SILICON VALLEY
AMES RESEARCH CENTER

AHED

ASTROBIOLOGY
HABITABLE ENVIRONMENTS DATABASE

PILOT MARCH 30TH

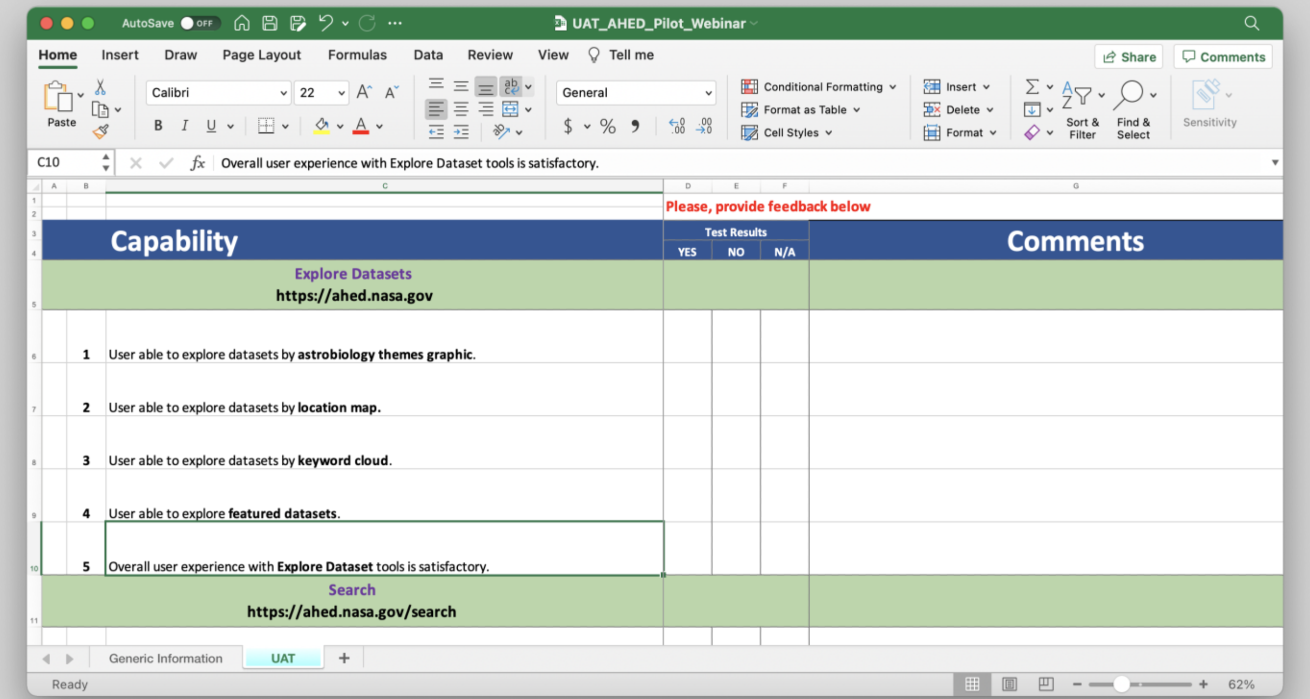
Webinar Agenda

- Welcome and Introductions.
- Pilot goals.
- Overview of the AHED system.
- Demonstration of AHED Portal, Account Creation, Search, and Login.
- Dataset creation demonstration.

Pilot Goals

- Get feedback on AHED to improve the system before launch to wider community.
- Dataset creation by participants involving a variety of data types and use cases.
- Discuss impressions of the system and gather formal feedback using a 'user acceptance test' (UAT) document.

UAT



- The document is available in the **AHED Pilot Webinar dataset – link sent with meeting invitation**.
- Structured to guide you through various parts of the website systematically and help compile feedback.

Drop-in Sessions

- Two informal drop-in sessions to provide additional help and provide a forum for verbal feedback and discussion are scheduled for **Monday 11th April 10 am PT and Wednesday 13th April 12 noon PT.**
- For timely implementation of changes, we'd like UAT and other forms of feedback by **Friday 29th April**.
- Email thomas.f.bristow@nasa.gov and blafuente@seti.org for help.

Questions

AHED

The Astrobiology Habitable Environments Database (AHED) is envisioned as community-driven repository and productivity platform for the storage, discovery and analysis of data relevant to the field of astrobiology.

Project GOALS:

- **Serve** as a centralized and open-source digital library of NASA funded research relevant to the Astrobiology Program.
- **Enable** proposers to fulfill mandated data management plan (DMP) archiving requirements.
- **Serve** as resource for the broader scientific community promoting the advancement of astrobiology through data sharing and standardization – including non-NASA funded research data.
- **Provide** an example of a data management strategy for other long-tail (small teams and individual PIs) research efforts in the Planetary Science.

