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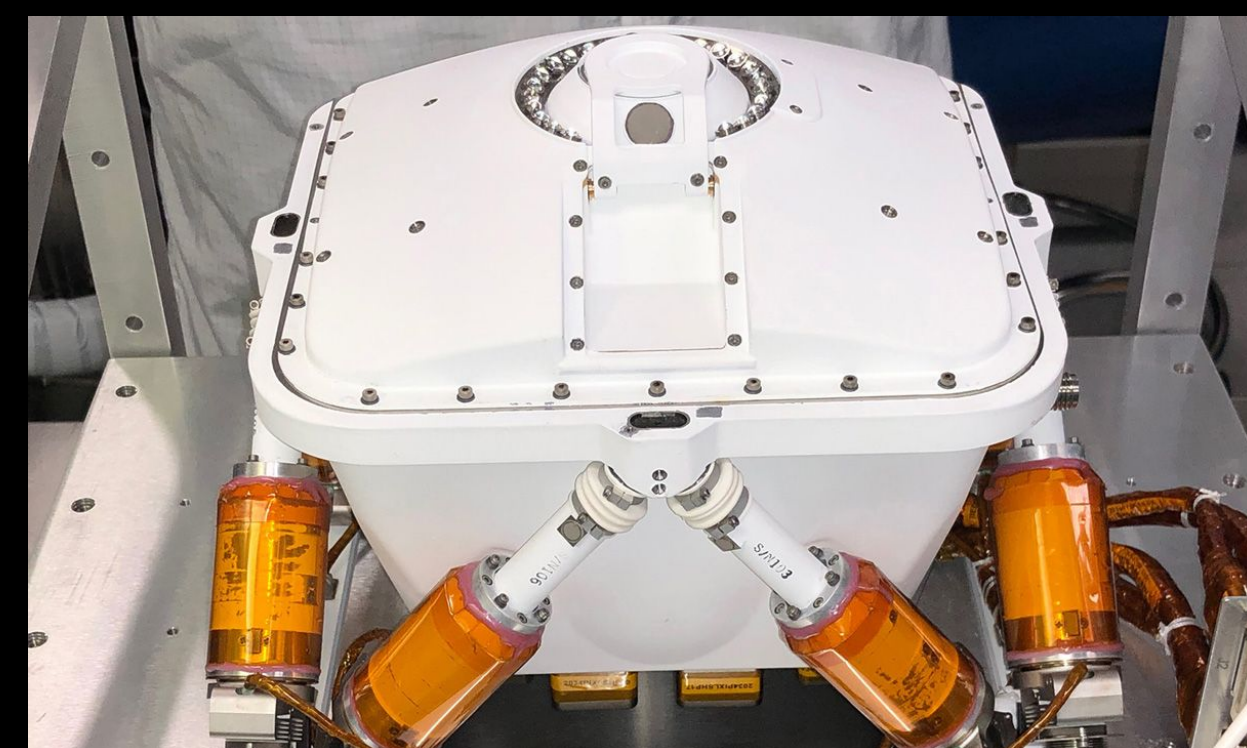
Carnegie Science Team:

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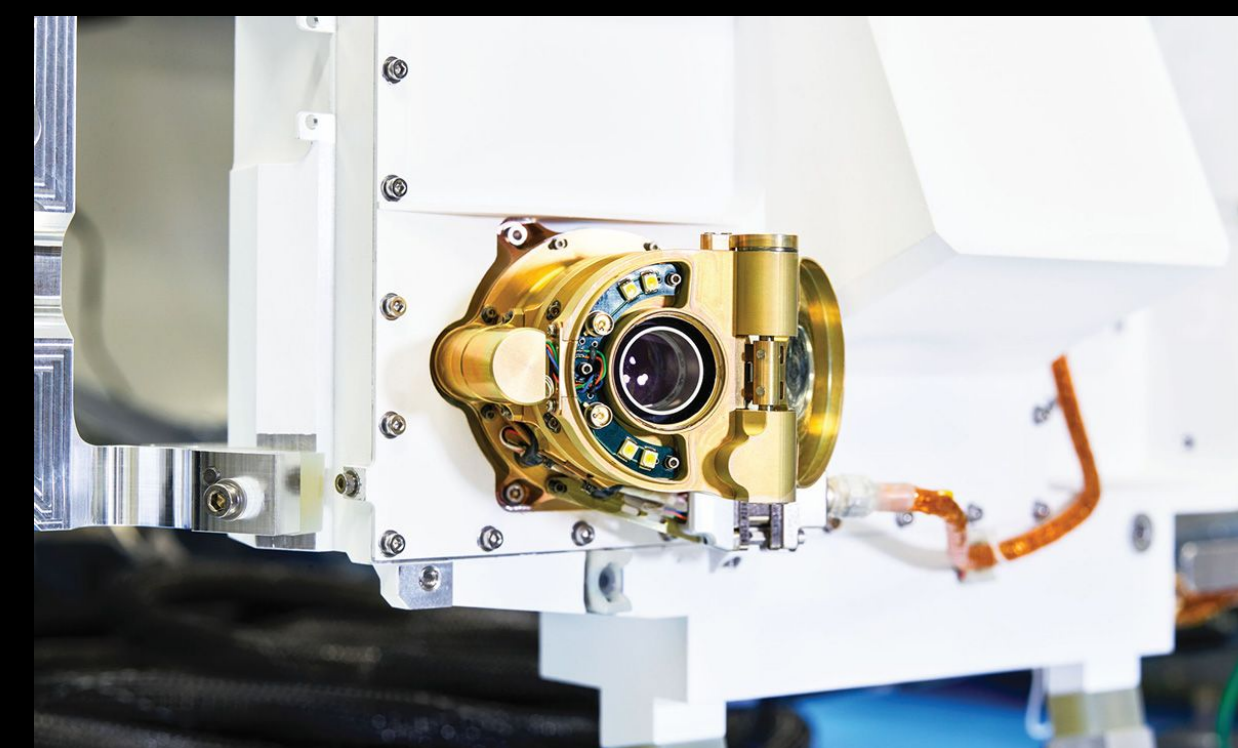
Earth & Planets Lab, Carnegie Institution for Science, Washington, DC

