



HAL
open science

MarsSI: Martian surface data processing service

Matthieu Volat, Cathy Quantin-Nataf, Lucia Mandon, Cedric Millot, Inès
Torres

► **To cite this version:**

Matthieu Volat, Cathy Quantin-Nataf, Lucia Mandon, Cedric Millot, Inès Torres. MarsSI: Martian surface data processing service. The Tenth International Conference On Mars, Jul 2024, Pasadena - CA, United States. hal-04745781

HAL Id: hal-04745781

<https://hal.science/hal-04745781v1>

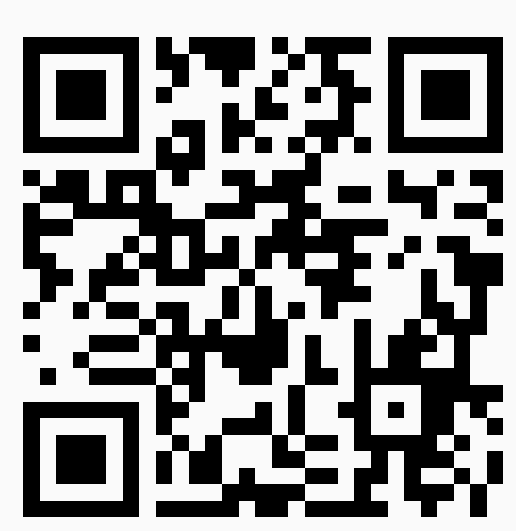
Submitted on 21 Oct 2024

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.



Distributed under a Creative Commons Attribution 4.0 International License



MarsSI: Martian surface data processing service

Matthieu Volat¹ Cathy Quantin-Nataf¹ Lucia Mandon²
Cedric Millot¹ Inès Torres¹

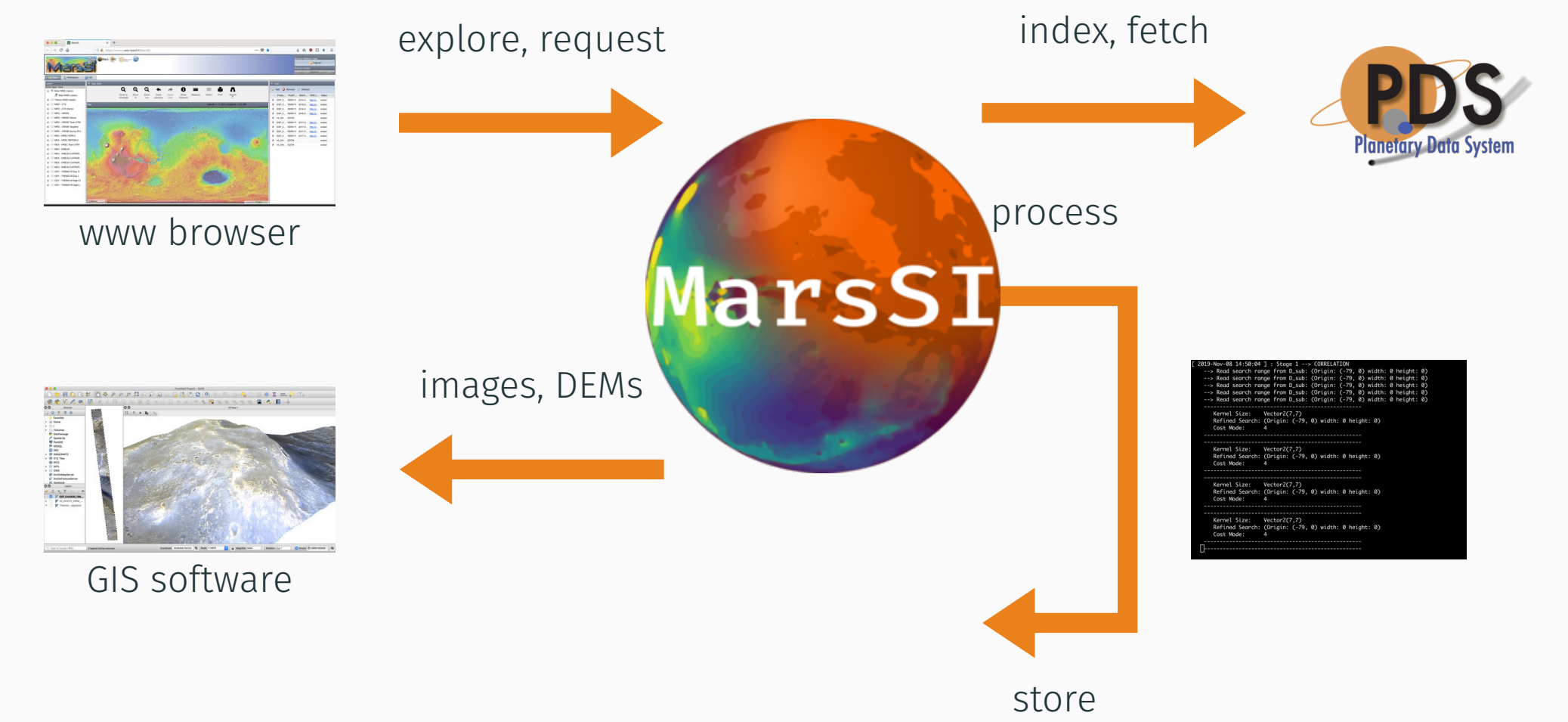
¹Observatoire de Lyon, Université de Lyon ²IPAG, Université Grenoble-Alpes