Project Motivation

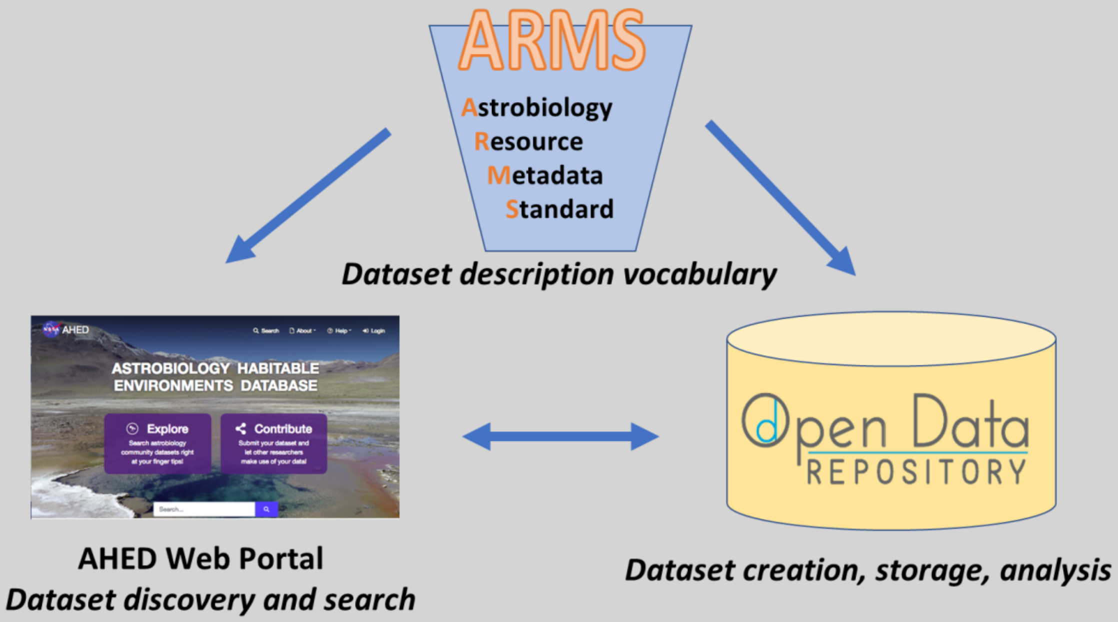
- Astrobiology is an inherently **multidisciplinary** field. High impact science requires **integration of disparate sets of data** (often small, complex and specialized) that may extend beyond traditional scientific disciplines.
- However, repositories and archives are not currently designed around specific needs of astrobiologists.
- New approaches/tools are needed to foster adoption of open data practices by PI's and small teams that tend to do the bulk of research in astrobiology (See Bristow et al., 2020).
- Funding agencies (NASA) and publishes are making data sharing and accessibility a higher priority.
- NASA SMD is promoting the growth of the 'Planetary Data Ecosystem.'

What makes up an AHED dataset?

- In AHED, ‘data’ consists of one or a combination of the following: a file, a collection of files, a link, or several links to other repositories or online resources (uniform resource locator URLs and digital object identifiers) containing relevant data.
- To become an AHED dataset, ‘data’ must be described and labeled using the Astrobiology Resource Metadata Standard (ARMS).
- Several dataset examples are described in the 'AHED Pilot Guide to dataset creation' document.
- For the Pilot, we one recommendation is creating a dataset containing the raw data and supporting materials to accompany a recent journal article. See this example.
- You may also have created your own online resource/database that you can make more discoverable, like in this example.

