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1. **Nature:** R = Report, P = Prototype, D = Demonstrator, O = Other

2. **Dissemination level:**

PU	PP	RE	CO
Public	Restricted to other programme participants (including the Commission Service)	Restricted to a group specified by the consortium (including the Commission Services)	Confidential, only for members of the consortium (excluding the Commission Services)

Executive Summary / Abstract:

A status report as of March 2022 on the GMAP Community Mapping projects is provided. A variety of individual mapping projects started, some deriving, following earlier projects, some newly started, or kick-started from the 2021 Winter School. Exemplary mapping project outlines are provided. Complete and up-to-date information is available from the GMAP wiki and web sites.

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List of Acronyms and Abbreviations

Table 1: Acronyms and abbreviations

Acronym	Description
CUGB	China University of Geosciences Beijing
JRA	Joint Research Activity
NA	Networking Activity
MOST	Ministry Of Science and Technology
USGS	United States Geological Survey
VA	Virtual Access
GMAP	Geologic MApping of Planetary bodies

Introduction

The GMAP VA Work Package supported the community through various activities, such as the yearly Winter School and documentation (see Rossi et al., 2022a, 2022b, and ref. therein) and standards (Naß et al., 2020), as well based on inputs and guidance from the overall VA Review Board (e.g., Raugh et al, 2020).

Community mapping projects are a key component of the GMAP activities, in which individuals and groups are engaged in specific geologic mapping efforts on Solar System bodies of their choice.

Community mapping involvement

Different engagement levels for project results are envisaged for GMAP: users of VA are heterogeneous, from those using training materials, to participants to Winter/Summer Schools and workshops, to mappers, more or less actively engaged in GMAP activities.

The list of the exemplary levels of engagement include (by increasing level of engagement):

- **Level 0** - Occasional users at the very beginning of their career, but curious about planetary geology, casual participants to informal monthly calls, active on social and relaunching GMAP content.
- **Level 1** - Participants to yearly / periodic schools and workshops, users of GMAP materials, e.g., registered to the GMAP web to access Winter School videos, or GitHub users (e.g., via stars, forks, other measurables) and casual participants to informal monthly calls.
- **Level 2** - Geologic mappers with published maps that make them discoverable via the GMAP portal (i.e., maps hosted and published elsewhere, but linked/listed from the portal (**no datasets** on repo).
- **Level 3** - Geologic mappers with published papers or other products who share data on GMAP Portal / Zenodo, using the portal but not complying to all standards (**dataset** on repo).
- **Level 4** - Geologic mappers with or without published papers who engage with GMAP and develop their project (from scratch or from a certain point) with GMAP, adhering to standards and joining calls/seminars where relevant/possible (**dataset** on repo).

The community involved at level 0 is represented by the activity documented in the virtual winter school social accounts. Twitter (https://twitter.com/PlanetaryGeoMap) has recorded 5000 profile visits, reaching more than 18,000 accounts during the last school edition and even Instagram (https://www.instagram.com/planetarymapping/) had a very high content engagement rate with active participations. Both social media profiles have about 170 followers with a constant increase.

The community involved at level 1 is reported in the VA yearly report within the description of each Geology and Planetary Mapping Winter School edition. Just to recall some numbers: 90 people from 30 different countries participated at the first virtual Winter School in 2021 whereas the registered real-time participants to the

second Winter School were 190 (maximum number of real-time participants during the week) from 50 different countries.

The community mapping projects on the following table 2 are currently from levels 2 to 4, although the ones for levels 3 and 4 are in variable stages of development, some just started. A partial update on the dataset release via the GMAP portal is due later in the first half of 2022 (see upcoming D8.8).

Current community mapping projects

Ongoing community mapping projects are recorded on the GMAP wiki[1]. A summary is included in Table 2.

