A comparison of Perseverance rover and HiRISE data: siteinterpretations in Jezero Crater

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A comparison of Perseverance rover and HiRISE data: siteinterpretations in Jezero Crater

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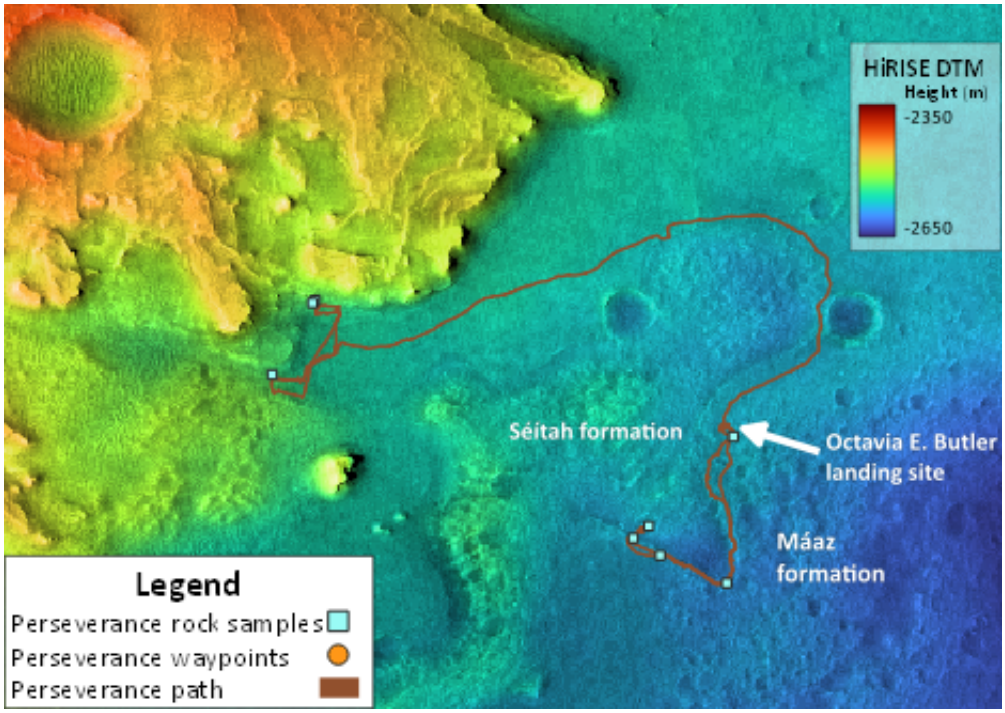
Large parts of the Martian surface have been imaged with orbiters. The High Resolution Imaging Science Experiment (HiRISE) can be used to build Digital Terrain Models (DTMs) of Mars with high horizontal and vertical resolution – distinguishing metre-size objects with a vertical error of tens of centimetres – and interpret the geologic history of a site. These maps may aid in rover landing site selection and finding science targets for these missions. However, rover-based imaging ultimately brings the most detailed view of a site and provides 'ground-truth' data to orbital observations on much smaller scales. Studying the differences between geologic interpretations from larger scale orbital observations and smaller scale rover images helps understand the limits of orbital maps and the added value of rover observations. We compare remote sensing data from orbit with rover panoramic camera data. The validity of geologic interpretations derived from orbital image data (such as HiRISE) in Jezero Crater is examined with ground-based, publicly available data from Mastcam-Z on the Mars 2020 Perseverance rover. Mastcam-Z can provide stereo colour images of the scene around the rover.

The rover is currently in its Delta Campaign after landing at the Octavia E. Butler site and its subsequent trip to the Séítah formation, indicated in the figure below which shows Perseverance's traverse near the western delta of Jezero crater (the basemap is a HiRISE DTM overlaid on a Context Camera mosaic produced by The Murray Lab). Along the way, it has imaged the Séítah and Máaz formations and outcrops of the western delta formation. These units are expected to be volcanic (Séítah and Máaz) and deltaic (western delta) deposits. We can use the Mastcam-Z images made along the traverse to test what geologic interpretations we can reliably infer from orbital data.


HiRISE DTM
Height (m)
-2350
-2650
Séítah formation
Octavia E. Butler
landing site
Máaz
formation
Legend
Perseverance rock samples
Perseverance waypoints
Perseverance path