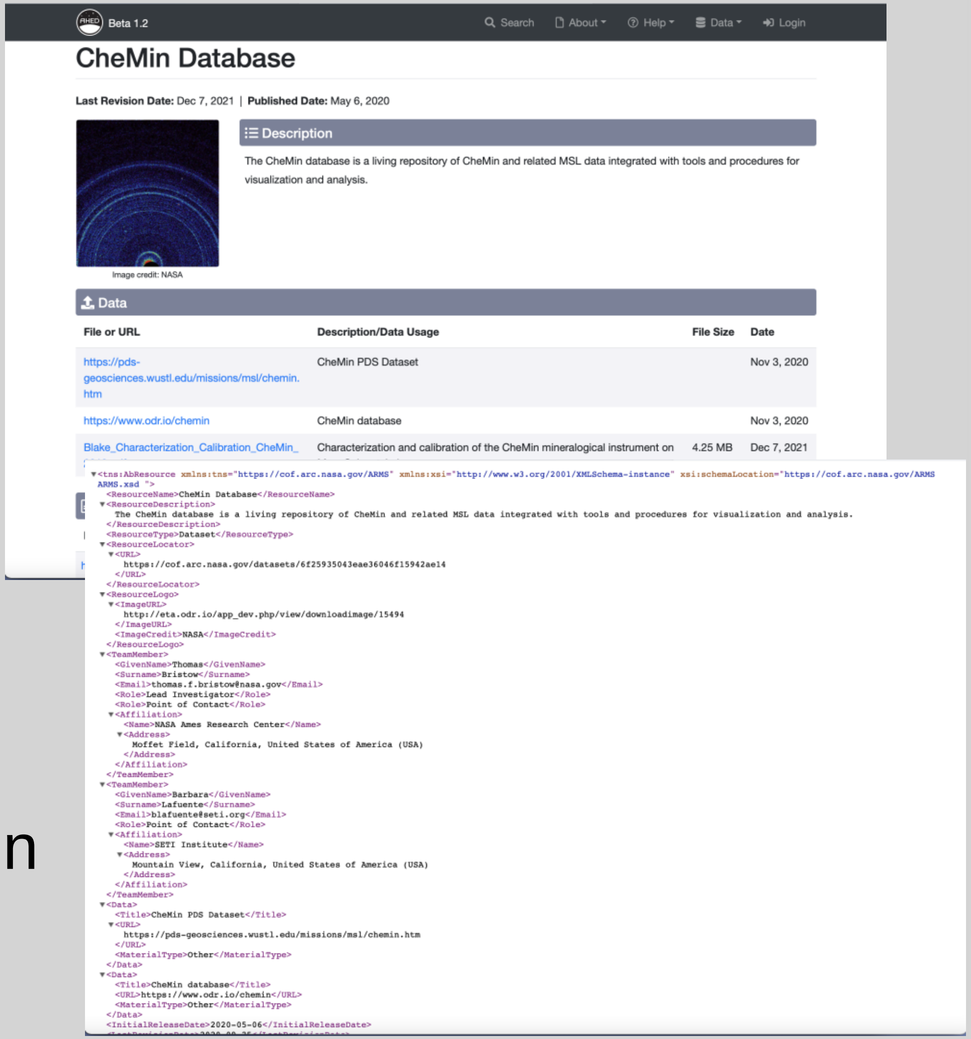
AHED System Overview

- 3 major components.
- An astrobiology specific standardized metadata framework called **ARMS**.
- The **AHED Portal** provides a web-based home to the project allowing new and returning users to create new ARMS compliant datasets, learn more about AHED and ARMS, and search for relevant datasets using a range of search tools designed around the needs of astrobiologists.
- Behind the scenes, the **Open Data Repository (ODR)** provides a powerful and flexible platform for the publication of datasets.



ARMS: Astrobiology Resource Metadata Standards

- Dataset description vocabulary to uniformly describe astrobiology ‘resources’.
- Required for all contributed AHED datasets.
- ARMS encourages common structure and metadata for all contributed datasets to facilitate cross-dataset search, integration, discovery and analysis.
- We are working with the SMD’s Catalog Team to help represent the Astrobiology community in their efforts.



ARMS metadata

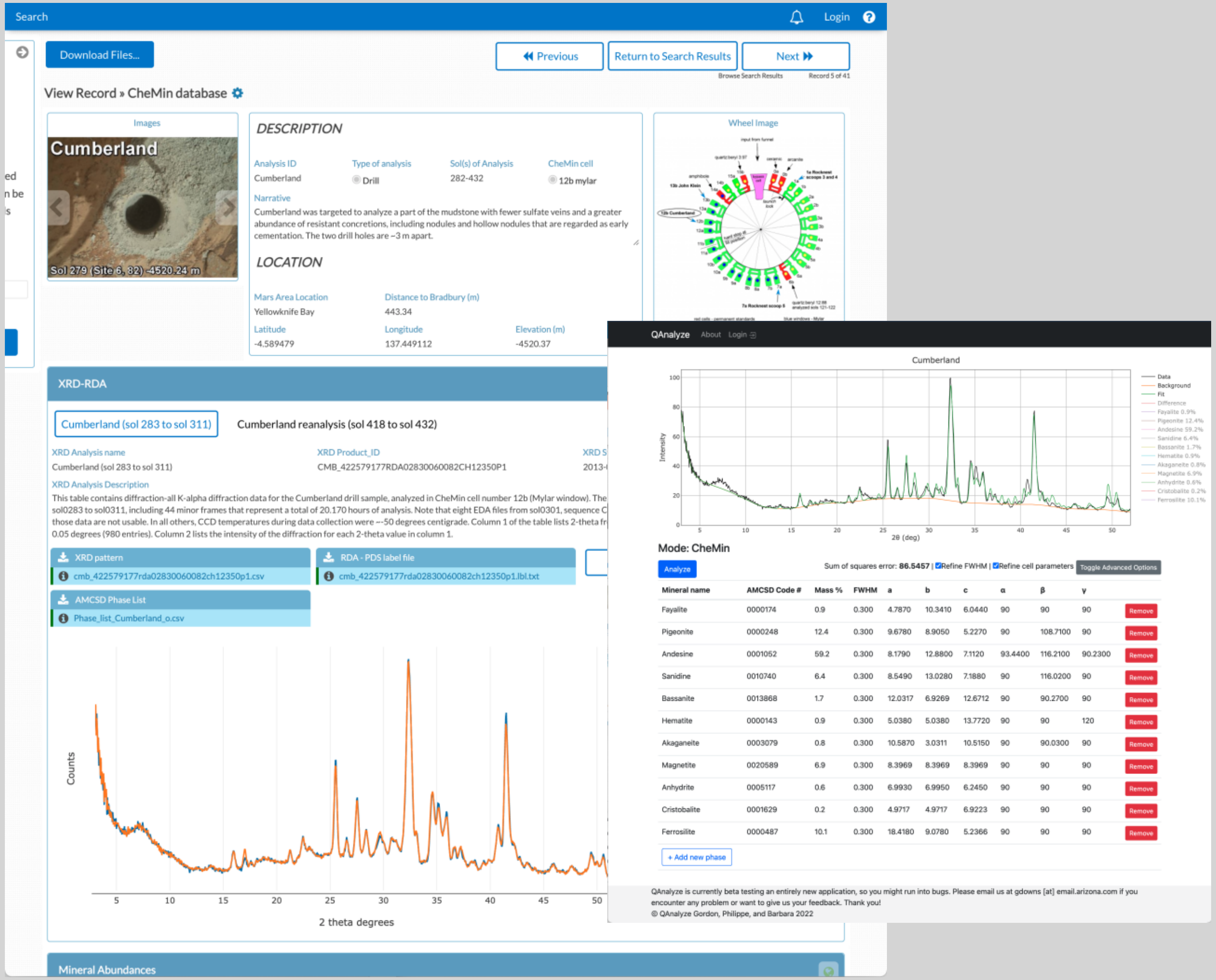
- **Dataset intrinsic**
  - Name
  - Description
  - Location
- **Support**
  - Team members
  - Funding
  - Project/mission
- **Research context**
  - Research theme
  - Science discipline
  - Keywords

