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HANDS-ON SPACE EDUCATION WITH REXUS/BEXUS - ROCKET AND BALLOON EXPERIMENTS FOR UNIVERSITY STUDENTS

Abstract

REXUS/BEXUS (Rocket and Balloon Experiments for University Students) is a German-Swedish student programme, realised under a bilateral agreement between the German Aerospace Center (DLR) and the Swedish National Space Board (SNSB), in cooperation with the European Space Agency's (ESA) Education office. Each year the programme allows up to 20 student teams from across Europe to participate in an educational programme which gives them the opportunity to fly their 'scientific' or technology demonstrator experiments on a sounding rocket or stratospheric balloon. The launches take place from SSC's Esrange Space Centre in northern Sweden and are managed and operated by EuroLaunch, a cooperation between Esrange and DLR's Mobile Rocket Base (MORABA). Experts from DLR, SSC, ZARM and ESA provide technical support to the teams throughout the programme.

Providing students with a hands-on experience within the space industry, the programme exposes students to numerous space agencies/organisations and enables direct transfer of knowledge from agency and industry experts. Key programme objectives include the provision of important hard and soft skills as well as the inspiration and motivation required to pursue further education, research and/or employment in space related fields.

The programme incorporates a full project life cycle, including a series of reviews, a thorough integration and testing campaign, launch and results dissemination. Since its establishment in 2007 over 1300 students have participated in the programme with the launch of over 130 experiments across 18 rockets and 20 balloons.

REXUS experiments are launched on an unguided, spin-stabilised rocket which takes approximately 40 kg of experiments to an altitude of up to 90 km. BEXUS experiments are typically lifted by a 12,000 m3 balloon to an altitude of 25-30 km, depending on total experiment mass (40-100 kg). The flight duration is 2-5 hours.

Experiments have performed investigations in a diverse range of topics from atmospheric physics to biology and tested numerous technologies, some of which have been developed to fly on other platforms (e.g. CubeSats). Participants' work on REXUS/BEXUS experiments has formed the basis for hundreds of bachelor, master and PhD theses, as well as appearing in numerous peer-reviewed journals. Through 'alumni' surveys and participant statistics, it's possible to see a growing reach within European universities, an increasing satisfaction with programme participation as well as increased interest in, and realised, employment in the space industry.

This paper gives an overview of this hands-on educational activity, its improvement over the years and the benefits for the participants.