MAPS IN MATISSE TOOL

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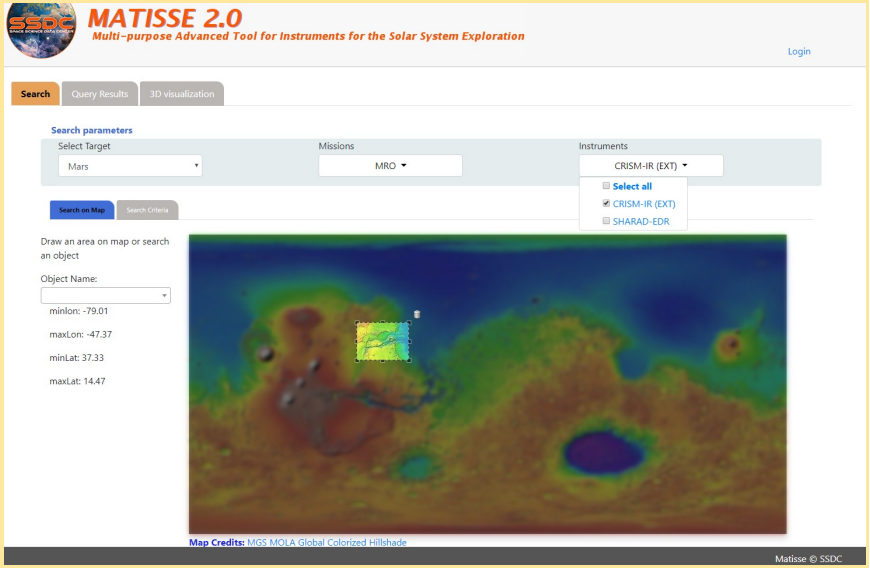
MATISSE

(Multi- purposed Advanced Tool for the Instruments for the Solar System Exploration)

Is a webtool created in 2012, which allows you to analyze, view and download data from some missions. This tool also provides other data like mosaics and false color RGB display, which allows the user to perform analyzes directly from the site, without having to download large amounts of data.

The goal of this project is to increase the interest and use of MATISSE for the geology community, with the insertion of the geological maps of some bodies of the Solar System.



MATISSE 2 is now available at Matisse Link

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The MATISSE tool uses some protocols such as EPN-TAP and allows access to a series of services without necessarily having to download the data but view the maps directly online.

***MATISSE** currently ingests both public and proprietary data from 8 instruments (VIR onboard Dawn, CRISM on MRO and VIRTIS on VeX) relative to 4 missions (DAWN, VEX, MRO and Models of Ceres and Mercury) and 5 targets (Vesta, Ceres, Mars, Mercury and Venus).*

*In this context the work here presented points at improving and expanding the functionalities of the MATISSE tool to the planetary geology, by including some already published **geological maps.***

- EXPLANATION OF GEOLOGICAL MAPS
- VISUALIZATION OF SPECTRAL MAPS
- VISUALIZATION OF TOPOGRAPHIC PROFILES, VISUALIZATION OF DEM AND SLOPE
- POSSIBILITY TO MAKE A RESEARCH BASED ON LITHOLOGIES AND MINERALS
- PROJECTING DATA DIRECTLY ON 3D MODELS