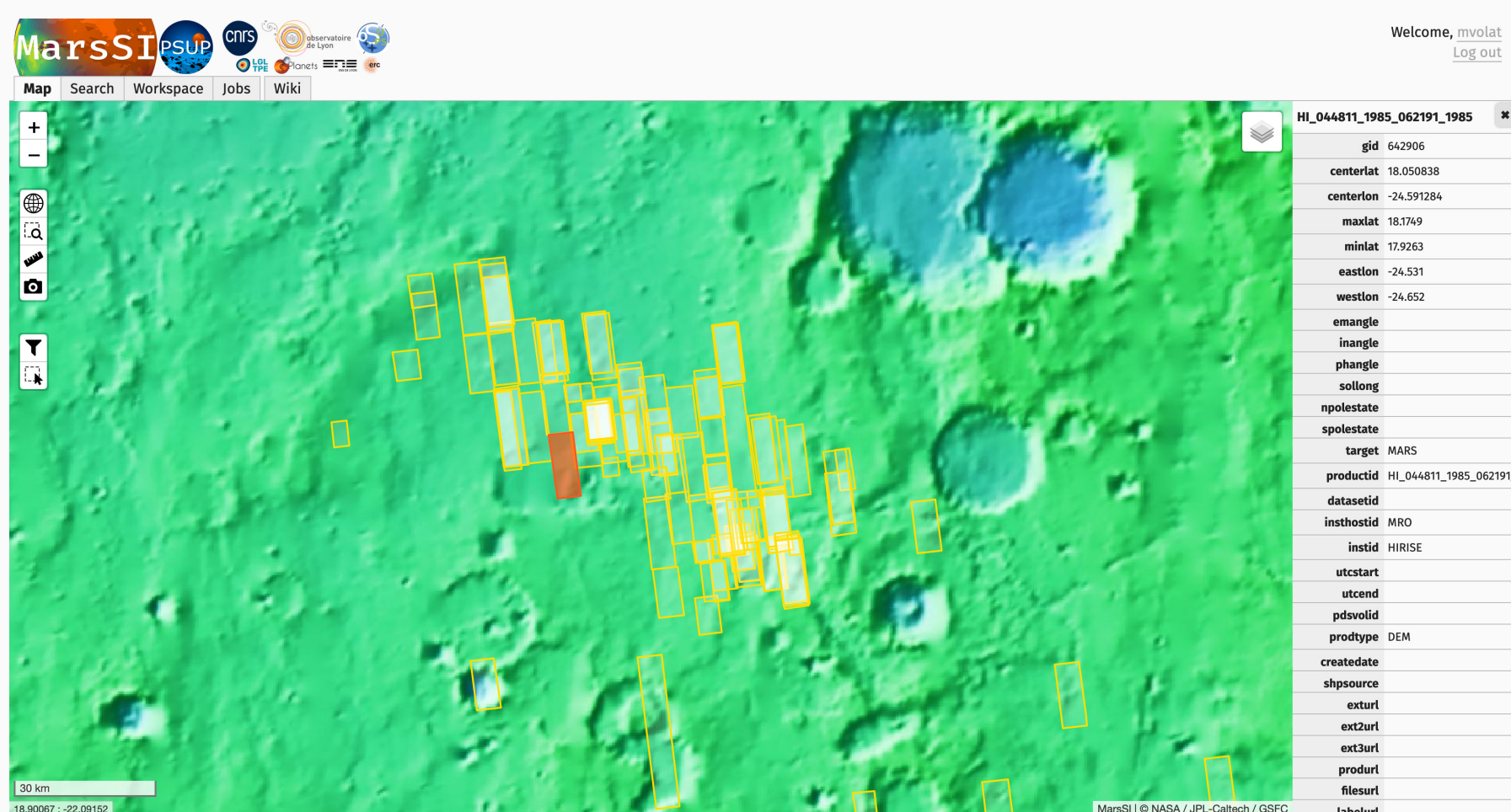
What is MarsSI?