The Rensselaer Mars Data Explorer (2023-)

- Ongoing exploration, analysis and visualization of scientific data from the Mars 2020 (M20) mission, featuring the **Perseverance rover** and **Ingenuity helicopter**
- Utilizes the R Shiny and Unity platforms to integrate high-resolution panoramic and aerial imagery, and 3D terrestrial models with scientific data provided by the Carnegie Institution
- Demonstrates the FOCI Campfire team's near turnkey ability to create compelling, science-driven data exploration environments



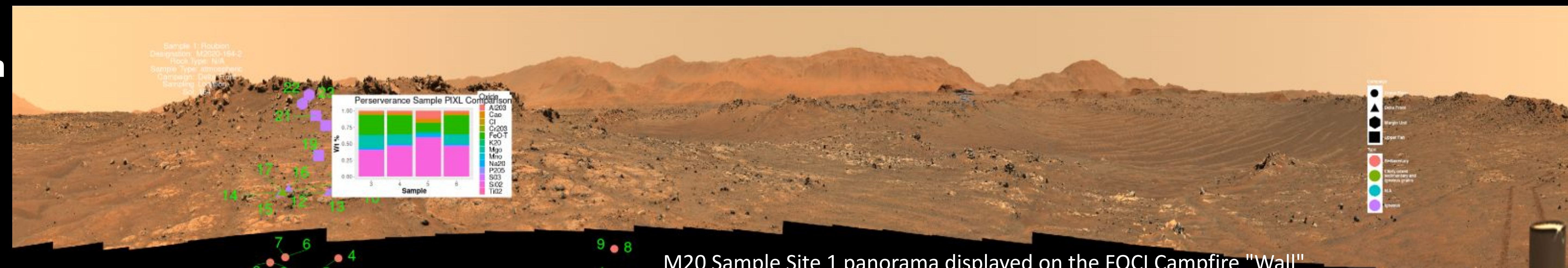
The PIXL instrument



The SHERLOC instrument

About the Data: Mars 2020 Science Instruments

- **PIXL: The Planetary Instrument for X-ray Lithochemistry** on the Perseverance rover is a microfocus X-ray fluorescence instrument that rapidly measures elemental chemistry at sub-millimeter scales by focusing an X-ray beam to a tiny spot on the target rock or soil and analyzing the induced X-ray fluorescence. Scanning the beam reveals spatial variations in chemistry in relation to fine-scale geologic features such as laminae, grains, cements, veins, and concretions.
- **SHERLOC: Scanning Habitable Environments with Raman & Luminescence for Organics & Chemicals** is an arm-mounted, Deep UV (DUV) resonance Raman and fluorescence spectrometer utilizing a 248.6-nm DUV laser and <100 micron spot size. The laser is integrated to an autofocusing/scanning optical system, and co-boresighted to a context imager with a spatial resolution of 30 μm. SHERLOC enables non-contact, spatially resolved, and highly sensitivity detection and characterization of organics and minerals in the Martian surface and near subsurface. The instrument goals are to assess past aqueous history, detect the presence and preservation of potential biosignatures, and to support selection of return samples.

