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COMPASS, BUGS AND REDEMPTION: EDUCATIONAL EXPERIMENTS OF THE UNIVERSITY OF BOLOGNA ON SOUNDING ROCKETS AND STRATOSPHERIC BALLOONS

Abstract

Designing and realizing a technological experiment plays a fundamental role in the training of young aerospace engineers. *Space Robotics Laboratory (SRL)* of the *II Faculty of Engineering* of the University of Bologna *Alma Mater Studiorum* carries out several training activities, seizing the opportunities made available from European Space Agency, in order to provide the students a real "hands-on" education. This paper describes the *SRL*'s students activities in the framework of the REXUS/BEXUS Programme, which provides a unique opportunity to perform student experiments onboard sounding rockets (REXUS) and stratospheric balloons (BEXUS). This educational programme is realised under a bilateral Agency Agreement between the German Aerospace Center (DLR) and the Swedish National Space Board (SNSB). The Swedish share of the payload has been made available to students from other European countries through a collaboration with the European Space Agency (ESA). EuroLaunch, a cooperation between the Esrange Space Center of the Swedish Space Corporation (SSC) and the Mobile Rocket Base (MORABA) of DLR, is responsible for the campaign management and operations of the launch vehicles. Experts from ESA, SSC and DLR provide technical support to the student teams throughout the project.

Two student teams from the *SRL* have successfully participated to the REXUS/BEXUS campaigns: COMPASS on BEXUS-9 on October 2009 and BUGS on REXUS-7 on March 2010.

COMPASS team has successfully performed its experiment measuring and analysing the geomagnetic field and solar flux; in particular the students have been able to verify the accuracy of the standard IGRF model at a local scale. BUGS experiment aimed to perform in near space conditions the deployment test of an innovative boom for gravity gradient stabilization for small satellites: the experiment allowed to analyse the behaviour of the boom and to qualify it for space missions.

Currently a new experiment, REDEMPTION, was selected from ESA to fly onboard REXUS on March 2012. Through REDEMPTION experiment, students will be able to evaluate the feasibility of an Active Debris Removal system based on a polyurethane expanding foam, to be used as a link between cleaner satellite and debris.

The above mentioned experiments are described in this paper both from the technical point of view, analysing how the teams have reached their scientific objectives, and from the educational point of view,

discussing the lessons learnt working in team and the skills acquired throughout the whole design process.