GOALS FOR OTHER FEATURES TO BE INCLUDED IN MATISSE

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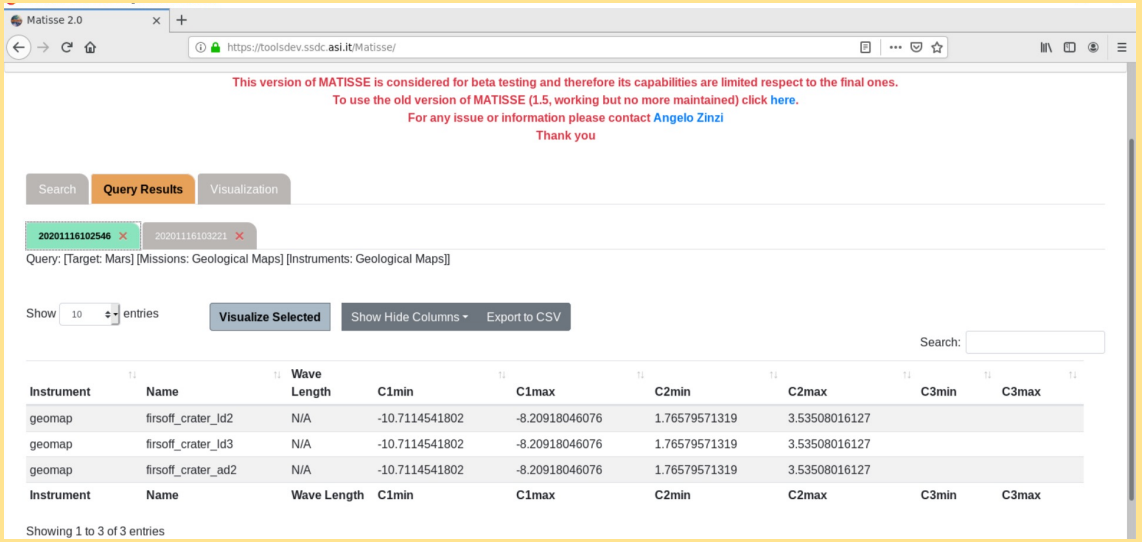
The user can choose one or more of the polygonal units as input for the geographical query after selecting the target and the instruments of interest. In this way the MATISSE capabilities can be fully exploited even trough geological oriented requests. The figure shows a table of geological units in the area that we have analyzed on the Martian surface, with the collaboration of the PLANMAP team.

In collaboration with **PlanMap** (LINK TO PLANMAP) and **GMap** (LINK TO GMAP) teams we are currently working to include Martian, Hermean and Cerean surfaces. This will allow recently ended missions (e.g., NASA's Dawn) and missions still not in their scientific phase (e.g., ESA's Bepicolombo) to benefit from this work.

The integration of this new functionality, currently under development, consists in the search for geological units or minerals present in the selected area.



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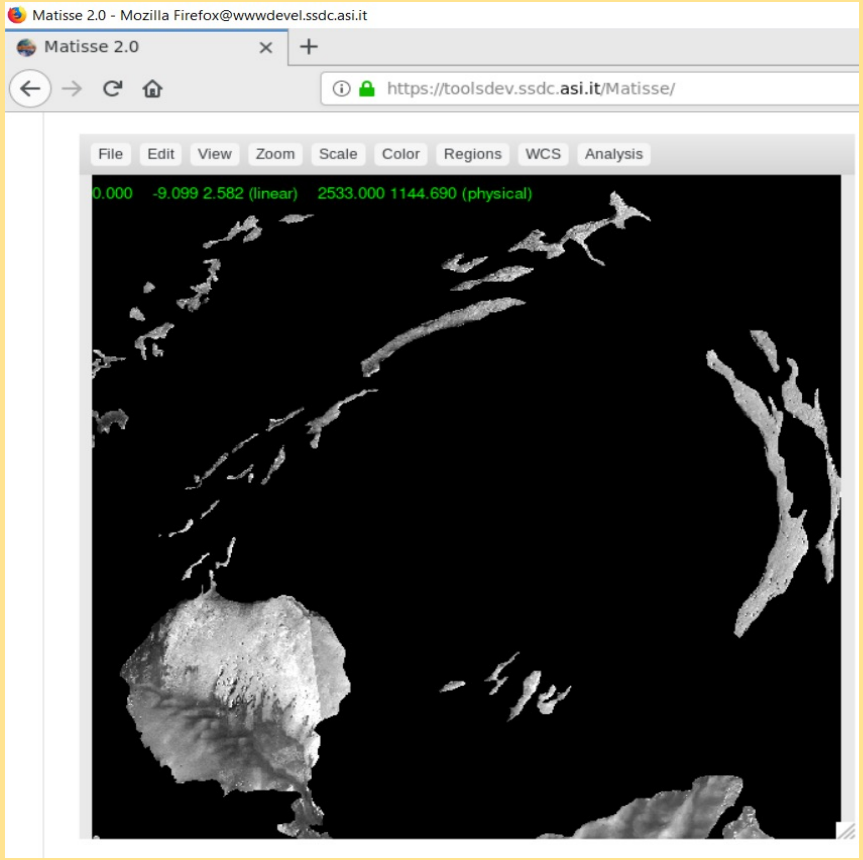
Here is an example of interrogation of geological unit query and selection in Firsoff crater Mars. The query will allow the user to visualize the geological units together with the associated observations (e.g. morphological description and lithologies)



