

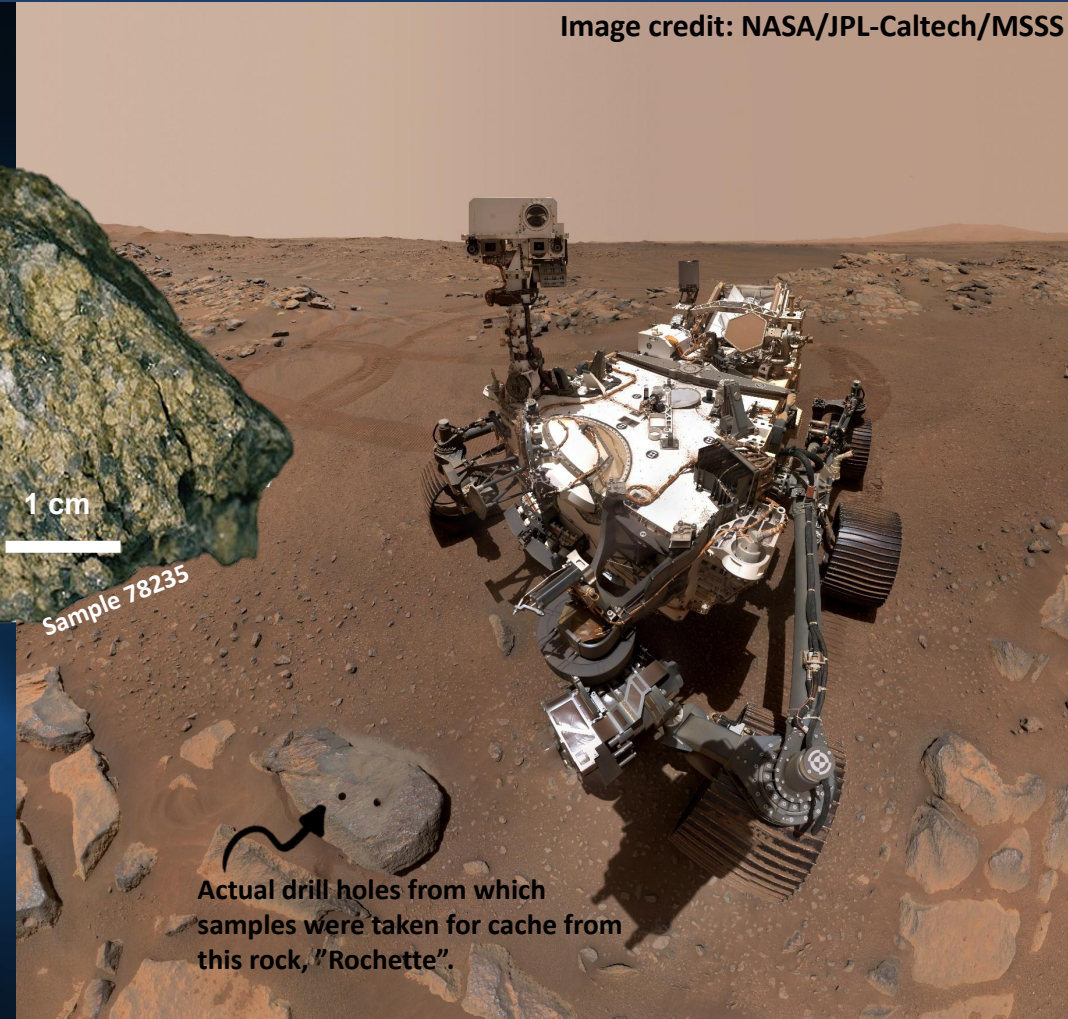
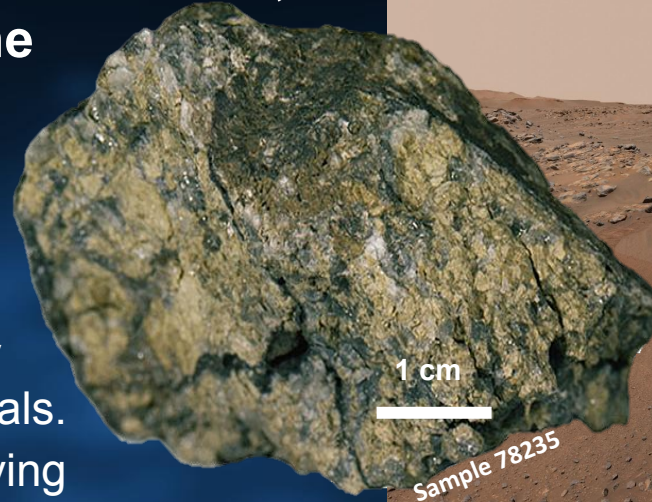
How does shock “impact” NASA Perseverance rover’s selection of optimal samples for return to Earth?

Image credit: NASA/JPL-Caltech/MSSS

Perseverance is the first NASA rover to select samples for return to Earth. Collected samples, when returned, could (1) place important constraints on the timing of Martian geologic events when studied in terrestrial labs and (2) reveal traces of fossil life, if it existed on Mars.

- The landing site, Jezero crater, shows abundant evidence of impact shock and Perseverance will likely be the first mission to encounter these kinds of materials.
- Scientists have recognized the important of identifying the extent of shock using spectroscopy techniques onboard the rover. They found that rocks which experienced impact shock may hamper geochronology and astrobiology studies on returned samples.
- This study provided recommendations to enhance the success of rover analyses in identifying minimally shocked samples for Earth return including interrogating single, coarse grains with SuperCam’s laser to increase the probability of identifying μm -scale shock effects using a mm-size Raman laser beam and targeting first-order endmember identifications in feldspars rather than discrete pressures.

Shkolyar et al. (2022) *Earth, Moon, and Planets*



Above: Selfie of the Perseverance rover at the site of the first sample collection on Mars. Mosaic was taken on 9/10/2021 on the 198th martian day of the mission. Center: Lunar rock showing an example of a feldspar, like that studied in this work, with black melt veins indicating impact shock alteration.