Table 2: Summary of community mapping projects, as of March 2022

Mapping project title	Project lead	GMAP contacts	Details
China's Chang'e-5 landing site: Geology, stratigraphy, and provenance of materials (2021) EPSL 561, 116855.	Yuqi Qian	WWU: van der Bogert, Hiesinger	A geological map of the Chang'e-5 lunar landing site for use in interpretation of the returned samples
Geology of the Hypanis outlet region	Agnese Caramanico	UdA: M. Pondrelli	Geologic and stratigraphic studies of the Hyspanis fan-delta system
Geology of the Tyras Vallis area	Davide Defilippis	UdA: M. Pondrelli	Map of the depositional environments of the Tyras Vallis paleolacustrine system using recent datasets
Chronostratigraphic reconstruction of Eastern Tharsis volcanism	Pierre-Antoine Tesson	CBK PAN: P-A Tesson, D. Mège, J.Gurgurewicz	Lava flow mapping at regional scale
A 1:600K Geological Map of the Sibelius Crater, Mercury	Marc Canale	INAF: Luca Penasa	A geological map of spectral and geomorphological features of the Sibelius Crater on Mercury using MESSENGER

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[1] https://wiki.europlanet-gmap.eu/bin/view/Main/community%20mapping%20projects/

			MDIS imagery
Structural map of Noctis Labyrintus region on Mars	Mayssa El Yazidi	UNIPD: Matteo Massironi	Will provide a quantitative framework for a better characterisation of the extensional history of the region
Characterisation of La Corona lava field planetary analogue at Lanzarote island (Spain)	Ilaria Tomasi	UNIPD: Matteo Massironi	Comprising mapping and 3D laser scanning of an extended lava tube, which represent a good analogue for lava tubes on the Moon or Mars
Geologic mapping and landing site characterization in Copernicus Crater (the Moon)	Filippo Tusberti	UNIPD: Matteo Massironi	Mapping aims to evaluate this region as landing site for exploration and sampling
Cerberus Fossae, Mars	Trishit Ruj	INAF: Riccardo Pozzobon	Structural mapping of the huge fractures system of Cerberus Fossae, where recent seismicity has been detected by Insight mission
Geology of the Holden crater	Monica Pondrelli	INAF: Monica Pondrelli	Geology of Holden crater
Geologic and structural mapping of chaotic terrains	Mauro Spagnuolo (University of Buenos Aires)	JacobsUni: Angelo Pio Rossi	Mapping focused to reconstruct the history of selected chaos-hosted layered deposits
Mars Double Impact Crater Lithostructural Virtual and 3-D Model	Wayne Barnett	UNIPD: Matteo	Virtual reality mapping of the double impact crater on Mars, and 3D

		Massironi	modelling of the lithostratigraphy
Evaluation		INAF: Riccardo Pozzobon JacobsUni: Angelo Pio Rossi	
Lunar LCROSS Impact Ice Study	Wayne Barnett	UNIPD: Matteo Massironi	Virtual Reality mapping of the LCROSS location
Geo-stratigraphic map of the North Polar Layered Deposits close to Olympia Rupes (Mars)	Nicole Costa	UNIPD: Matteo Massironi	Stratigraphy of a restricted area close to Olympia Rupes on the Northern Polar Cap
The geologic map of Sinus Iridum	Teng Hu	CUGB: Zhizhong Kang (MOST)	Orbital imagery-based geologic map of Sinus Iridum (the Moon)
The geologic map of Zhurong landing site	Teng Hu	CUGB: Zhizhong Kang (MOST)	Orbital imagery-based geologic map of the Martian Zhurong rover landing site
High-res descent map Chang'e 5 landing site map	Teng Hu	CUGB: Zhizhong Kang (MOST)	Descent imagery-based map of the Chang'e 5 landing side
Geological map of the Rima Bode region, Moon	Sascha Mikolajewski	WWU: Hiesinger, van der Bogert, Poehler	Geological mapping of the Rima Bode region of the Moon in preparation for a lunar mission
Geologic and compositional characterization of the Tsiolkovskiy crater, Moon	Gloria Tognon	UNIPD: Gloria Tognon, Matteo Massironi	Geologic, color-based and spectral mappings aimed at characterizing the lunar far side Tsiolkovskiy crater and laying the groundwork for a landing site

