

# Assembling and Managing a Large, Diverse, Inclusive Team: EDIA Lessons Learned from my First 2 Years as PI of MER PORTAL



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# Themes

- Be flexible
  - It's okay to change your mind
- Dare to ask
  - They might say yes!
- Listen to experts
  - People who are experts in their field
  - The members of your team

EDIA is at the core of the MER PORTAL. Aspects of our organization relevant to EDIA include:

- A collaboration with the Southwestern Indian Polytechnic Institute (SIPI), based on long-standing relationships, to work with (and pay) a SIPI teacher to develop MER Image Interpretation Lesson Plans
- A paid Accessibility Consultant who identifies as a person with disabilities
- An Ombud to mediate any misunderstandings or interpersonal issues

Team diversity:

- 53% of team members are women and/or people with feminine gender expression, including 3/5 of our leadership
- At least 13% of team members identify as having a disability and/or chronic illness(es)
- 2/5 of our leadership are People of Color

Text from our LPSC 2023 poster (Cole+ 2023)

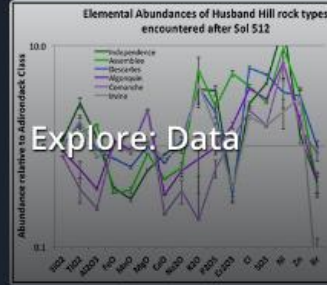
# The Project

- Mars Exploration Rovers (MER) Portal to Observations, Resources, and Tools to Advance Legacy Science (PORTAL)
- Goal: Ensure that people who have no connection to the mission have what they need to find and analyze MER data
  - Documentation
    - Data analysis
    - Rover/instruments
    - Data acquisition and caveats
  - Tools recommended by MER Team members
  - Educational activities and lesson plans
  - (Eventually: science-based search for data)

**<https://mer-portal.spacescience.org>**

I'm searching for...

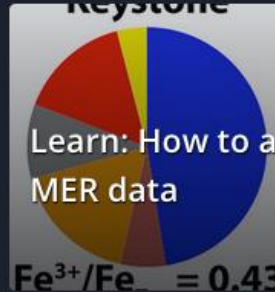
All Categories



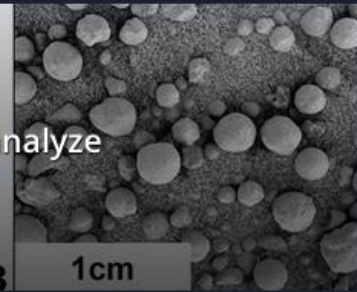
## Explore: Data



## Explore: Images



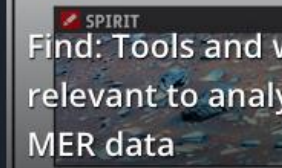
Learn: How to analyze  
MER data

$$\text{Fe}^{3+}/\text{Fe} = 0.43$$


1cm

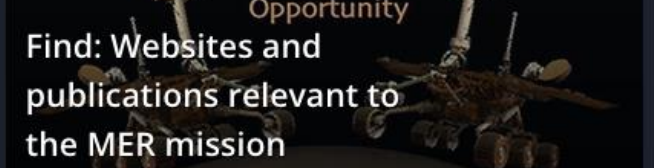
Use the Analyst's Notebook to explore planetary data from MER. The Notebook combines sequence information, engineering and science data, and documentation into standard web-accessible pages to provide mission "replay".

