

25th IAA SYMPOSIUM ON SMALL SATELLITE MISSIONS (B4)
19th Workshop on Small Satellite Programmes at the Service of Developing Countries (1)

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DESIGN, DEVELOPMENT, TESTS AND FIRST FLIGHT RESULTS OF 1KUNS-PF, THE FIRST
KENYAN UNIVERSITY CUBESAT

Abstract

1KUNS-PF (1st Kenyan University Nano Satellite – Precursor Flight) is the first 1-Unit CubeSat developed by the Republic of Kenya, and the first nano-satellite selected for the “KiboCUBE” programme. This is the result of the cooperation between the United Nations Office for Outer Space Affairs (UNOOSA) and the Japan Aerospace Exploration Agency (JAXA), and it is aimed to provide developing countries with the opportunity for a CubeSat deployment from the International Space Station (ISS) using the Japanese Experiment Module (Kibo). 1KUNS-PF has been designed, constructed, tested and prepared for launch by students of the University of Nairobi and of Sapienza University of Rome. The development was assisted by the Kenyan Space Agency (KSA) and the Italian Space Agency (ASI), with the support of the Italian companies NPC (New Product Concept) and Robotics S.r.l. (a Sapienza Spin Off). The mission represents a precursor flight for the IKUNS mission (Italian-Kenyan University Nano-Satellites), a project, managed by Sapienza and ASI, with the collaboration of the University of Nairobi, aimed at allowing Kenyan and Italian students to develop 1U and 6U CubeSats. The mission objective is to acquire, store and transmit to ground panchromatic images of the East Africa Region, using three Commercial-Off-The-Shelf (COTS) micro-cameras. The telemetry link will take advantage of an on-board transceiver

and two ground stations, one in Rome, Italy and the other in Malindi, Kenya. The secondary mission objective is the in-orbit functional verification of several components, both COTS and in-house developed, designed for the IKUNS mission. 1KUNS-PF will provide the possibility to test the performances of the chosen components and verify their behaviour in the space environment for the development of the IKUNS CubeSats. The development and integration of the satellite took place between May and October of 2017, while the environmental testing campaign was performed at the Sapienza facilities between November and December of 2017. On January 16, 2018, the CubeSat development team formally handed over 1KUNS-PF to JAXA, at the Tsukuba Space Center (Japan). The nano-satellite is expected to be deployed from the Japanese Experiment Module (Kibo) on the ISS in Spring 2018. This paper will describe the development and integration of the nanosatellite, the results of the environmental tests and the first in-orbit operations of 1KUNS-PF.