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IN-FLIGHT RESULTS OF THE NAPA-2 TURN-KEY HIGH RESOLUTION IMAGING SYSTEM – A STEPPING STONE TO WORLD-LEADING EO MISSIONS USING CUBESAT TECHNOLOGY

Abstract

Earth Observation has grown to become a key-application for CubeSats enabling low-latency, global imagery to customers. With the earlier development of the 6U NAPA-1 satellite ISISPACE joined the ranks and built-up valuable experience with respect to platform performance and data processing. Confined to snapshot imaging only with NAPA-1, ISISPACE took it up a notch through the development of NAPA-2. NAPA-2 is another 6U Earth Observation satellite housing the Simera Sense MultiScape 100 CIS: a 7-band multi-spectral line-scan imager. This turn-key EO system offers not only an impressive ground sampling distance of 5m but also includes an on-ground data calibration and processing chain through FarEarth, a system developed by Pinkmatter Solutions.

With its launch and commissioning completed, tons of images were taken, and valuable data was gathered specifically for the attitude determination and orbital control system (AOCS). The AOCS, a completely new ISISPACE built, has successfully supported the imager with forward-motion-compensation (FMC) maneuvers, stable attitude control for long line-scans, and high levels of time-delay integration (TDI).

The NAPA-2 system and its operational chain covering the space and ground segment, will be described. Flight planning and day-to-day operations have been carried out fully by ISISPACE building up its expertise further with mission planning, automation, and handling large data volumes. The resulting performance of the AOCS, the platform, and camera and the iterations performed between them for the various maneuvers will be highlighted in this paper. In particular, the occurrence of jitter and stability – both vital for imaging – and other lessons learnt will be discussed. The many images taken for, amongst others, calibration purposes will be shared, showing the image product types, and the images before and after on-ground calibration. The calibration process itself, including geometrical and radiometric calibration, will be elaborated on as well.

The experience gained by the development of the NAPA-2 mission allows ISISPACE to support more demanding missions with confidence, such as the proposed ESA Scout mission TANGO, which requires Forward Motion Compensation and stable pointing, as well as higher resolution imaging missions.