Astrobiology keywords

- The ARMS keyword defined vocabulary is a compilation of publication-style keywords extracted from Astrobiology-related journals from the Web of Science for the past 10 years
- After careful curation of the keywords, we developed a 3-4 tier taxonomy with **757** taggable keywords
- Validated against 848 AbSciCon 2019 abstracts
  - 99% of the abstracts contained 1+ ARMS keywords
  - 67% of the ARMS keywords appeared in the abstracts
  - Cluster analysis revealed 36 potential new keywords, which were added to the lexicon

Open Data Repository

- Dataset Publication Platform
- Provides the backend for AHED
- Design & Create Databases Online
  - Design data entry forms for inputting data
  - Create a layout that displays your data
- Interactive Datasets
  - Graphing capability
  - Plugins for specific functionality
  - Integrate with 3rd party apps
- Manage access through permissions
- Dynamically update data via CSV imports and API
- To learn more about ODR's functionality:
  - https://www.opendatarepository.org



Questions

Next steps

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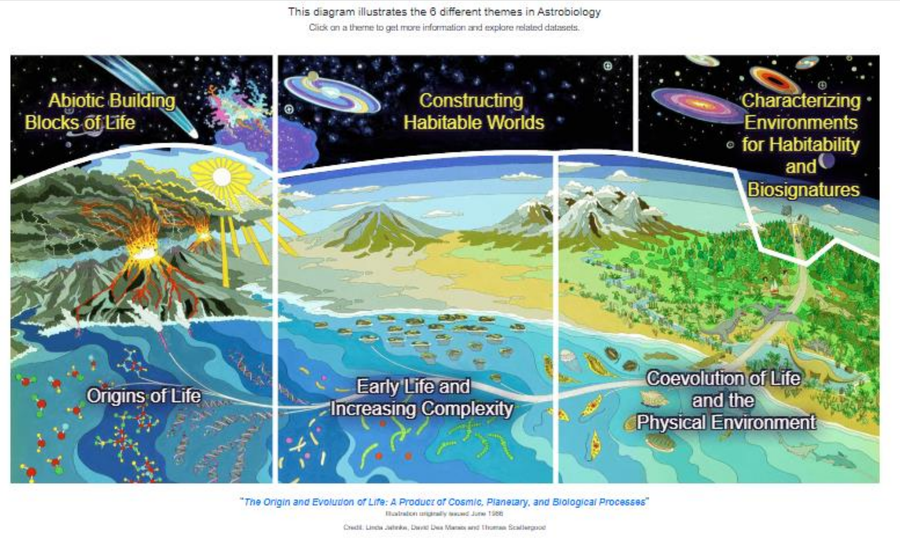
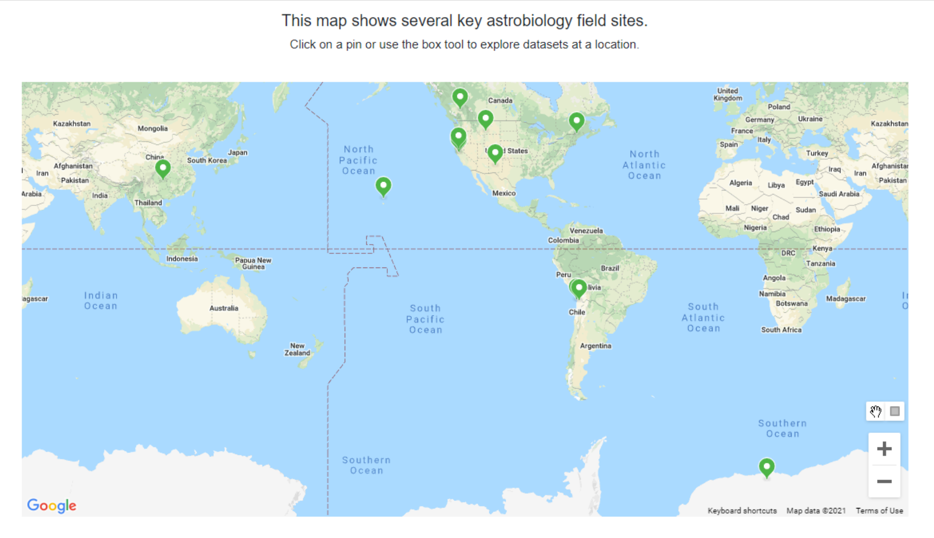
Thank you!

