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The Close-Up Camera of the Marco-Polo-R Asteroid Mission, Science Objectives and Description

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Abstract

The CUC (Close-Up Camera) is part of the selected scientific payload for the MarcoPolo-R mission. It is a powerful, miniaturized, low-power, efficient and highly adaptive system of 820 g, composed of three main parts: a flexible structure focus mechanism allows the acquisition of sharp images of any target from 10 cm to infinity; a colour Active Pixel Sensor with 2652 x 1768 x 3 pixels provides RGB colours keeping the spatial resolution; a high-performance integrated electronics system allows a good flexibility for the operations of the CUC.

The CUC is designed to characterize at high resolution and in colour the sampling area and provide the geological context of the sample prior to the sampling operations, which is crucial for the subsequent analysis of the sample back to Earth. The aim is to determine physical key properties of the target's surface, such as grain size distribution, textural, mineralogical, structural, and morphological details in geologic materials, influence of space weathering processes. Thanks to its varying focal length, CUC images can also be acquired before and after the sampling operation:

- during the descent, to provide information on the unperturbed regolith surface state of a larger area around the sampling site,

- during the ascent, to study how the sampling process will have altered the structural properties of the surface.

With its ~14° field of view (diagonal), the CUC can also contribute to the local and global characterization phases, in synergy with the other instruments.