Identifying Community Needs for a Mars Exploration Rovers (MER) Data Catalog

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1. MOTIVATION

MER Data Legacy

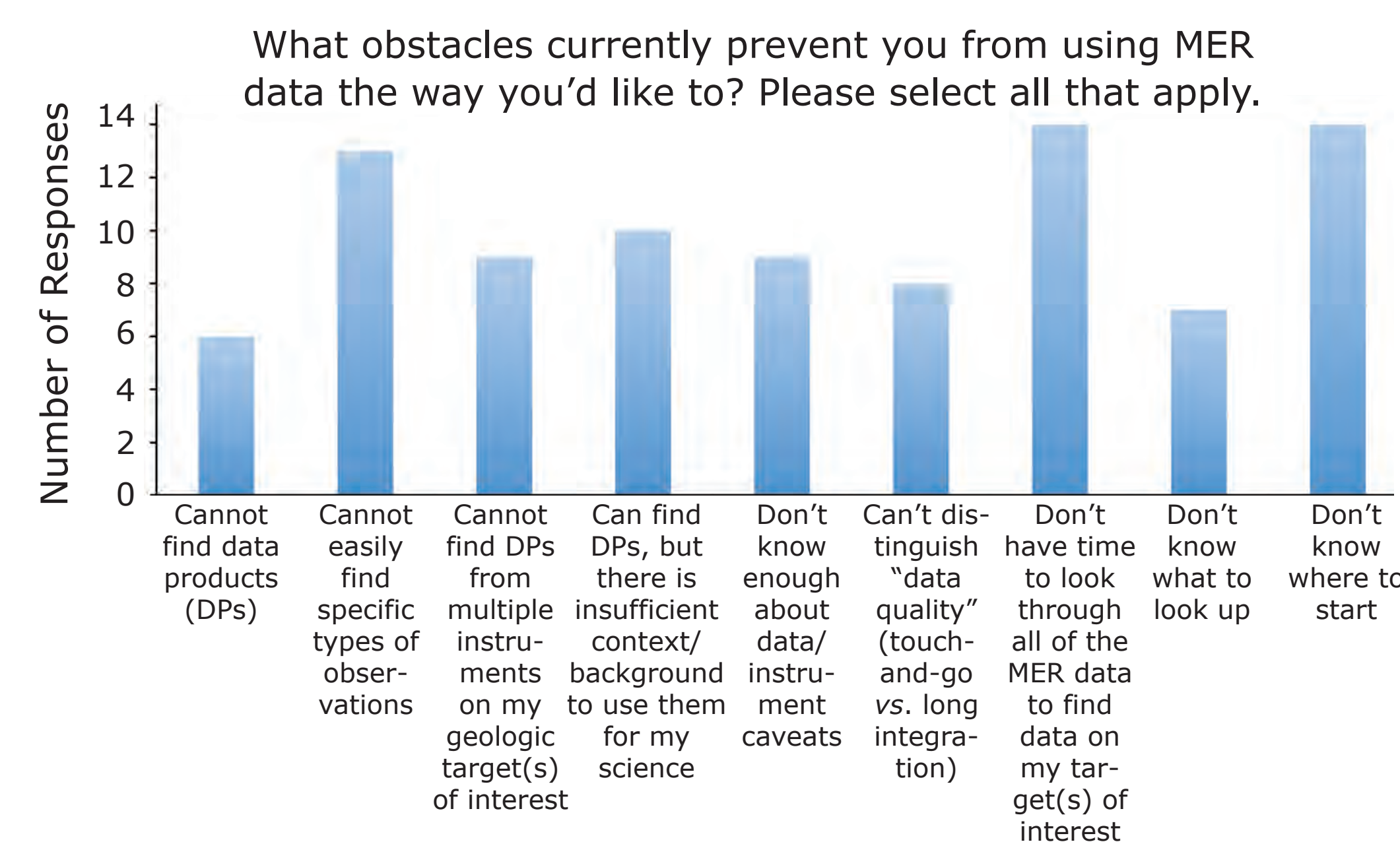|	Spirit	Opportunity
Sols	2210	5111
Products[1]	>3 mil	>5.5 mil
Volume[1]	2.5 TB	4.6 TB

