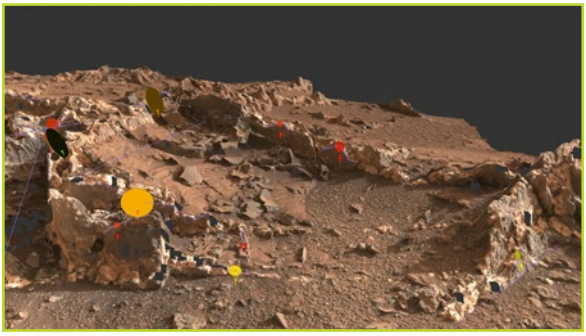
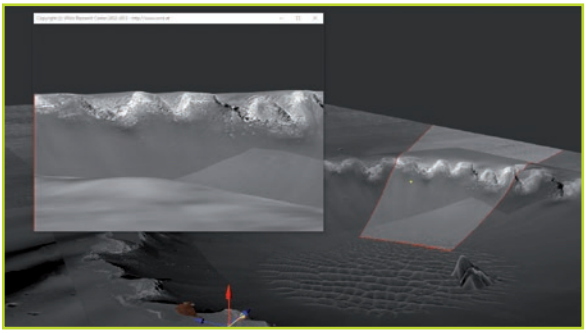
PRo3D Viewer

An interactive 3D visualization tool.





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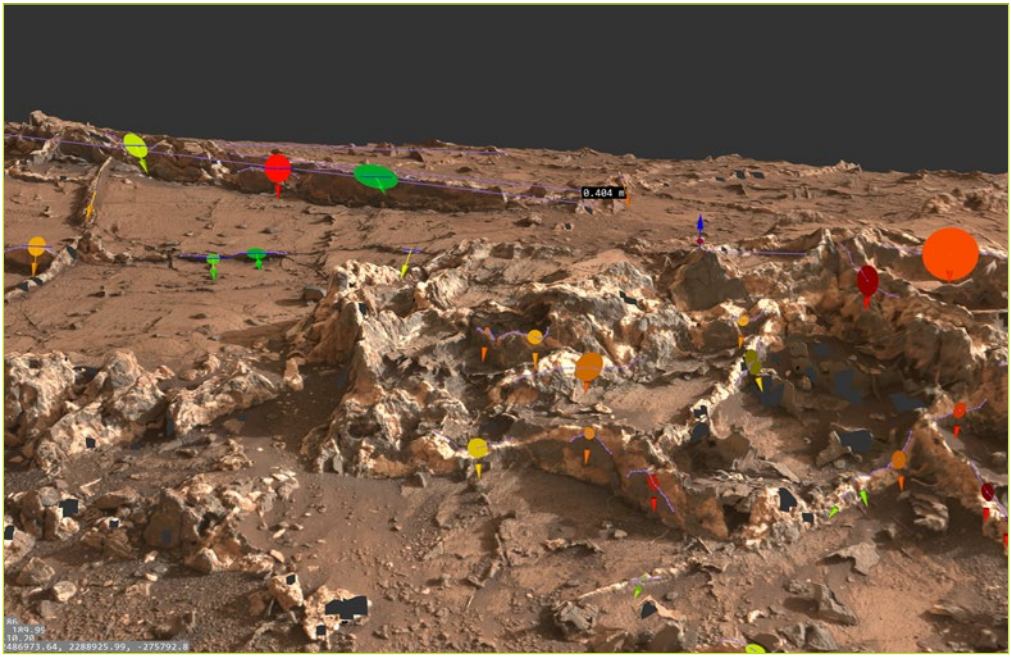
PRo3D, short for Planetary Robotics 3D Viewer, is an interactive 3D visualization tool to allow planetary scientists to work with high-resolution 3D reconstructions of the Martian surface.

For the past 5 years, our team geared the development of PRo3D towards providing **planetary geologists** with interactive tools to digitize geological features on digital outcrop models (DOMs) of the Martian surface. During the fruitful cooperation with geologists from the Imperial College of London, PRo3D has emerged as their main tool to conduct remote geological analysis, which lead to many publications and talks in the geological science community.

Planetary geology is the most elaborately supported use-case of PRo3D; however, we strive to expand our user groups by addressing other use-cases, so we have also developed features for supporting science goals in **landing site selection** and **mission planning.**

We developed PRo3D within the Aardvark.Media framework as part of the Aardvark Platform for scientific rendering and visualization established and used for many other projects at VRVis.

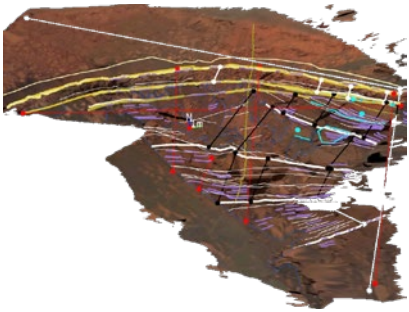


A 3D view of the rock formation "Garden City" on Mars, including dip-and-strike annotations for evaluating layer orientations.

Features of PRo3D

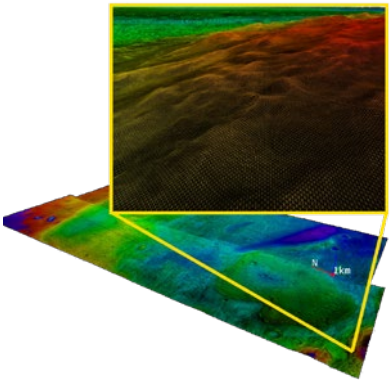
Geological Annotation

PRo3D lets users pick points on the 3D surface at the full resolution of the data present. The tools encompass point, line, and polyline annotations, while line segments are projected onto the surface. PRo3D computes various measurements at the highest possible accuracy, such as the distance along a 3D surface or dip-and-strike orientations of sediment structures.



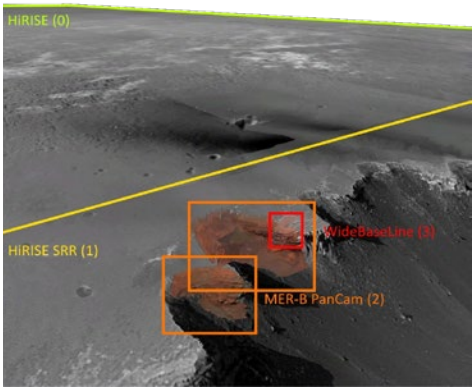
Large Data

Surface reconstructions from high-resolution satellite images can easily yield gigabytes of data in terms of geometry, imagery, and additional layers. With PRo3D, users can explore huge datasets interactively and even perform measurements of topographic features. The displayed dataset on the right consists of 2GB of raw 3D position vectors, a 1GB elevation map, and 10GB of image data rendered at interactive framerates with commodity hardware, utilizing adjustable level-of-detail and out-of-core techniques.



3D Layers

Although, PRo3D is not a GIS system, we need to provide our users with typical GIS functionality to solve their geospatial problems, such as evaluating topographic or geological features. Our 3D layering technique allows a seamless integration of different reconstructions present at a single location. Unlike image or DTM layering, we allow users to blend full 3D data by assigning rendering priorities, which is crucial to explore reconstructions from multiple rover camera instruments or unify satellite image reconstruction and close-up DOMs from laser scanners or rover cameras.



PRo3D

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