			evaluation
Geologic mapping of the H-9 Eminescu quadrangle, Mercury	Mayssa El Yazidi	UNIPD: Mayssa El Yazidi, Gloria Tognon, Matteo Massironi INAF-IAPS: Valentina Galluzzi, Lorenza Giacomini	Geologic map of the equatorial H-9 Eminescu quadrangle on Mercury
Geologic mapping and interpretation of a Fractured-Floor Crater in Ladon Basin - Mars	Diandra Cardinali	UNIPD: Matteo Massironi	Geologic and structural mapping of a Floor-Fractured Crater in Ladon Basin

Examples of Level 2 engagement level projects are from Qian et al., (2021), see also Table 2. Some projects are starting, and initial sketches or maps are visible as graphics output on the GMAP wiki, see e.g., Tesson et al. (2020), as visible in Figure 1.
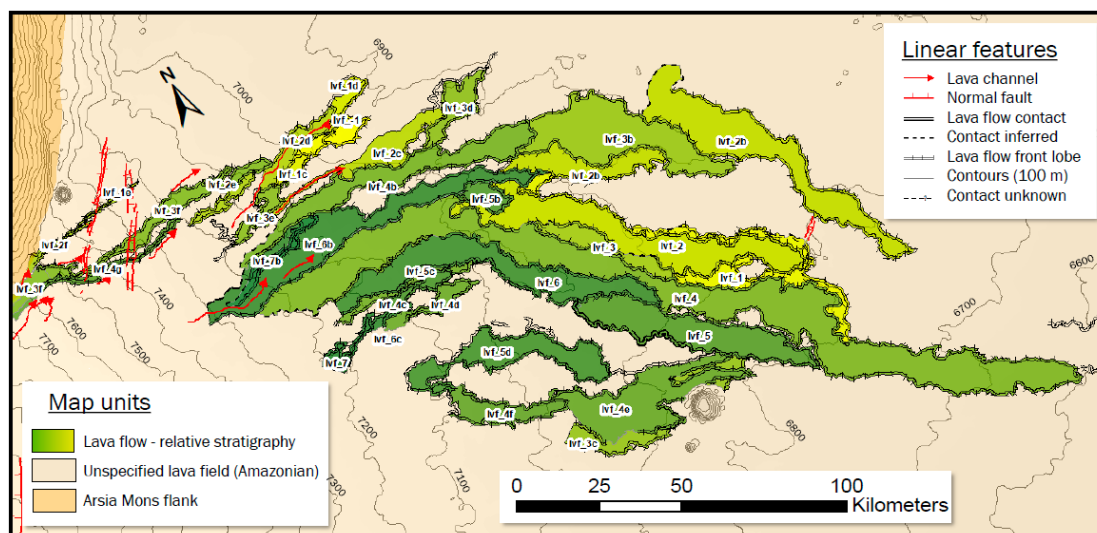

Figure 1: Initial map output from the community mapping project "Chronostratigraphic reconstruction of Eastern Tharsis volcanism" (Tesson et al., 2020)

Both scale and coverage of the projects are variable: some extremely large-scale, some very local. GMAP welcomes a wide range of mapping projects (e.g., see Figure 2; project by N. Costa).

