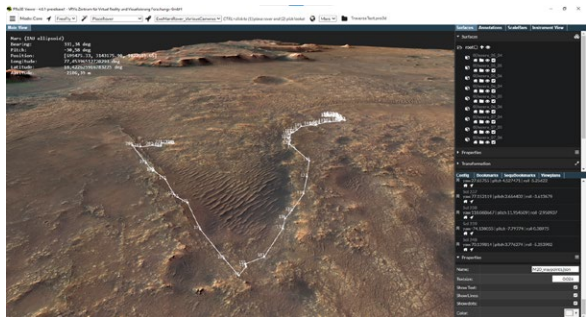
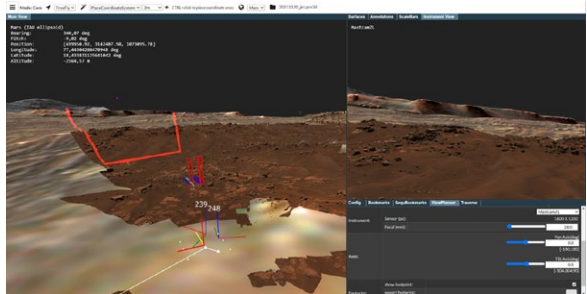


# Space Technology Visual Computing Solutions for Space and Planetary Research

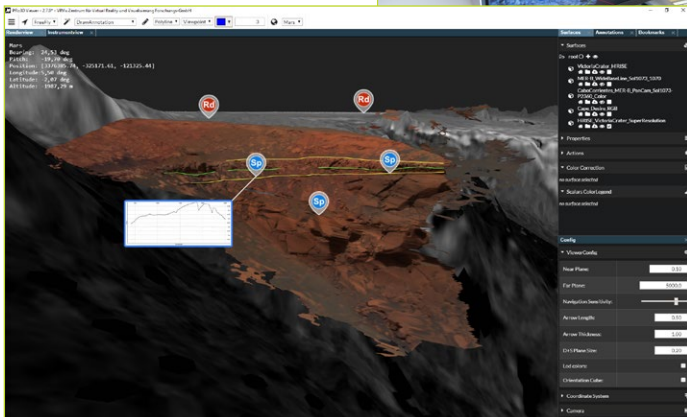
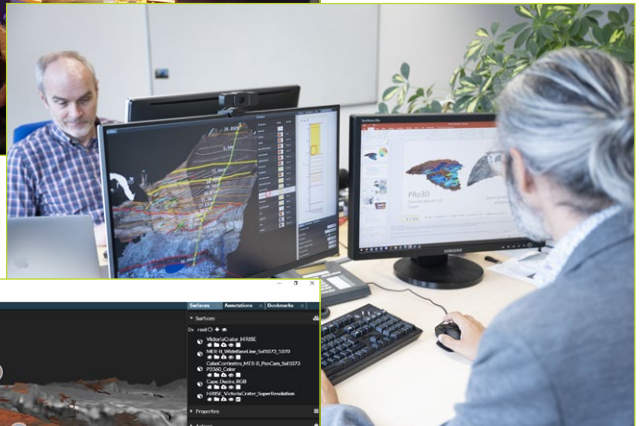


**v r vis**

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# Space Technology

VRVis has substantial experience in the field of geospatial visualization to render huge geospatial datasets (e.g., planetary surfaces) in real-time, enabling virtual exploration and analysis. VRVis participated in the EU-FP7 project PRoViDE, the ESA ExoMars Pancam, and the NASA Mastcam-Z projects, where we developed the PRo3D viewer for exploration and analysis of planetary surfaces.



## Our solutions

### ■ Interactive 3D visualization for space exploration

In the context of the Mars rover missions Perseverance of NASA as well as ExoMars of ESA, VRVis has developed the unique 3D viewer PRo3D, which makes it possible to interactively explore highly accurate planetary surface reconstructions. They are based on rover and orbiter imagery and created by our partner Joanneum Research. PRo3D users can explore huge datasets interactively and perform measurements of morphological and geological features. Learn more about PRo3D: <https://pro3d.space>

### ■ Analysis tools for planetary geology

Highly detailed 3D reconstructions from satellite and ground-based sensor data enable geologists to analyze the surface structures of planets, such as Mars. Significant here is the possibility of targeted geological interpretations. PRo3D offers special tools that allow scientists to work synergistically to analyze, annotate, and comprehensively explore heterogeneous mission data in a single framework.

### ■ Simulation and generation of training data for deep learning

For the training of a deep learning system, which lets rovers „autonomously“ identify relevant targets for image capturing and on-site sampling, VRVis created a method to automatically render a wide variety of images from existing reconstructions of the Martian surface. The DL system was trained to detect shatter cones caused by asteroid impacts.

### ■ Extended reality for space weather exploration

Space weather, such as solar storms, can affect Earth in a serious manner. Due to the high complexity, it is crucial to present the topic in an understandable way for scientists as well as the public. Using innovative VR and AR solutions, we collaborate with the German Aerospace Center (DLR) to utilize extended reality to visualize complex weather data in a low-threshold way: for human-centered analysis, simulation, and communication.

### ■ Super Resolution Reconstruction for the optimization of satellite imagery

Satellite images are major data sources. However, many satellite images, especially those freely available, lack the level of detail necessary for effective work and research. To address this, VRVis developed AI-based solutions that refine the resolution of freely available satellite imagery using adapted Super Resolution Reconstruction methods. One use case is to create AI-based monitoring of small-scale agricultural areas that supports sustainable agriculture in the sense of the European Green Deal.

# Space Technology by VRVis

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## Scientific partners



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