Extra slides

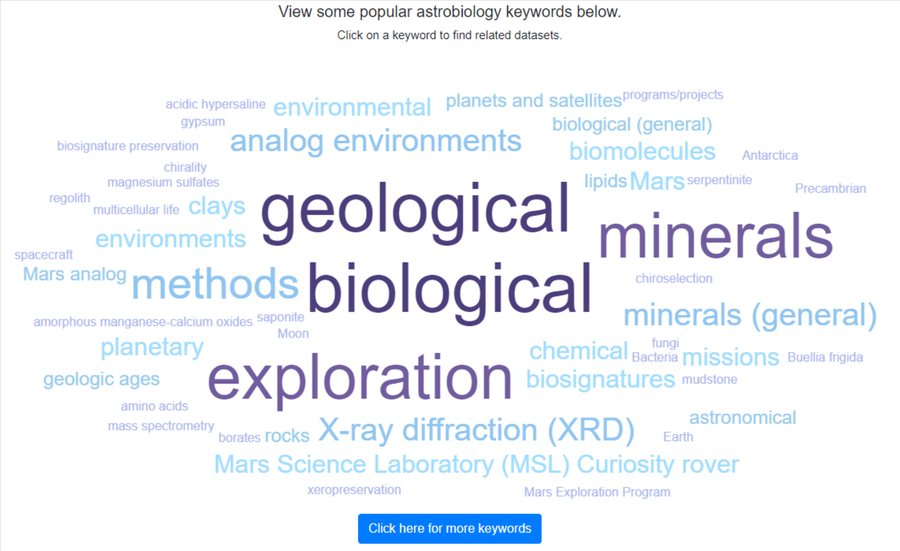
Search and Discovery tools



Astrobiology Theme

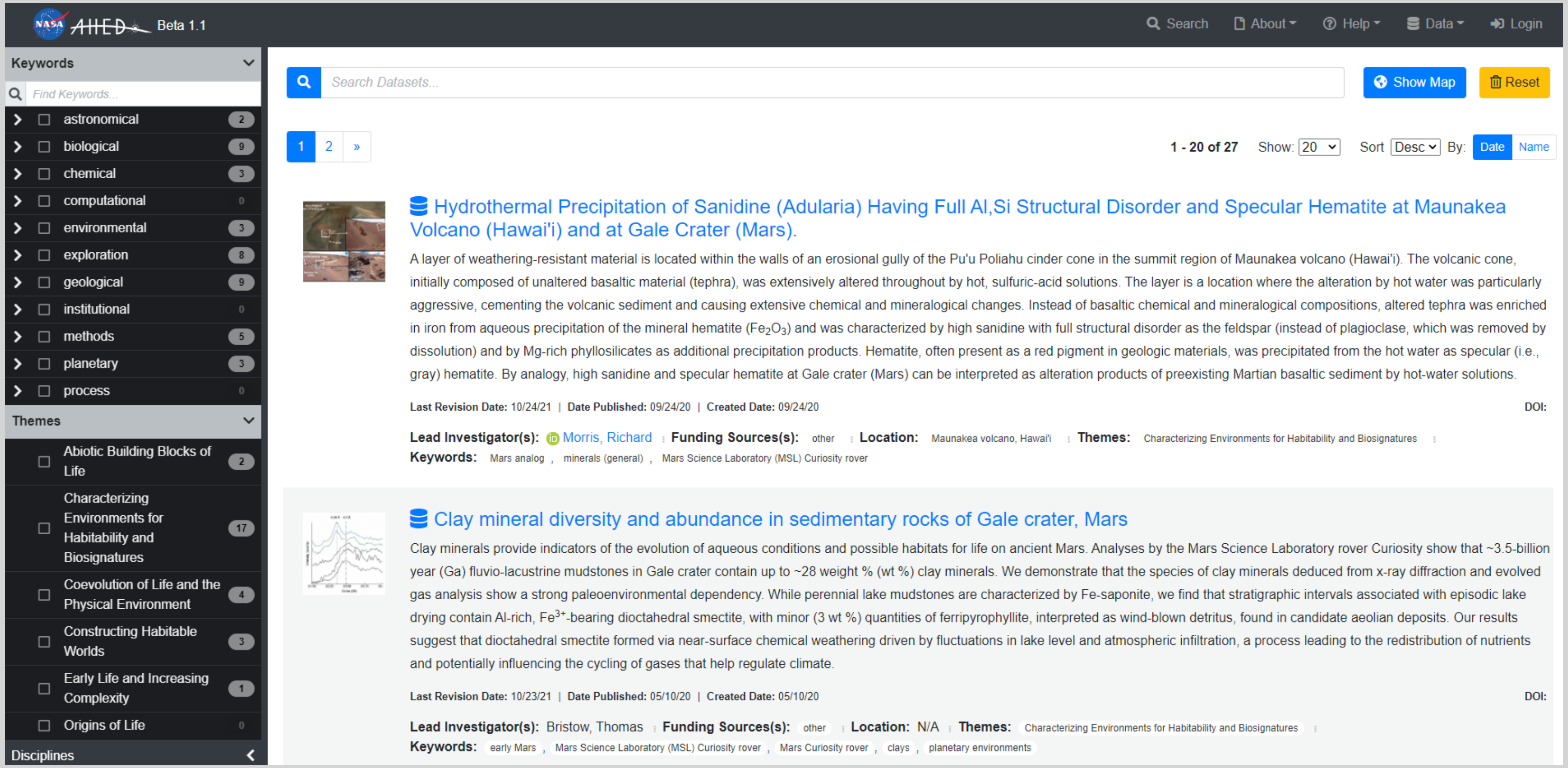


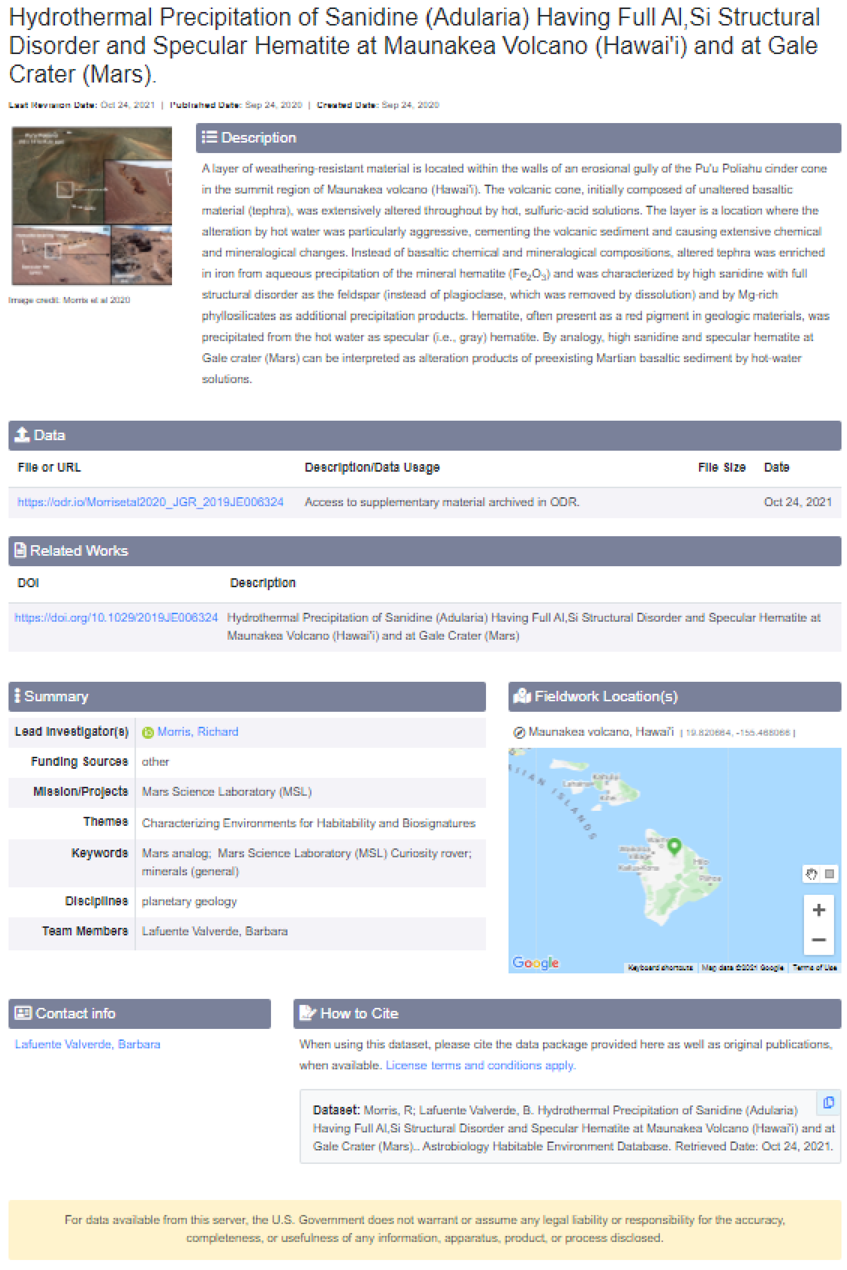
Field Location



Astrobiology Keywords

Search Results

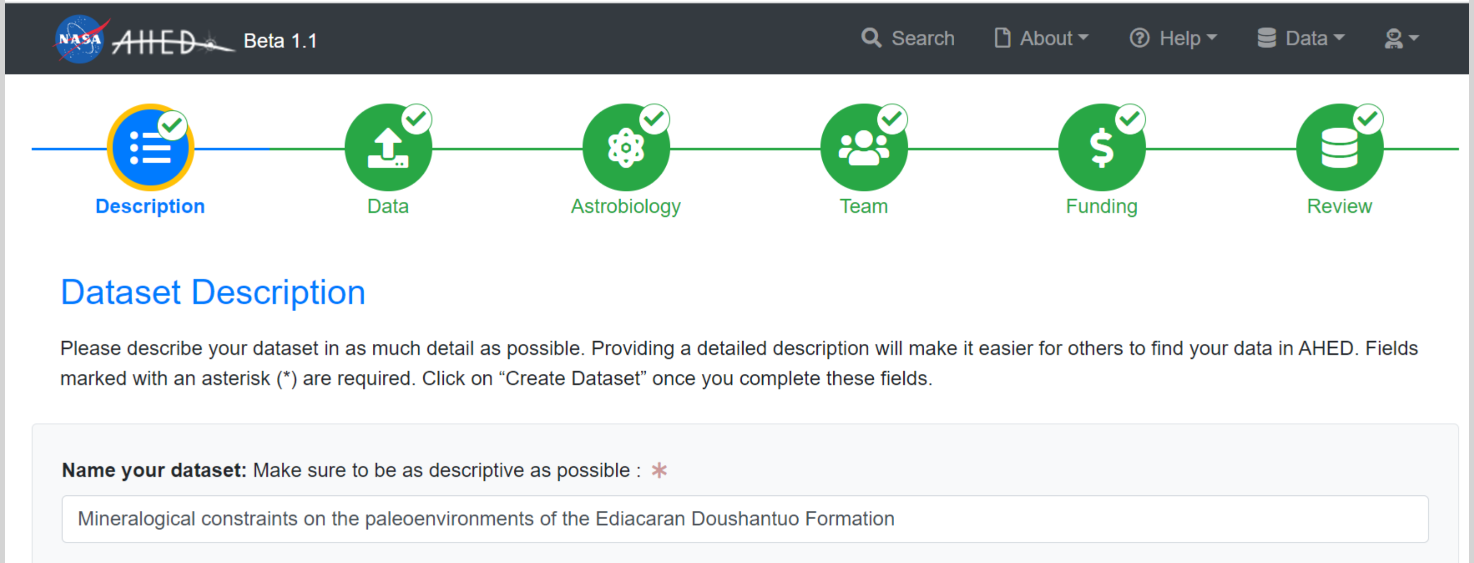




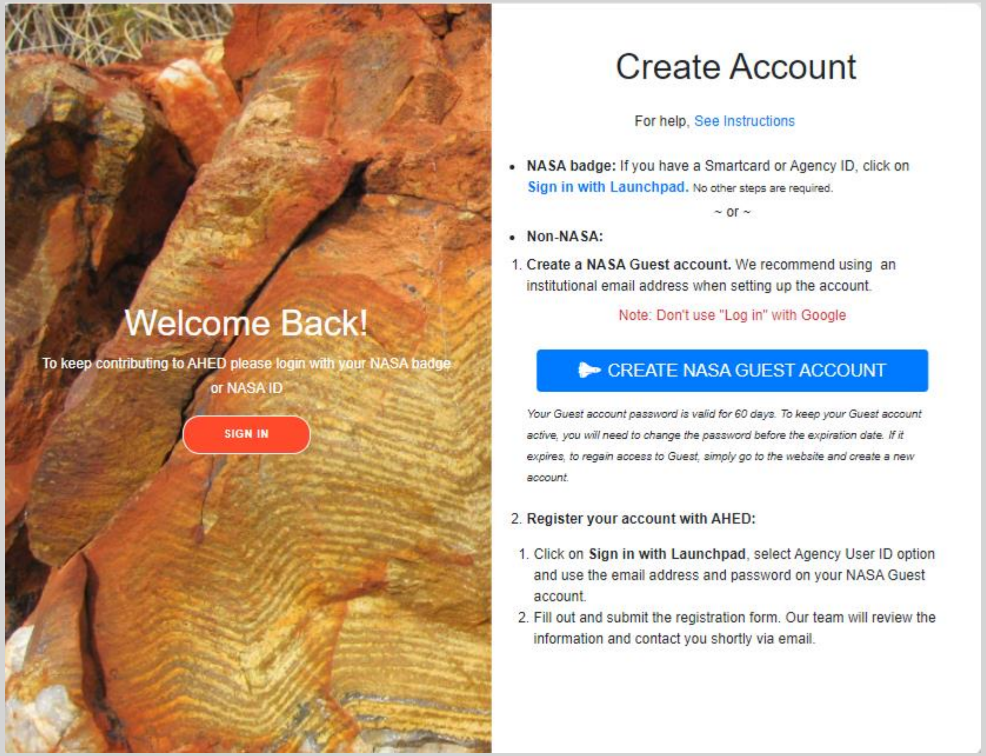
DOI implemented through DOIMS

https://ahed.nasa.gov/10.80300/c72m-rq68

Contribution

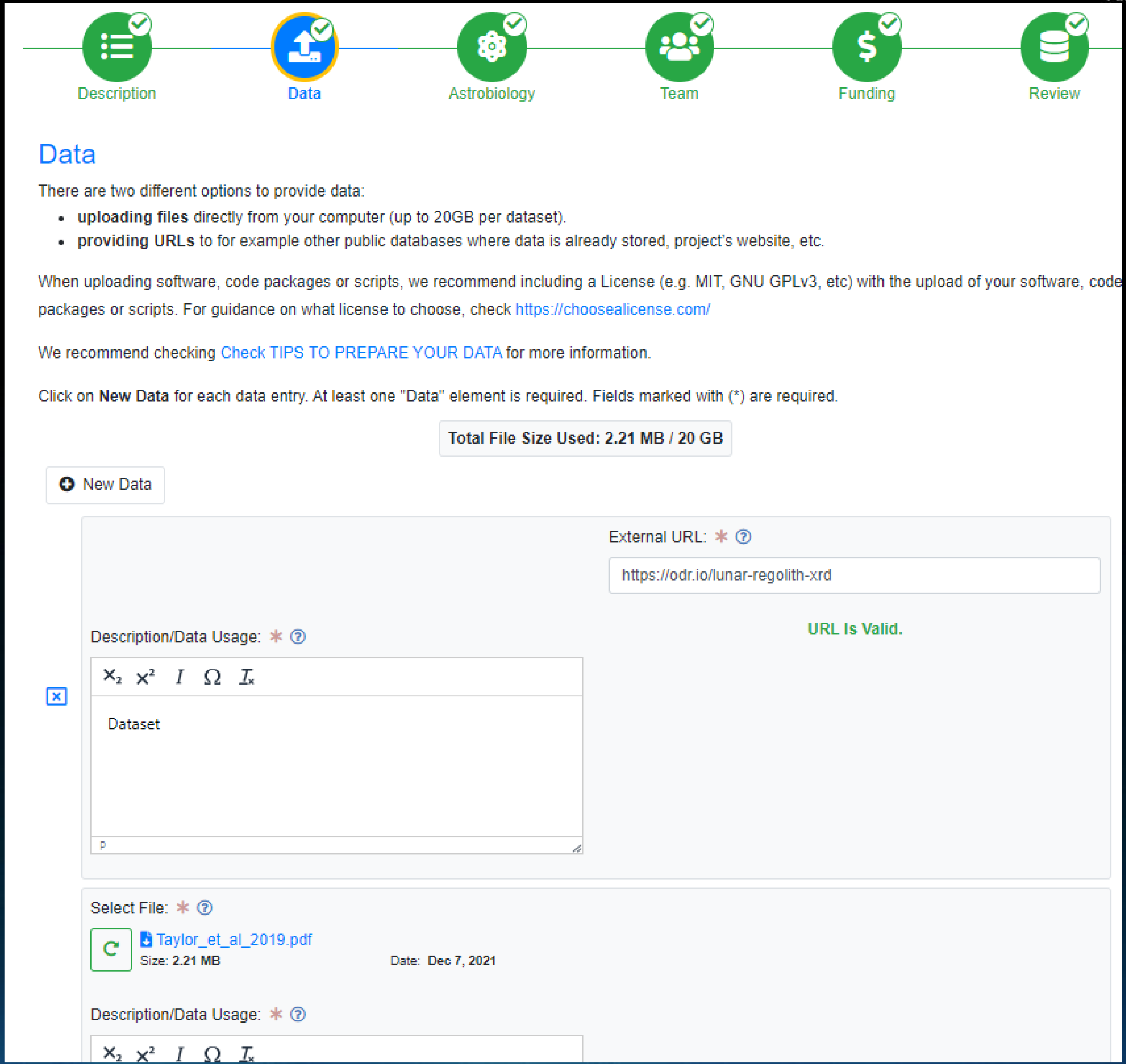


step-by-step dataset creation wizard



Implementation of login for NASA and non-NASA users.

File/URL upload



DOI implementation through DOIMS

- DOIs are included with every dataset. to follow the FAIR guidelines making each dataset findable, accessible, interoperable, and reusable.
- The implementation of AHED DOIs has been done with the NASA STI Program Office through their Digital Object Identifier Management System (DOIMS).
- We have worked with them to develop their API to provide DOI services to us and another NASA systems.
