Mapping and Planetary Spatial Infrastructure Team (MAPSIT)

Report to Planetary Advisory Committee (PAC)
November 15-16, 2021 Meeting

Updates to MAPSIT Steering Committee

Brad Thomson (Univ. Tenn.), *Chair*

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Brent Archinal (USGS)

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Pete Mouginis-Mark (Univ. Hawaii)

Andrea Naß (DLR, Germany)

Jani Radebaugh (Brigham Young Univ.), *past Chair*

David Williams (Arizona State Univ.)

* = new SC members

Becky McCauley Rench (NASA HQ) – Ex Officio NASA Liaison

Retired 2021: Caleb Fassett (NASA/Marshall), Lisa Gaddis (LPI), Alex Pathoff (PSI), Louise Prockter (JHU/APL), Sarah Sutton (Univ. Arizona)

MAPSIT Findings: Knowledge Inventory

Live website version of knowledge inventory of foundational data products in planetary science (Laura and Beyer, 2021).

- https://fdp.astrogeology.usgs.gov/

https://github.com/USGS-Astrogeology/FoundationalDataProducts

"Foundational data products" in this context are the base-level data products that underpin everything we do in planetary science. Foundational data products include geodetic coordinate reference frames and are rigorously transformed to accurately represent spatial relationships, with well understood uncertainty.

MAPSIT finding: MAPSIT support this community effort which is an example of a first step to realizing Planetary Data Spatial Infrastructure (PSDIs). Long-term maintenance of these types of efforts (e.g., living documents) would benefit from strategic funding of people and infrastructure.

Full citation: Laura J. R. and R. A. Beyer (2021) Knowledge Inventory of Foundational Data Products in Planetary Science, *The Planetary Science Journal, 2*(18), doi:10.3847/PSJ/abcb94.

MAPSIT Activities: Knowledge Inventory

Live website version (living document) of knowledge inventory of foundational data products in planetary science (Laura and Beyer, 2021).

- "Foundational data products" in this context are the base-level data products that underpin everything we do in planetary science. Foundational data products include geodetic coordinate reference frames and are rigorously transformed to accurately represent spatial relationships, with well understood uncertainty.
- https://fdp.astrogeology.usgs.gov/
- This website is backed by data (in CSV format) here:

  https://github.com/USGS-Astrogeology/FoundationalDataProducts
- Full citation: Laura J. R. and R. A. Beyer (2021) Knowledge Inventory of Foundational Data Products in Planetary Science, *The Planetary Science Journal, 2*(18), doi:10.3847/PSJ/abcb94.

MAPSIT Findings: Knowledge Inventory

PSD Call for community-identified datasets of priority for restoration or preservation (Nov 2021). Call sent to each AG, results will be posted on science.nasa.gov and can be referenced for upcoming solicitations (by NASA and community)

MAPSIT comment: MAPSIT supports and encourages community efforts to identify critical data products and foundational products for each community

MAPSIT Activities: LCDP-SAT report

Lunar critical data products – a joint MAPSIT-LEAG SAT for HEOMD and SMD PSD

- LCDP SAT met twice a week during August/September to evaluate and discuss the 6 tasks listed in the Terms of Reference (TOR)
- High-level goal was to aid in prioritizing resources for the development and planning of upcoming lunar missions in an efficient way that will also facilitate future exploration and data useability
- Focus was initially on data for the south polar landings, but scope of SAT was broader
- Final Report: 30 Findings with rationale
- Documents are on MAPSIT's website: https://www.lpi.usra.edu/mapsit/standup-committees/

MAPSIT Findings: LCDP-SAT report

Lunar critical data products – a joint MAPSIT-LEAG SAT for HEOMD and SMD PSD – was a case specific to the example of upcoming lunar missions and exploration

MAPSIT comment: Some findings of this type of report can broadly apply to other programs, and echo other similar findings (e.g., the PDE IRB concepts), such as:

- Importance of making data interoperable to maximize their utility
- Having set standards and best-practices documented early
- Making data more accessible and analysis-ready by having data sources, transformations, usage, and uncertainties consistently reported and accessible
- Ensuring data and their utility transcends single missions
- Improving communications between data providers, users, and mission planners
- Example: a lunar spatial data infrastructure (SDI), people and data, could be coordinated by a working group that would aim to make data more useable. Such WGs would benefit from strategic investments of resources, support, and funding.

MAPSIT Findings: 2020 PMSR issues with regards to data standards

- Current missions are now required to deliver data in PDS4 format. From the 2022 PMSR:
  - *"All data acquired during the proposed EM must be archived in PDS4 format."*
  - *"Missions are encouraged, but not required, to develop a plan to deliver previous mission data, originally submitted in PDS3 format, to the PDS in PDS4 format. …This optional portion …may be listed in the Overguide section of the proposal."*
- Previously, existing missions were grandfathered into PDS3 standards (new missions are PDS4), some received variances (exceptions)
- There is substantial cost associated with a conversion to PDS4.
  - For example, the HiRISE team estimates it would cost >$1M to convert the existing PDS3 HiRISE archive to PDS4 [A. McEwen, personal communication 2021]

Source: https://www.lpi.usra.edu/NASA-academies-resources/Call-for-Proposals_2022PMSR-FINAL.pdf

MAPSIT Findings: 2020 PMSR issues with regards to data standards

- Current missions are now required to deliver data in PDS4 format.

MAPSIT comment: The conversion from PDS3 to PDS4 may burden some PMSR missions. While modernization is important, depending on how cost-constrained extended missions are and the cost of conversion, to include the conversion cost in the guideline budget might come at a reduction to science.

  - Alternatives provided in the PMSR 2022 FAQ include requesting variances, Overguide options (rarely funded) or PDS Node Funding (unclear how much that might accommodate). Nonetheless, it could leave some missions feeling “squeezed” and others maintaining 2 standards at extra cost/complexity.

Source: https://www.lpi.usra.edu/NASA-academies-resources/Call-for-Proposals_2022PMSR-FINAL.pdf

MAPSIT Findings: SPD-41, Scientific Information policy for the Science Mission Directorate

SMD Information Policy (Aug 2021):

III A. All SMD-funded publications, that is publications funded by SMD or reporting on SMD-funded research, shall be made publicly accessible.

a. As-accepted, peer reviewed manuscripts shall be deposited in NASA's PubSpace repository and made publicly available no-later than 12-months after their publication date

MAPSIT comment: This is in accordance with current best practices and aligns with FAIR data principals (i.e., to make data Findable, Accessible, Interoperate, and Reusable)

Source: https://science.nasa.gov/researchers/science-data/science-information-policy

MAPSIT Findings: SPD-41, Scientific Information policy for the Science Mission Directorate

SMD Information Policy (Aug 2021):

> *III H. "SMD's policies should remain consistent with best practices to maximize access to information and to keep costs as low as possible (OMB A-130)."*

MAPSIT comment: PMSR teams could use further clarification of PSD/SMD priorities for data and how to prioritize PDS3 to PDS4 conversion costs, particularly for lower-order data products that are not widely used.

Source: https://science.nasa.gov/researchers/science-data/science-information-policy