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Author: Dr. Imène TALEB
Agence Spatiale Algérienne (ASAL), Algeria

Dr. Abdelmadjid Lassakeur
Agence Spatiale Algérienne (ASAL), Algeria

A SURVEY OF COMPACT OPTICAL CAMERAS FOR EARTH OBSERVATION CUBESAT MISSIONS

Abstract

There are currently projects implementing nanosatellites or constellations of the CubeSat class nanosatellites. This type of platform is growing at the speed of light, it has several advantages in terms of cost, deployment, and launch, it paves the way for the development of a multitude of missions, such as Earth observation, astronomical, environmental, weather missions. CubeSats are used for technological and scientific demonstration missions but also constitute a training tool in various and varied fields. The enthusiasm of universities and space companies for these nanosatellites on the market is rapidly increasing. This lightweight spacecraft use increasingly compact imagers for image acquisition and Earth observation missions. Indeed, the technological advances made to optical sensors, particularly in terms of the miniaturization of electronic components and optical systems such as CMOS detectors, filters, and electronic modules, have led to the appearance of new solutions. When selecting an imager for a spacecraft mission, it is important to know several parameters, such as cost, the technical specifications, and performance criteria, in terms of spatial, spectral, and radiometric resolutions and swath. The choice of an imager in a satellite mission, whether onboard as a main or secondary payload, must be justified by meeting the defined mission requirements. Therefore, the importance of drawing up a state of art, grouping together all the optical cameras developed and embedded to date would be an essential tool for CubeSat designers. This paper presents a detailed survey of miniaturized optical cameras, defining the technical specifications of the imagers in the context of a mission analysis of Earth observation CubeSat missions. The work provides guidelines for future CubeSat missions, the performances and constraints of the cameras are presented in such a way as to serve for the choice and decisions according to the requirements fixed initially by the mission.