MarsSI[1] is a Martian orbital data service. Using our web interface, you will be able to rapidly **explore** available datasets, easily **process** them with our automated pipelines such as image calibration and Digital Elevation Model (DEM) generation. **Retrieve ready-to-use** products fit for analysis in GIS software such as QGIS or ArcGIS. MarsSI is a part of the Planetary Surfaces Portal (PSUP[2]).

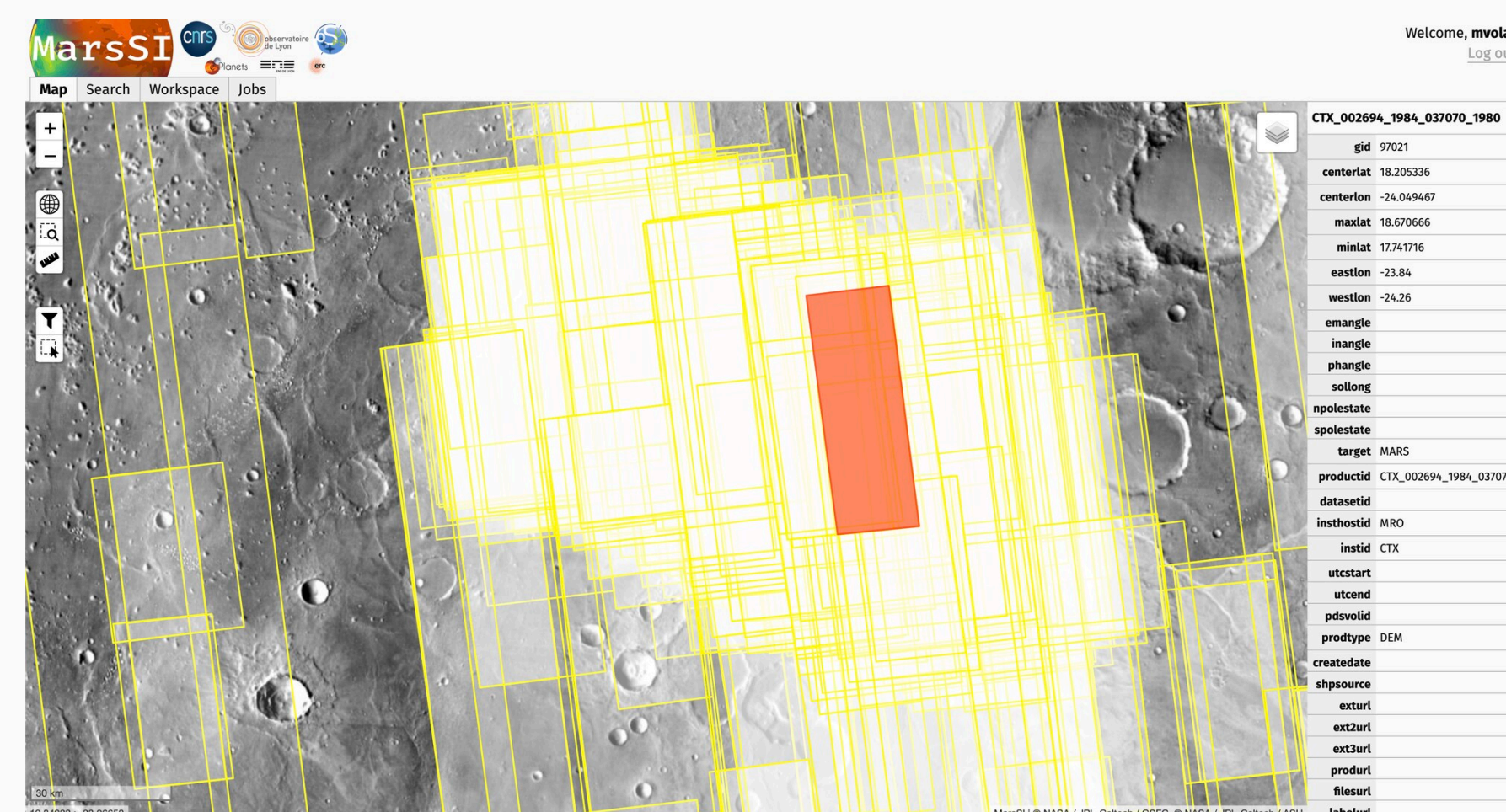
<https://marssi.univ-lyon1.fr/>



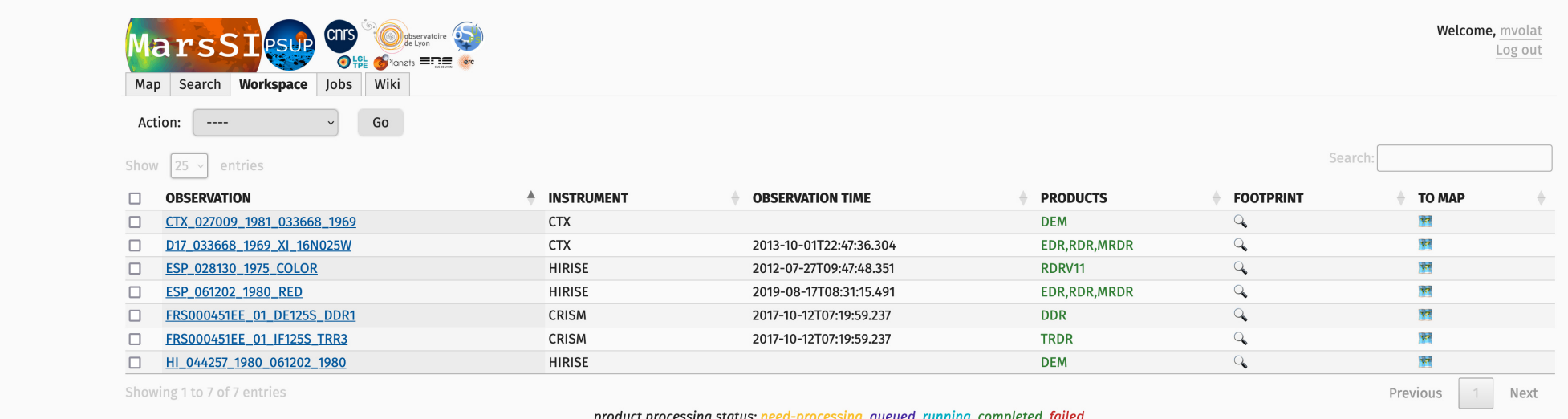
Exploring datasets



In the map view of the web interface, you can explore Mars using MOLA, Themis-Day or CTX backgrounds. Enable layers to **display footprints of orbital acquisitions** and show their coverage (here, HiRISE DEMs).