Takeaway Points

We are creating a user-focused catalog of MER data that will
- Enable analysis by non-MER team members
- Be searchable by target name, geologic features, *etc*.
- Include data quality indicators, analysis tips, and tutorials

- MER was the first long-duration surface-based exploration of another world; up to 14.5 years of daily data from multiple instruments has been accumulated.
- Lack of MER Team membership (with its corporate knowledge) shouldn't be a barrier to MER data analysis.
- When astronauts go to Gusev and Meridiani, they must be able to ground-truth each of our measurements.

Catalog[2] vs. Archive[3]

Archive A place in which public records or other important historic documents are kept.

Catalog Now usually distinguished from a mere list or enumeration, by systematic or methodical arrangement, alphabetical or other order, and often by the addition of brief particulars, descriptive, or aiding identification, indicative of locality, position, date, price, or the like.

The MER data are *archived* in the PDS; researchers with expert knowledge of the mission can find data using the MER Analyst's Notebook[4].

The data would be more accessible to a greater number of people if they were thoroughly *cataloged.*

Goals

The MER Data Catalog Project aims to **remove barriers of entry** to the rich MER datasets by

- Providing the capability to **search** archived data products using **user-friendly**, descriptive terms such as location, target, and rock or soil class
- Cataloging **geologic and atmospheric features** apparent in image data (*i.e.*, bedforms, meteorites, dust devils, *etc.*)
- Augmenting data products with **contextual information** and **data quality indicators** (*e.g.*, locations of all data products acquired during multi-sol campaigns, low signal-to-noise (S/N) "touch and go" observations *vs.* high S/N long integrations)
- **Documenting** the instruments and datasets at a level accessible to workers new to MER analysis

3. PRELIMINARY SURVEY RESULTS

Many users cannot find the data they need with existing resources.

What obstacles currently prevent you from using MER data the way you'd like to? Please select all that apply.

Requests for tools include:
- Guides to science & engineering payloads
- Tips written by science & operations teams
- Sunrise, sunset, Phobos/Deimos rise/set times
- Conversions: Sol, date; LMST, rover clock time
- Search by L_s

<u>Translation requests</u>:
Danish, French, German, Mandarin, Spanish

Potential catalog users span the entire spectrum, from homeschooled children to PhD research scientists.

