IAF SPACE EDUCATION AND OUTREACH SYMPOSIUM (E1)
On Track - Undergraduate Space Education (3)

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EDUCATIONAL ACTIVITIES ON MODEL ROCKETRY BY SAPIENZA UNIVERSITY AT THE BROGLIO SPACE CENTER IN MALINDI (KENYA)

Abstract

Historically, Italy has been the third country in the world to build, launch, and operate a satellite on its own efforts: the San Marco 1 spacecraft in 1964. As part of the San Marco programme, the Broglio Space Center (BSC) in Malindi, Kenya was used as operative spaceport from 1964 to 1988. In those years 27 launches were performed, including sounding rockets and low-weight payload orbital flights.

Thanks to an international collaboration among the Italian and Kenyan Space Agencies and Sapienza University of Rome, a partial restart of the rocketry activity from BSC is sought, with the long term purpose of restoring the site in order to allow for the operation of sounding rockets and student space activities.

The first step in such a challenging program is a training project for students from Kenyan Universities and young members of the Kenya Space Agency (KSA), which is the topic of the present paper. The training activities are aimed at the design, build, and launch of single-stage rocket models reaching altitudes between 100 and 1000 meters.

The first phase of the educational activities is carried out at Sapienza University of Rome in Italy through a one-month intensive program. After theoretical lectures, 40 undergraduate students dive into the engineering design and construction of their rockets. They take action in every step of the process, from the definition of the rocket propulsion apparatus to the integration of telemetry systems and the preparation of atmospheric measurement experiments, and eventually to the launches. Two Kenyan students who have participated to this course have successfully launched their first rocket model to an altitude of 100 meters.

The second phase of the project is carried out at the BSC in Kenya, where 4 groups of 4 Kenyan students/engineers each take on a challenge to perform a flight reaching a specific altitude. Students and young engineers are responsible for team organization by distributing the workload, for choosing the payload design, components integration, operation verification, launch preparation and execution, and finally for data analysis.

This training program is the occasion for young African students and engineers to be initiated to the field of rocket science at an affordable cost. The process of designing and launching a rocket model yields a

problem- and team-based learning process resulting in an effective pedagogical method, which is enriched by the multicultural and international nature of the activity.