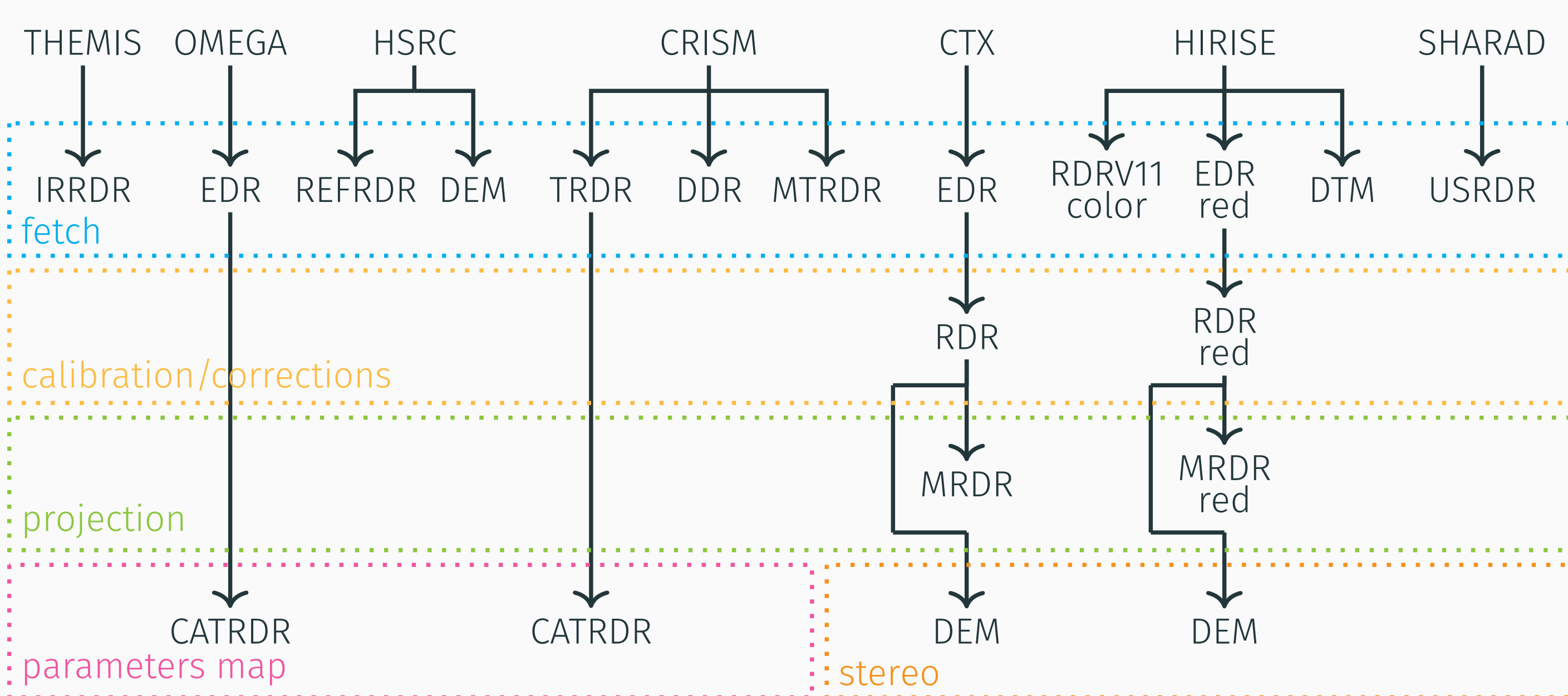


For example, have a look at ESA's Exomars2028 landing site, Oxia Planum, and see what CTX-based DEMs are available. Find the products relevant to your study, **select and add** them to your workspace.



The workspace view shows the previously selected products, allow more filtering and display their statuses. Select