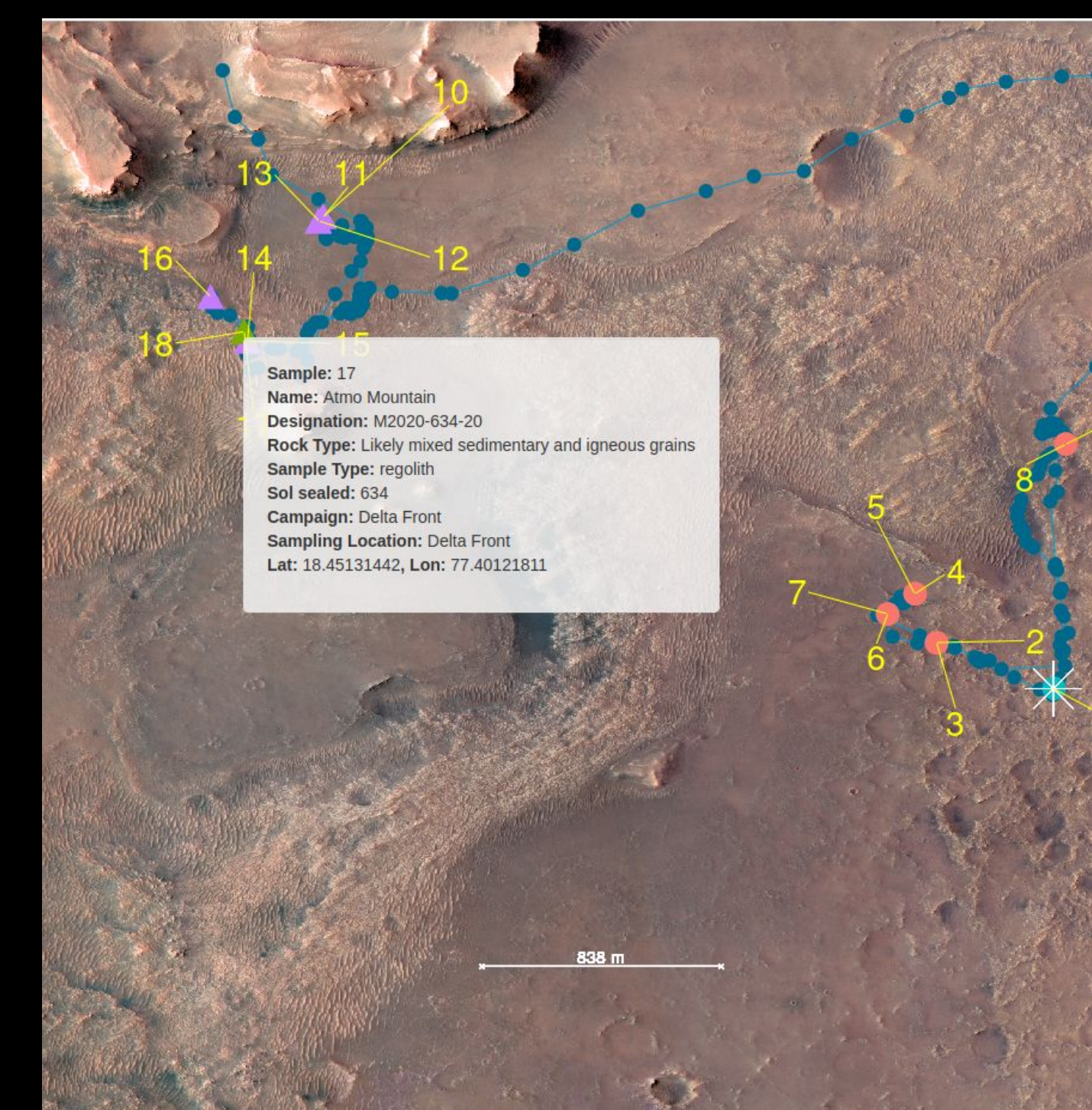


M20 Sample Site 1 panorama displayed on the FOCI Campfire "Wall"

