

Mars 2020 is a NASA space mission that landed in the Jezero impact crater on Mars in February 2021. The Mars rover "Perseverance" is collecting Martian rock, soil, and atmospheric samples from within Jezero Crater and beyond. These samples will be brought to Earth as part of the joint NASA and ESA Mars Sample Return Mission to investigate, among other things, whether there might be any evidence that life once existed on Mars.

Mastcam-Z is the main camera system onboard the Perseverance rover. The stereo camera system, designed as a scientific instrument, consists of two identical cameras equipped with a zoom system and filters for spectral recordings (visible/near-infrared). To be able to see the surrounding space three-dimensionally (3D), humans need two eyes. From the two slightly offset, but otherwise identical, images, our brain then creates a 3D image of our environment.

The same is possible with the stereo images that Mastcam-Z is providing from the Martian surface. The stereo images from the rover camera enable a 3D visualization of the Martian landscapes. With the 3D reconstructions from the Martian stereo images, geometric analyses and interpretations can be carried out at geological outcrops, and observations and measurements can be planned (see Fig. 1) more adequately. This research is supported in the current project.

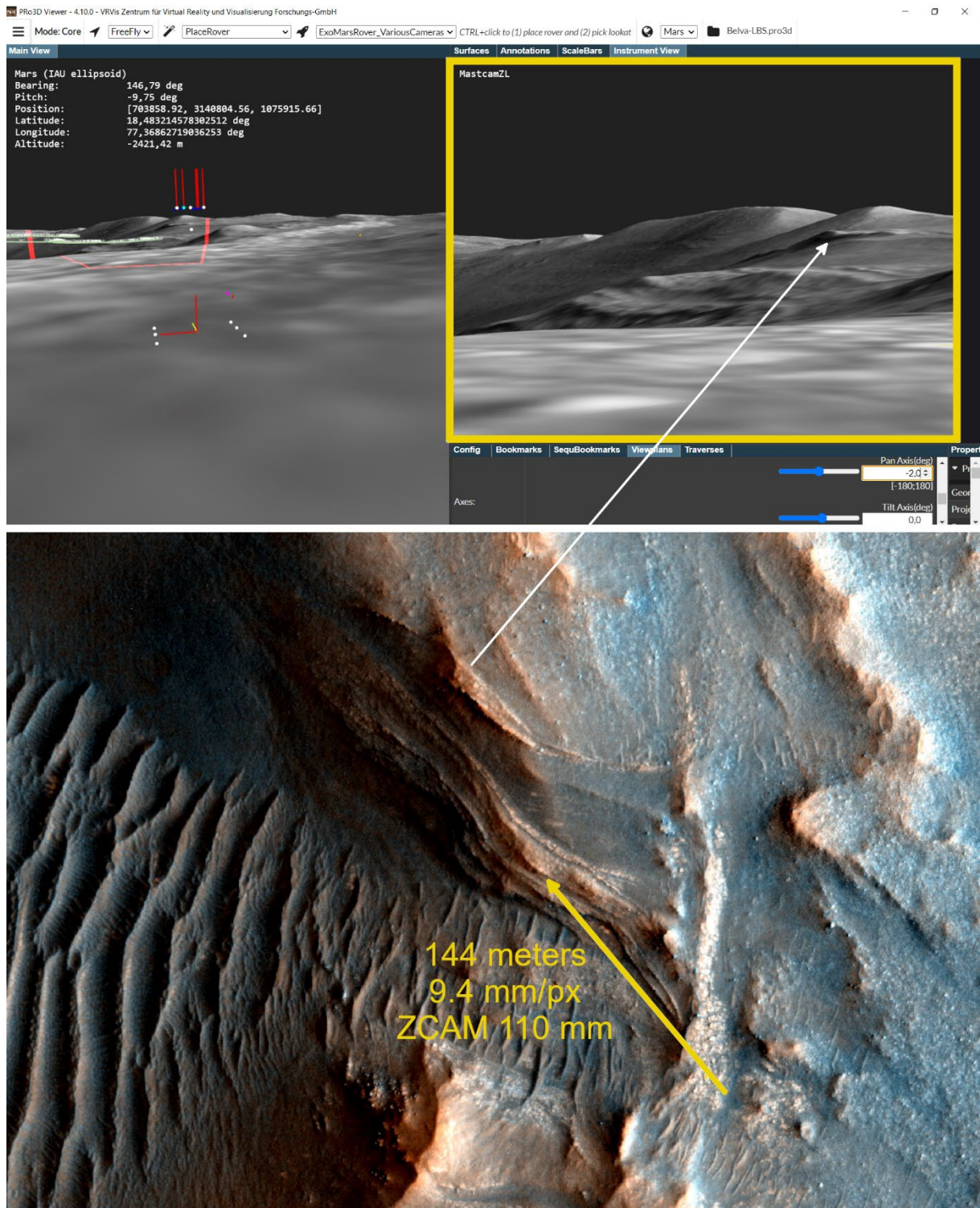


Figure 1. On the upper left side, you can see a digital terrain model in PRo3D generated by Johanneum Research from HiRISE stereo images. On the surface, which is in the Jezero Crater on Mars, a rover with a virtual Mastcam-Z was placed. This makes it possible to simulate an image with the same focal length and content as imaged from Mastcam-Z. In the left yellow framed window on the upper right side such a simulated image is shown. From several such images a landscape mosaic as created by Mastcam-Z can be simulated. This PRo3D function is used for example to discuss the most suitable rover locations to capture locations of interest with the Mars 2020 Science Team. Credits: NASA/JPL/ASU/MSSS/JR/VRVis/ÖAW

The Austrian Academy of Sciences (Andreas Bechtold as PhD student and Christian Koeberl as supervisor) is together with JOANNEUM RESEARCH (Gerhard Paar as Mastcam-Z Co-Investigator) and the visualization specialists from VRVis (PRo3D software), part of the

Mastcam-Z Science Team and contributes expertise in the field of meteorite and impact research in planetary geology. Funded by the Austrian Research Promotion Agency (FFG).

<https://www.joanneum.at/>

<https://www.vrvis.at/>

<https://mastcamz.asu.edu/>

<https://mars.nasa.gov/mars2020/>

Project time frame:

01.01.2023 – 31.12.2024