products and if needed, run the **"process"** action, or the copy to transfer them to a SFTP directory.

Data & pipelines



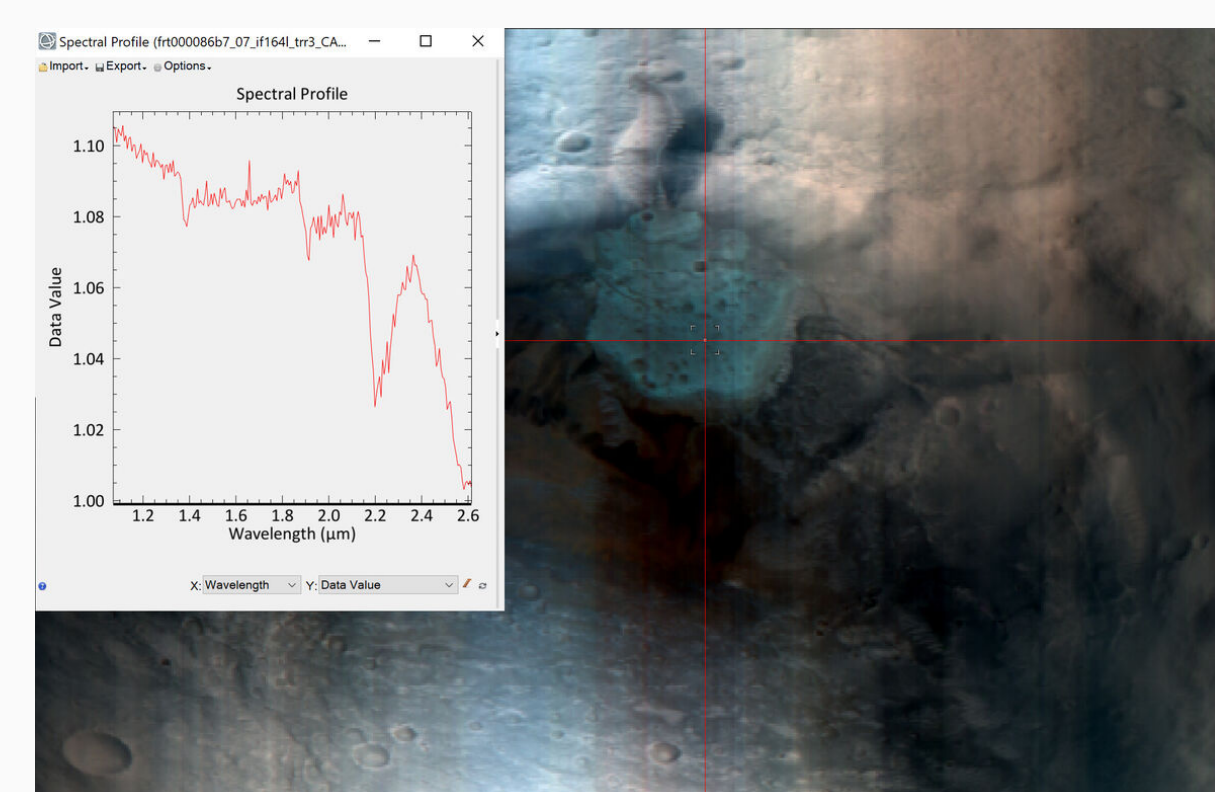
We define pipelines paths that are based on instrument acquisitions. Space agencies (often low-level) products are **downloaded** and can be further **processed** using our computing cluster.