The community projects exemplified above are level 4-type projects, like most of those, which, in the course of the GMAP activity and the Europlanet 2024 RI, will result in datasets available to the community.
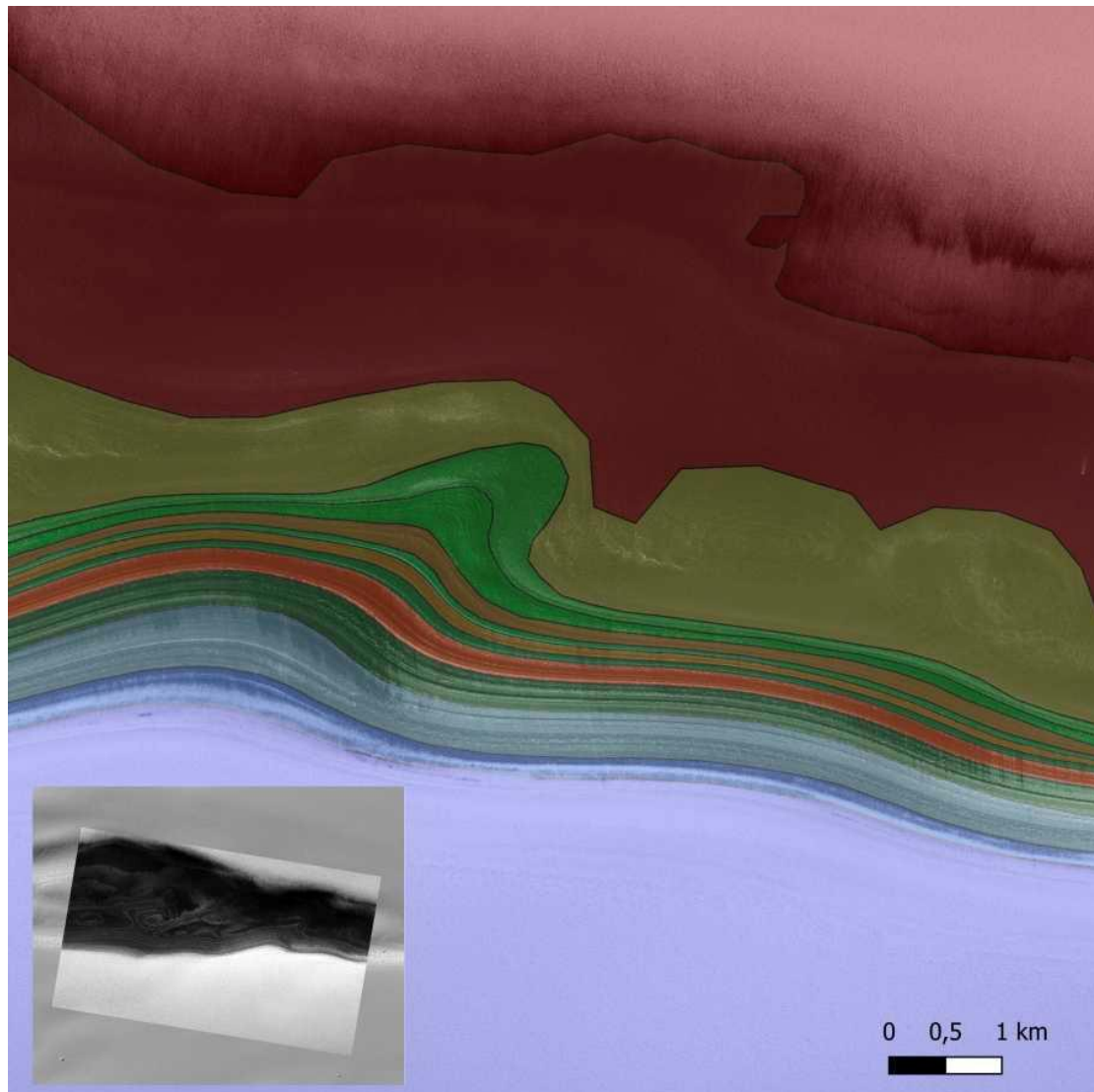

Figure 2: Geo-stratigraphic map of the North Polar Layered Deposits close to Olympia Rupes (Mars) by Nicole Costa (see GMAP wiki).

Notably, some community mapping projects also engage (mining and 3D geologic mapping) industry partners, such as SRK Consulting (Wayne Barrett, SRK). Some projects involved participants in the 2021 edition of the GMAP Winter School (Marc Canale, Open University). Also, three mapping projects from the partner Chinese MOST projects are present (projects from Z. Kang, CUGB).

Plans and next steps

Currently more than 20 GMAP community mapping projects started or were embedded. We plan to expand the project base and help make more relevant planetary geologic mapping products and related data discoverable, visible to and reusable by the planetary geologic community.

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