Who in your institution/research group/classroom/community would be using the catalog? Please select all that apply.
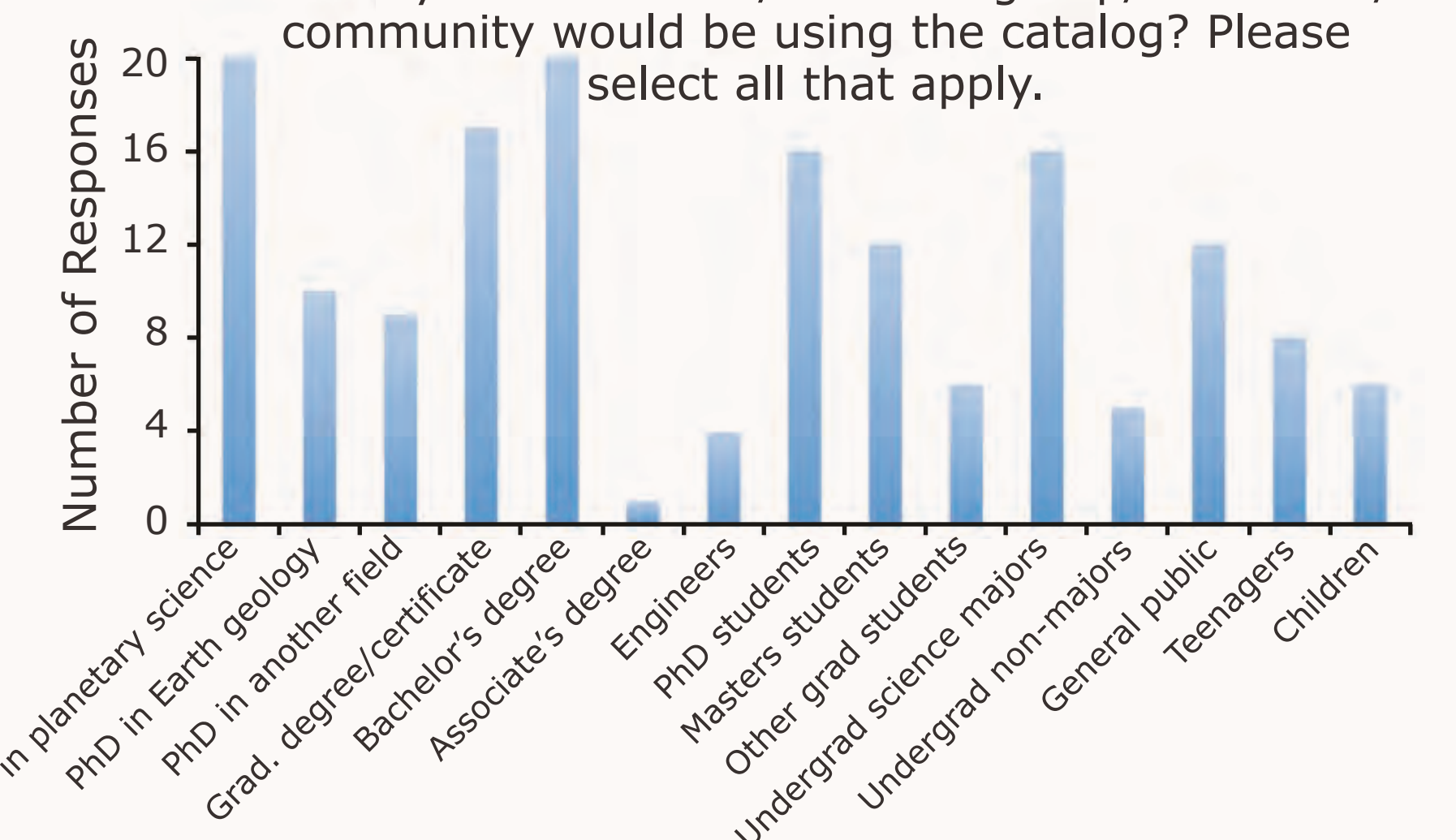
In what institutional setting do you plan to use the catalog? Please select all that apply.

Do you work at an HBCU, tribal college, or community college? We want to hear from you!

HBCU = Historically Black Colleges and Universities. DP = Data Product. LMST = Local Mean Solar Time. L_s = solar longitude. As of 15 March 2020, the survey had 43 participants. All multiple-choice questions accept multiple responses.