Our pipelines are **fully automated**: no need to set parameters. Just click to request data processing. Computed products are added to the global catalog, shared between all users: maybe the data you need is already done.

MarsSI aim is to provide **ready-to-use** high-value datasets that will be used in high-level analysis. There is a specific focus to use **standardized formats and metadata** to use our outputs in GIS software.

Hyperspectral data cubes

Based on Hopkin's CRISM Analysis Toolkit, our pipeline allows calibration, atmospheric corrections, denoising, map-projection on Omega and CRISM cubes collections.

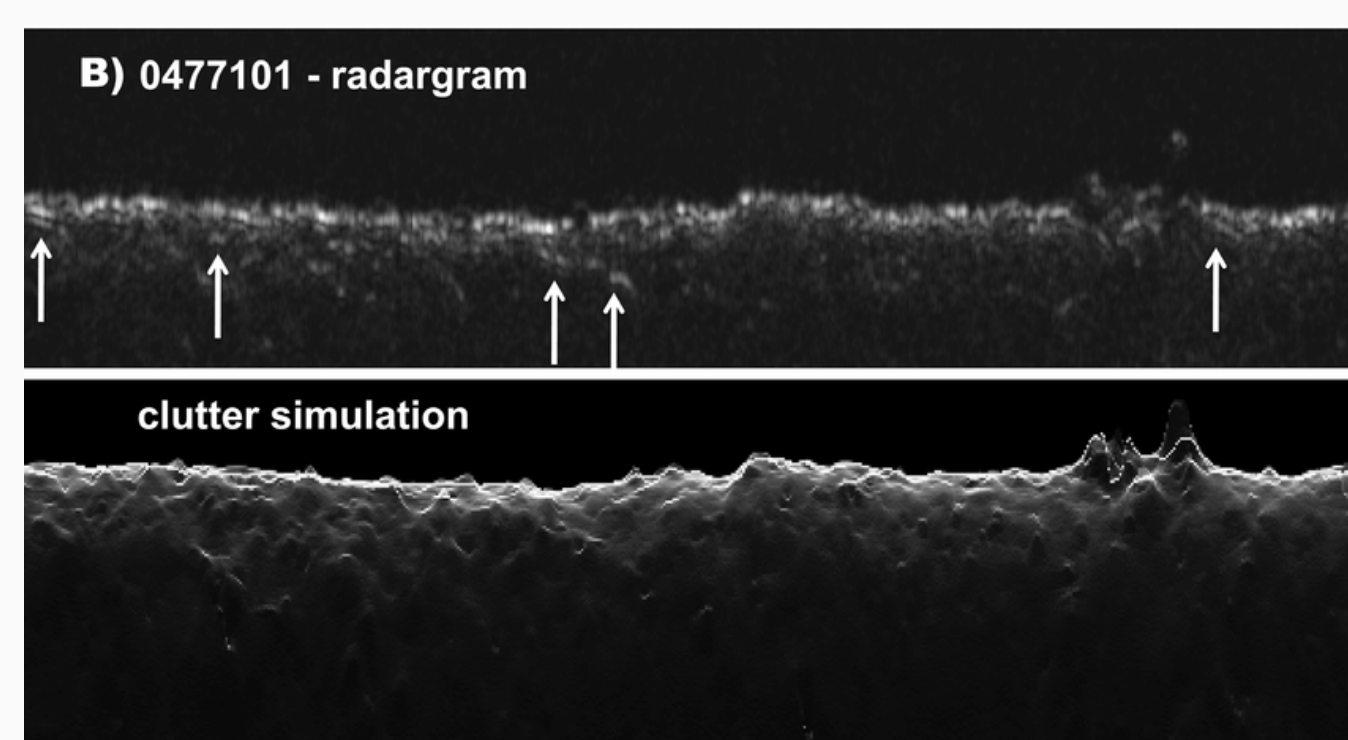


We also compute **spectral parameter maps**.

CRISM spectrum and color composite. The spectrum is showing a deep 2.2 μm absorption band as described by Pan et al. 2020

SHARAD (NEW!)

We have added SHARAD USRSR **radargram** products.

