IAF EARTH OBSERVATION SYMPOSIUM (B1)
Interactive Presentations - IAF EARTH OBSERVATION SYMPOSIUM (IP)

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

Dr. Imène TALEB
Agence Spatiale Algérienne (ASAL), Algeria
Dr. Mohammed Amine Meghabber
Agence Spatiale Algérienne (ASAL), Algeria

ASSESSMENT OF THE CUBESATS CAPABILITIES FOR HIGH-RESOLUTION EARTH OBSERVATION MISSIONS

Abstract

Over the last decade, CubeSats have evolved from purely educational missions for universities as a tool for space technology development and scientific research to standard platforms for technology demonstration and scientific instrumentation. This class of satellites is increasingly being used for Earth observation, remote sensing, communications, as well as for astronomical applications. CubeSats have been able to impose themselves in the category of nanosatellites and microsatellites, due to their advantages in terms of small size, development time, and low cost compared to other types of satellites, as well as the ease of technology using commercial off-the-shelf (COTS) components, and the possibility of launching several CubeSats with a single rocket launch, forming very large constellations or clusters of CubeSats. The paper aims to assess the state-of-the-art CubeSats capabilities of providing high-resolution Earth observation missions based on COTS products for up to 16U CubeSats platforms, in terms of payload capabilities, performance of the attitude and orbit control system, and the power system. The technological advances observed in optical sensors, particularly in terms of the miniaturization of electronic components and optical systems such as CMOS detectors, and filters, have led to the appearance of new promising solutions. The choice of camera payloads for a satellite mission must be justified by meeting the defined mission requirements, thus, drawing up a state of art, and grouping together the high-resolution optical cameras developed and successfully launched to date, would be an essential tool for CubeSat designers. This paper presents ultimately, a survey of miniaturized optical cameras, defining the technical specifications of the cameras in the context of a mission analysis of high-resolution Earth Observation CubeSat missions. This work provides guidelines for future CubeSat missions, in addition, the performances and constraints of the cameras are presented in such a way as to serve for the payload selection according to the mission requirements initially fixed.