4. NEXT STEPS

In the next year, we will
- Submit a PDART proposal to fund this project
- Submit a White Paper to the Decadal Survey recommending that a user-focused, searchable data catalog be a standard component of all planetary missions
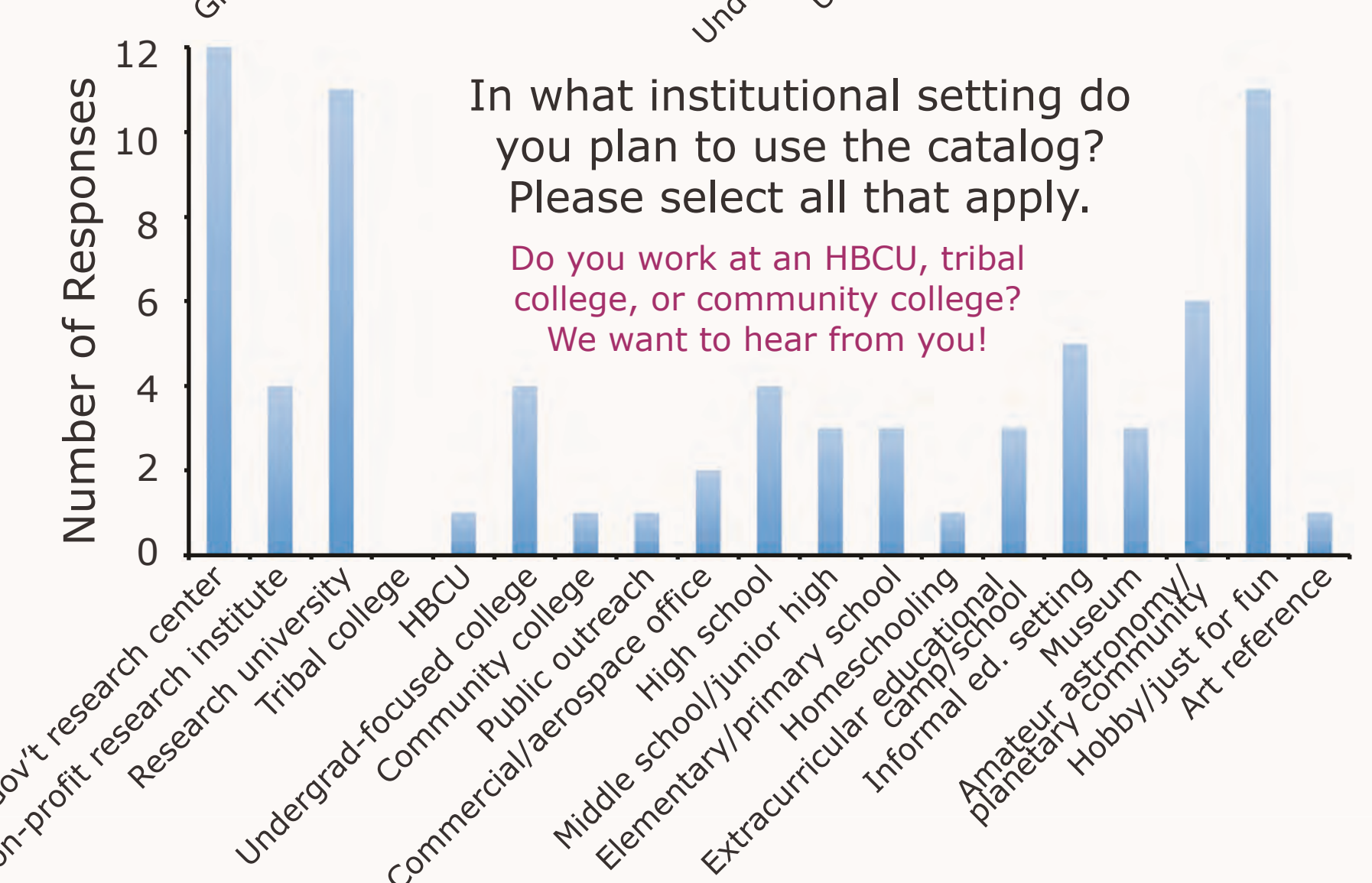
Join us!

We're looking for:
- Accessibility Specialist
- PDS Liaison
- Database programmer(s)
- User interface programmer(s)
- MER team members' contributions

Once funded, we will
- Actively recruit as catalogers people with non-traditional backgrounds who are interested in space exploration
- Connect our catalogers to our professional networks if they want to pursue a career in planetary science or exploration

2. METHODOLOGY

MER Data Catalog User Survey

In order to best meet community needs, we are surveying potential users to determine their

- Research interests
- Institutional settings
- Obstacles to MER data analysis
- Desired search terms, tools, and features

Cataloging Pilot Study

To estimate the length of time required to catalog the MER dataset, we are training high school-aged apprentices to

- Identify geologic features (float rocks, ventifacts, *etc.*) in MER images
- Identify and cross-reference all data products acquired on a given geologic target

The survey will be open through May 2020. If you are interested in using MER data, please participate! Access the survey with this QR code, or at
http://www.merdatacatalog.com/survey

The survey should take approximately 5-10 minutes to complete. No identifying information is collected, and all data will be presented in aggregate. Conducting a survey constitutes experimenting on humans; this survey has received approval from the Cornell University Institutional Review Board (IRB) Office.