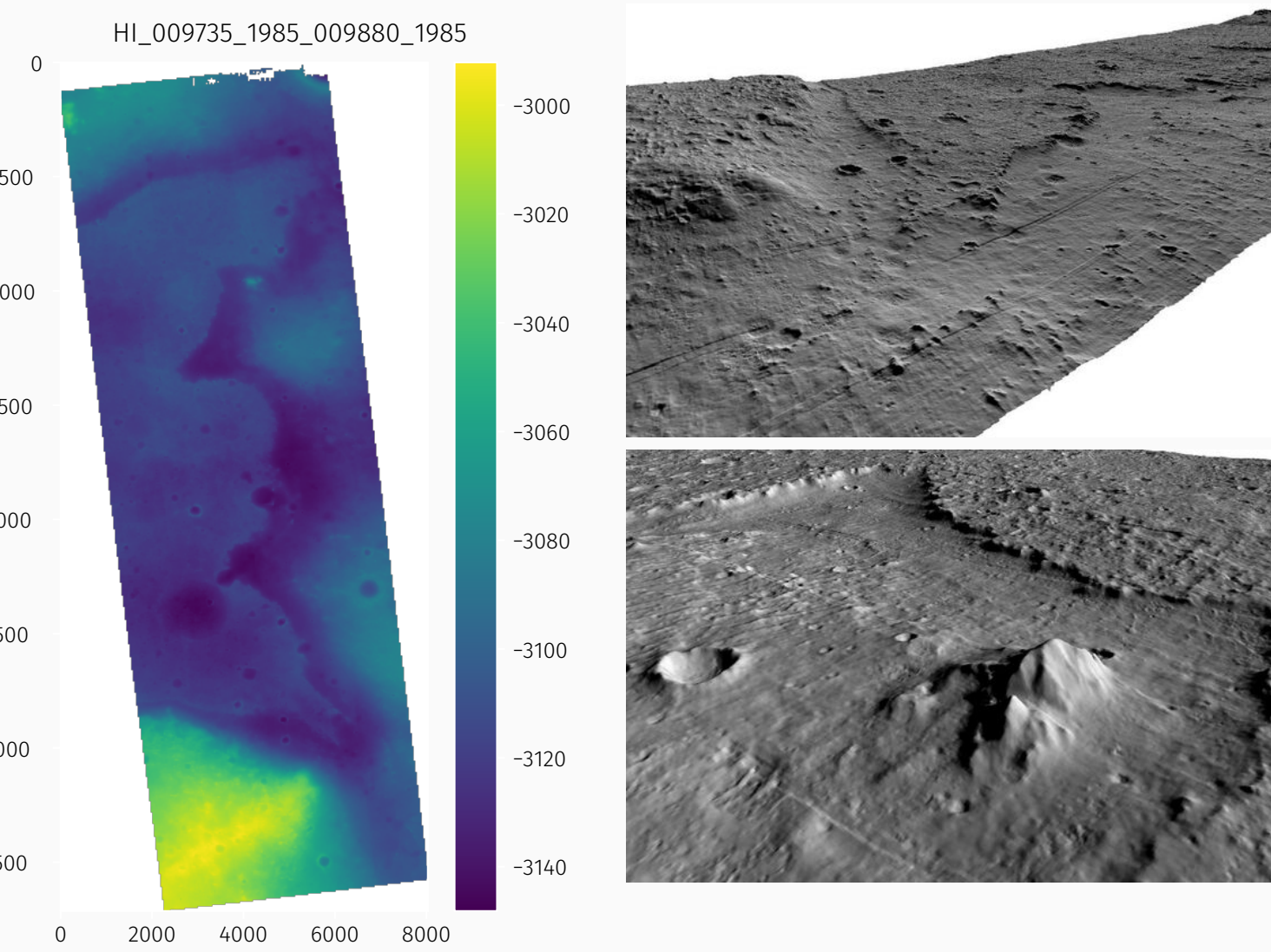


Radargram 477101 with accompanying surface clutter simulation, nunes et al. 2010

We are working to provide a pipeline to create **surface clutter simulations** based on CTX DEMs in the next months.