- Once created, the DOI, along with guidance for citing the data by the DOI, are provided on each dataset's landing page in AHED. Researchers can use this data citation and reference the data in publications and articles.

Link to data from: Brine driven destruction of clay minerals in Gale crater, Mars

Last Revision Date: Sep 8, 2021 | **Published Date:** Sep 8, 2021 | **Created Date:** Sep 8, 2021

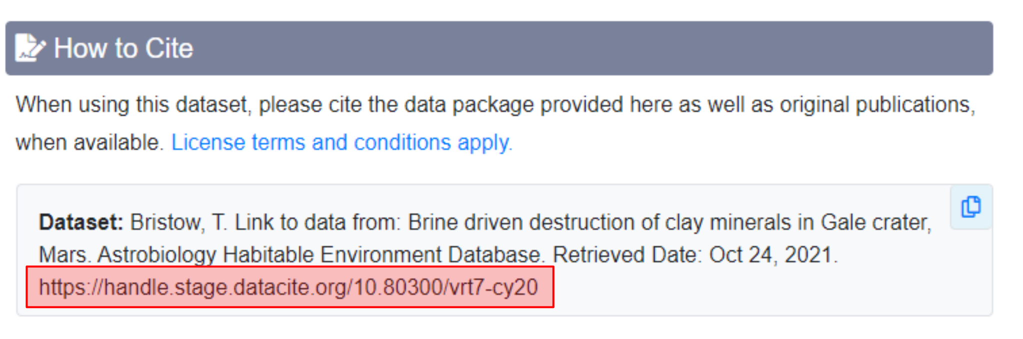
DOI: https://handle.stage.datacite.org/10.80300/vrt7-cy20

Image credit: NASA/JPL/MSS

Description

This repository contains files and non-commercial software associated with the journal article "Brine Driven Destruction of Clay Minerals in Gale Crater, Mars."

The article presents mineralogical, geochemical, and sedimentological observations made by the Mars Science Laboratory rover *Curiosity* in an area called Glen Torridon, Gale crater, Mars. Rocks exposed in Glen Torridon were deposited in a lake that occupied the floor of Gale crater about 3.5 billion years ago and are stratigraphic and depositional equivalents of rocks exposed ~ 400m away on Vera Rubin ridge. The mineralogy of rocks in