

FIRST RESULTS FROM THE COLOUR AND STEREO SURFACE IMAGING SYSTEM (CaSSIS) OF EXOMARS TRACE GAS ORBITER (TGO)

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I will present the concept of the CaSSIS instrument that has been imaging the surface of Mars from orbit since April 2018 and discuss some of the early results.

Keywords: Mars, surface, imaging

1. Exomars Trace Gas Orbiter

The Colour and Stereo Surface Imaging System (CaSSIS) is one of the four scientific instruments of the Trace Gas Orbiter (TGO), the first step of ESA's Exomars program and the latest addition to the fleet of spacecraft scrutinizing the surface of Mars from orbit. The overarching scientific goals of the TGO are to measure the atmospheric composition of the Martian atmosphere with very high precision and to look for possible sources for the trace gases at the surface or in the subsurface. Trace gases are indeed key for our understanding of current geological and possibly biological activity on Mars as they could be the products of volcanism, hydrothermal activity or metabolism. The TGO also supports other current and future missions by providing communication relay for lander and rovers and by characterizing and certifying possible future landing sites.

2. CaSSIS

CaSSIS is the scientific imager of TGO and supports the scientific and technological objectives of the mission by imaging the surface of Mars with a resolution of 4.5 metres per pixels, in up to four colours and in stereo, in order to retrieve quantitatively the topography of the surface. CaSSIS was built at the University of Bern with hardware contributions from the University of Padova (Italy) and the Space Science Center of Warsaw (Poland). Colour images are recorded by a 2048x2048 pixels CMOS detector covered by four colour filters at the focus of an off-axis four-mirrors telescope with a 13.5 cm primary mirror. This optical system comprising the telescope and the detector is mounted on a rotation mechanism that serves two purposes: compensate for the rotation of the spacecraft and allow for stereo imaging by taking two images of the same targets from two different positions on the orbit.

After presenting the concept of the instrument, I will show a selection of some of the first images acquired from the nominal science orbit since April 2018 and discuss briefly the scientific questions behind these images. Some of the themes covered will be: the ancient alteration of the Martian crust by water, the current Martian climate, the diurnal and seasonal volatiles cycles.

References

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