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CONCEPTS FOR WIDE FIELD CAMERAS ON-BOARD SMALL ROVER MISSIONS

Abstract

Optical wide field imaging cameras are the core components of any planetary surface mission. They provide the necessary surface view to support decision taking in operations, as well as deliver data to perform surface navigation of highest precision, and to identify worthwhile scientific targets for up-close investigation. Very importantly, optical images are the lasting public legacy of any robotic surface mission, and thus represent crucial products for public outreach. The cameras on-board small rover missions are usually a compromise of the performances required to reach the operational and scientific goals, and the mass and complexity envelope, and cost. For example, scientific high performance camera systems would employ sets of filters to obtain images in different wavelengths to obtain the spectrophotometric data. However, the involved mechanical complexity of such a system is often prohibitive for small missions. The use of three band (RGB) color sensors is a compromise as it allows to obtain at least some basic spectral resolution, while maintaining system complexity at a low level. To discuss the various tradeoffs this paper presents the imaging system of a small lunar rover in the 10kg class. This system consists of two identical cameras, one of which acts as prime and one as secondary camera. The component identity is beneficial in view of minimizing system and development complexity, as well as suitable orientation on the rover provides operational redundancy. This paper discusses the considered use cases, operations scenarios, the thus deduced requirements, and their weighing in view of the different design goals for the imaging system. The camera system design parameters are shown, and how these fit in the overall mission concept, and the anticipated usage, and mission boundaries.