Find: Tools and websites relevant to analyzing MER data

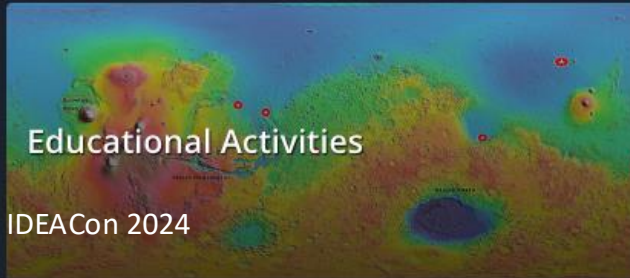


Spirit  
and  
Opportunity

**Find: Websites and publications relevant to the MER mission**



## Educational Activities



## Fun Stuff!



# Motivations

- I was on the MER Team and had complete access to data, people, and internal mission tools, but:
  - The learning curve to find and use the data I needed was steep
  - My dissertation research would have been impossible without the help of my MER colleagues
- Hundreds of people (out of >8 billion) know how to use (at least some) MER data, but they're aging, retiring, and/or moving on to other rovers
  - Need to preserve the institutional knowledge necessary to use these data
- Anyone/everyone should be able to find and use MER data
  - TONS of science still to be done
- My personal values
  - Social justice
  - I love teaching, especially non-majors science courses, but I've left academia

# The Team

- 1 PI
- 4 Co-I's, with expertise in
  - The MER mission
  - Formal and informal education
  - Machine Learning (ML)
  - Systems engineering/development life cycle
- 7 Professional staff
  - Technical Writer
  - Web Development
  - Accessibility Consultant
  - Interview Consultant
  - Graphic Designer
  - Spanish Translator
- 28 Collaborators
  - MER Team members
  - Mars scientists who weren't involved in the MER mission
  - Librarian, programmers
  - Expertise:
    - MER data acquisition, analysis, and ops
    - Planetary Data System (PDS)
    - Planetary geospatial data
    - Databases
    - NASA missions
    - Undergraduate and graduate education
    - Accessibility

# Assembling the team

- Asked colleagues/friends to join me
  - MER colleagues: Commit to ~1 hour interview about how they analyze/acquired their data
  - Librarian/database expert, non-MER martian scientists, programmers
- Presented the project at the final MER Team Meeting
  - 2 people I didn't know told me to contact them if there was anything they could do to help with the project...and I did (Co-I Jayne Aubele, Interview Consultant A.J.S. Rayl)
- “Relationships First and Always” (Gardner-Vandy+ 2021)
  - Co-I Aubele: Decades-long relationships with many Indigenous communities in the Albuquerque area
- Out-of-hierarchy mentor for the interns (who were descoped), Ombud
  - Co-I Kennda Lynch (systems engineer, leading the project's development life cycles)
- MERfolks told me about a team member who was using ML to catalog MER image data
  - I was initially against including ML, but I'm glad I did
- “Weak network ties”: Asked people at the edge of my network to recommend someone from their network (Vertesi 2017)
  - Accessibility Consultant Sean Thatcher
- SSI's in-house web development, graphic design, and translation staff

# Proposal -> Award

- Used project titles (Co-I, Consultant) instead of honorifics (Dr., Ms.)
  - Identify people by their strengths and relevant skills rather than their gender, marital status, and educational history
  - At least 2 members of my team didn't complete PhDs because of discrimination and trauma
- Included everyone at each step
  - We are a team – keep people informed and feeling involved
  - Dozens of potential proofreaders!
- Project was descoped
  - I dared to aim high (huge & expensive project)
  - Review panel highly recommended the full project, Program Officer loved it
  - PO awarded partial funding; we descoped the project (“Phase 1”)



# Leading the team

- Contacting/connecting with people (especially Co-I's)
  - If they're not good at responding to emails, maybe they respond better to texts
  - First few minutes of meetings are for check-in/chatting/"human time"
- Emails to the team: "Our project", "Our website"
  - Continues the collective spirit of the MER mission (Vertesi 2020)
- Instead of asking people to do administrative tasks (e.g., write their first invoice) on their own, schedule a meeting where we work on it together
  - Similar to a flipped classroom
- Mentor and be mentored
  - You learn through doing, and through teaching
  - Your team members (hopefully) trust you, and will both teach and learn from you