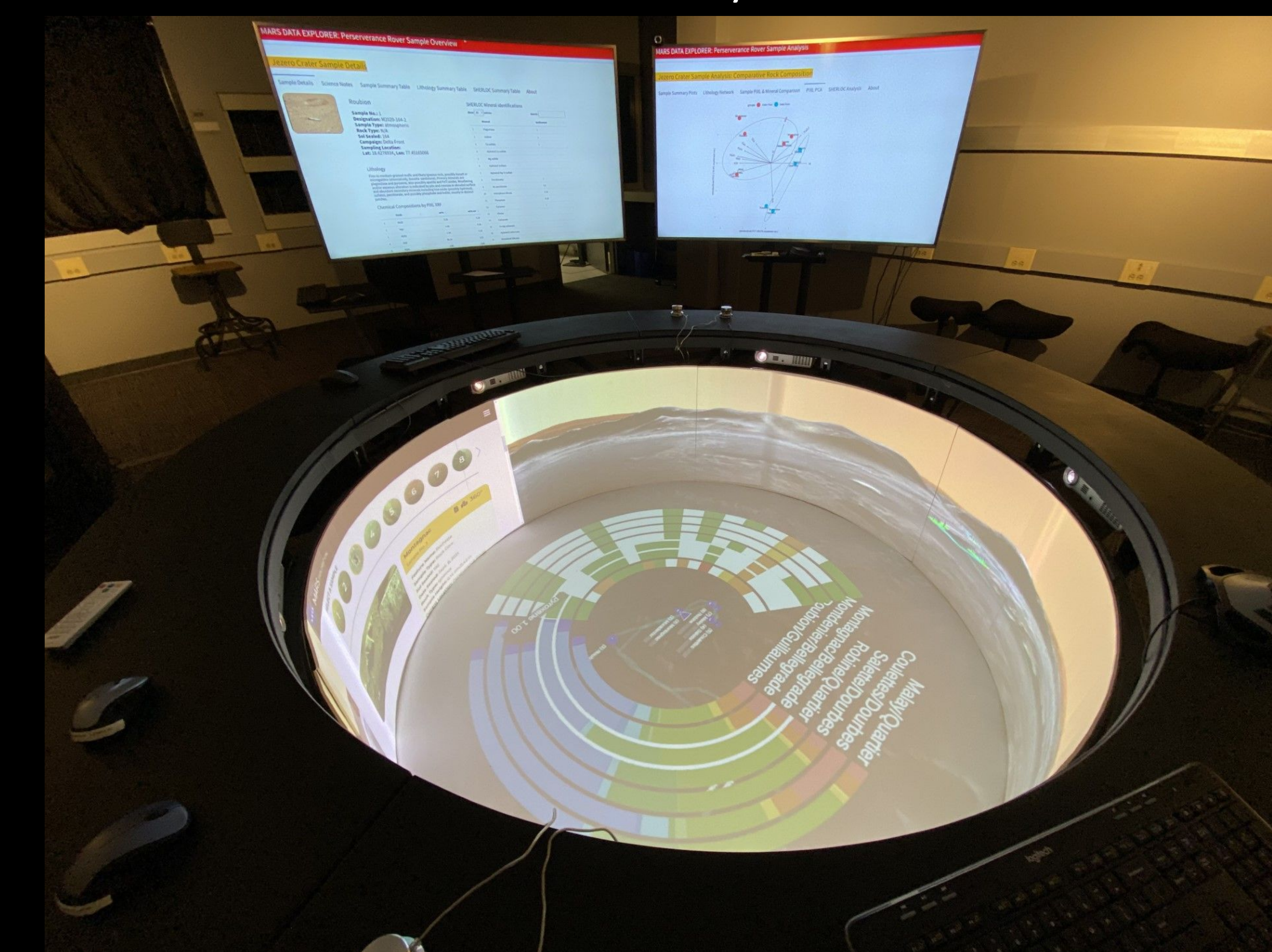


LEFT: Detailed image of **Melyn** (Sample site 19), Sol 749, March 30, 2023, a sedimentary rock core

RIGHT: Interactive Jezero Crater sample site explorer displayed on the FOCI Campfire "Floor"



BELOW: Mars Data Explorer in Unity-based "Virtual Mars" mode, showing PIXL and SHERLOC analysis for a selected sample displayed near the position of the sample, enabling scientists to review the analysis in the context in which it was collected



BELOW: Mars Data Explorer in R Shiny-based "Real Mars" mode, showing PIXL and SHERLOC analysis on large monitors and in-context visualizations of analysis overlaid on sample location panorama

About the FOCI Campfire

- Visualizations run on the **Rensselaer FOCI Campfire**, a multi-user, collaborative, immersive computing interface.
- Campfire is a desk-height, six-foot panoramic screen (the **Wall**) and floor projection (**Floor**) that users gather around and look into, maintaining contact with one another with no artificial or virtual barriers between themselves as they observe and engage with presentations and applications.
- Two large monitors adjacent to the Campfire complement the integrated Wall and Floor visualizations with appropriate content, enabling investigators to be fully immersed in their exploratory tasks.
- Higher-res **Campfire Mark III** to be unveiled Spring 2024!

References:

- Eric L. Ameres, "Reducing the cognitive load of visual analytics of networks using concentrically arranged multi-surface projections focusing immersive real-time exploration," Ph.D. dissertation, Rensselaer Polytechnic Institute, USA, 2018.
- Eric L. Ameres and Gordon P. Clement, "Pseudo-volumetric display apparatus and methods", U.S. Patent 10,996,552 B2, May 4, 2021.
- NASA, "PIXL for Scientists." [Mars 2020 Mission Website](#)
- NASA, "SHERLOC for Scientists." [Mars 2020 Mission Website](#)