these two areas are different despite forming in the same lake at the same time. Glen Torridon rocks contain about 30 wt % clay minerals and 2 wt % or less of the mineral hematite (an iron oxide). In contrast, Vera Rubin ridge rocks contain 5 to 13 wt % clay minerals, with larger quantities (between 9 and 16 wt %) of iron oxide and oxyhydroxide minerals. The observed differences in mineralogy are attributed to preferential post-depositional alteration of Vera Rubin ridge rocks by silica-poor brines. These brines are thought to have formed during the deposition of sedimentary strata of the 'sulfate-bearing unit' that overlie Glen Torridon and Vera Rubin ridge rocks. Orbital spacecraft have detected magnesium sulfates in the sulfate-bearing unit. The presence of these highly soluable salts imply that changing climate and/or hydrological conditions in Gale crater resulted in the formation of dense brines during deposition of the sulfate-bearing unit. It is hypothesized that brines infiltrated older clay-bearing sediments, converting iron-rich clay minerals to iron oxides and oxyhydroxides. Glen Torridon rocks also contain a mineral phase not previously identified on the mission. This mineral gives rise to a distinctive x-ray diffraction peak represents a interplanar spacing of 9.22 angstroms. This phase is identified as a mixed-layer serpentine-talc and is thought to have been transported into the crater floor by rivers.



How to Cite

When using this dataset, please cite the data package provided here as well as original publications, when available. License terms and conditions apply.

Dataset: Bristow, T. Link to data from: Brine driven destruction of clay minerals in Gale crater, Mars. Astrobiology Habitable Environment Database. Retrieved Date: Oct 24, 2021. https://handle.stage.datacite.org/10.80300/vrt7-cy20

Long-tail research

White paper submitted to the **Planetary Science and Astrobiology Decadal Survey** 2023-2032:

Bristow, T.F. et al. (2020) **Strategy for Managing NASA's Long Tail of Planetary Research Data Insights from the Development of the Astrobiology and Habitable Environments Database (AHED).**