DEM generation

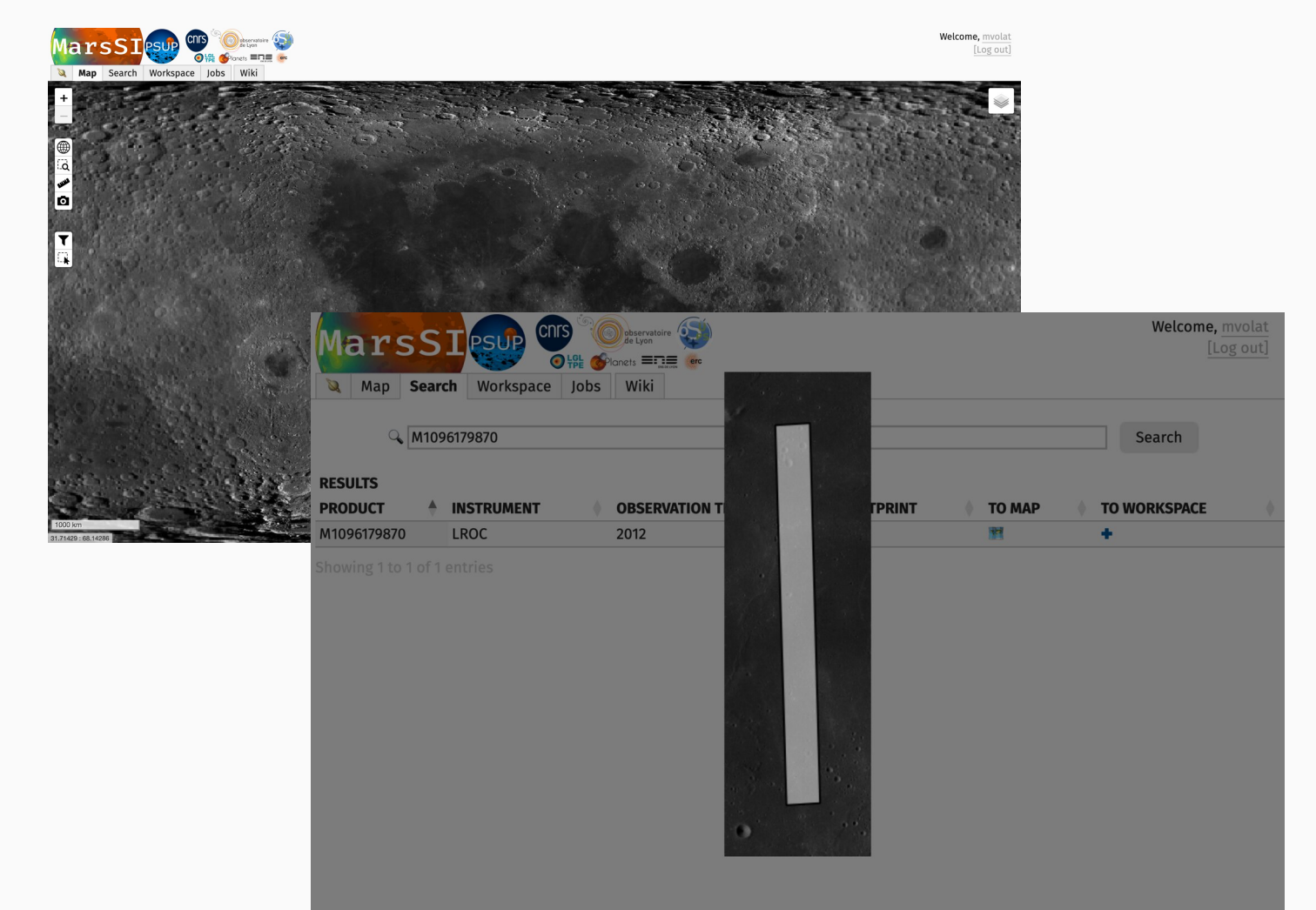
We propose a pipeline based on Ames StereoPipeline to perform **Stereogrammetry** on CTX and HiRISE images to create **Digital Elevation Models**.



This pipeline was updated in 2020[3].

Lunar products (NEW!)

MarsSI now reach further than Mars! We have made available a **Moon** view and a pipeline to handle **LROC-NAC imagery**.



We fetch, calibrate and map-project LROC-NAC imagery, merging left and right tracks.

References

- [1] C. Quantin-Nataf et al. "MarsSI: Martian surface data processing information system". In: *Planetary and Space Science* 150 (2018).
- [2] F. Poulet et al. "PSUP: A Planetary Surface Portal". In: *Planetary and Space Science* 150 (2018).
- [3] M. Volat, C. Quantin-Nataf, and A. Dehecq. "Digital elevation model workflow improvements for the MarsSI platform and resulting orthorectified mosaic of Oxia Planum, the landing site of the ExoMars 2022 rover". In: *Planetary and Space Science* 222 (2022).

Acknowledgements

MarsSI is a national Research Infrastructure, recognized as such by the French Ministry of Higher Education and Research under the ANO5 label. It was supported by the Programme National de Planétologie (PNP) of CNRS/INSU, co-funded by CNES.