Expected outcomes:

The inclusion of this functionality in the tool could produce a sensible step forward in the study of planetary geology giving the possibility of fully exploiting different datasets.

Another goal will be to expand the use of the tool, making it similar to the Geographic Information System (GIS). It will be also possible to obtain topographic profiles and select multiple data to be simultaneously observed. All these analyzes will be performed directly on 3D models

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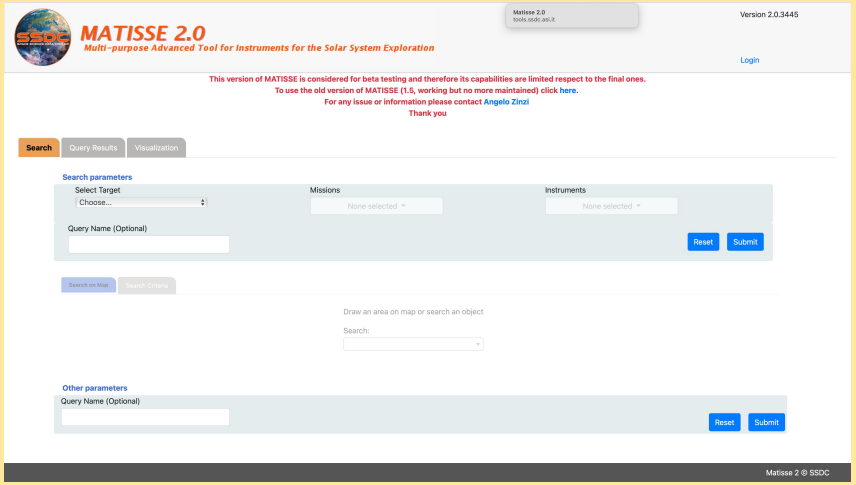
FUTURE GOALS

MATISSE can be configured as an important tool that will allow the extension of the research also to other fields of study. In particular, ***Mercury*** *is an ideal case study as we can have a fusion of geology and THERMOPHYSICAL CODE DATA.*

This data fusion will allow the definition of the correspondence between different thermal conductivity values and lithologically different zones.
MATISSE will thus be ready to work on ***Bepi Colombo's*** *data.*
In addition to Mercury, our goal is also to expand the use of MATISSE to smaller bodies, such as ***Ceres****, as it has already available the VIR datasets of the DAWN mission.*



Furthermore, the integration of 3D models will make direct observations to small bodies more interesting, such as the upcoming NASA DART and ASI LICIACube planned to reach the Didymos-Dimorphos asteroid system, where the shape of the target makes the correct use of the common Projections impractical. 2D.

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We have made a small video to show you what can be done so far by selecting given geological units

→ **MATISSE VIDEO**

Acknowledgements & References

Zinzi A. et al. (2016) Astron. Comput., 15, 16-28.
Zinzi A. et al. (2019) EPSC-DPS Joint Meeting 2019, id. EPSC-DPS2019-1272.
Pondrelli M. et al. (2010) Earth and Planetary Science Letters, 304, 511-519.