# Running the grant

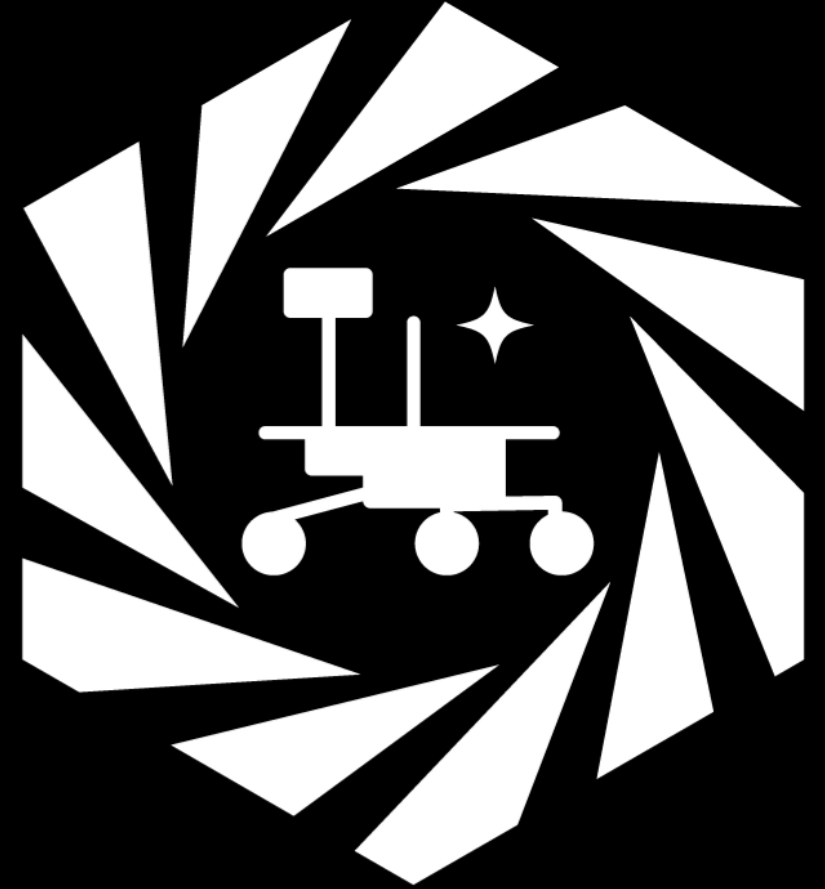
- Hard to run a ~40-person team, especially when working part-time
  - Similar to running a large college class
- Allowing for team members' lives (illnesses, family responsibilities, etc.) makes for a better team, but where to draw the line?
  - Scheduling monthly meetings helps, but doesn't always work
- It's actually harder to get people to send in their invoices than it is to get them to do work
- Took a long time to get all of the subcontracts finalized
- Hire experts! They'll do the work faster and better than you



Logo by Amy Briones

# Themes

- Be flexible
  - It's okay to change your mind (multiple times!)
- Dare to ask
  - They might say yes!
- Listen to experts
  - People who are experts in their field
  - The members of your team



# Website is now live! (but not yet complete)

Currently available: <https://mer-portal.space-science.org>

- Curated lists of online tools and websites relevant to MER data analysis and the MER mission
- Educational activities aimed primarily at middle school students
- Curated list of “pretty pictures”

Still to come:

- Guides to the MER vehicle and instruments (nearly ready!)
- User Guides, based on interviews with MER Team members, that preserve institutional knowledge about the mission and enable data analysis by anyone
- MER Image Interpretation Guidebook
- Undergraduate-level Lesson Plans

# References

- S. B. Cole et al. (2023) Vision for the Mars Exploration Rovers Portal to Observations, Resources, and Tools to Advance Legacy Science (MER PORTAL). *LPSC LIV*, Abstract #1302. Abstract available at <https://www.hou.usra.edu/meetings/lpsc2023/pdf/1302.pdf>
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- J. Vertesi (2017) “The D-word: Solving for Diversity on Spacecraft Teams.” Invited presentation to the NASA Outer Planets Advisory Group, NASA Small Bodies Assessment Group, the Jet Propulsion Laboratory, and Space-X corporation. Available at <https://www.lpi.usra.edu/sbag/meetings/jun2017/presentations/Vertesi.pdf>
- J. Vertesi (2020) *Shaping Science: Organizations, Decisions, and Culture on NASA’s Teams*. Univ. of Chicago Press.