

SPACE EDUCATION AND OUTREACH SYMPOSIUM (E1)
“Hands-On” Space Education (1)

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REXUS-4 - VEHICLE AND SUBSYSTEM DESIGN, FLIGHT PERFORMANCE AND EXPERIMENTS

Abstract

In October 2008 EuroLaunch launched the REXUS-4 rocket at Esrange in Northern Sweden comprising five technological student experiments from German and Swedish Universities. EuroLaunch is a joint venture of the DLR Mobile Rocket Base and the SSC Esrange Space Center. REXUS-4 was a two-stage unguided solid propellant sounding rocket. The vehicle consisted of a Nike motor as 1st stage, an Improved Orion as 2nd stage, a motor adapter, a recovery system, a service system, two experiment modules and a nosecone. The rocket was spin-stabilized during the ascent. After the burn-out of the 2nd stage a yoyo system de-spun the rocket to a rate of only a few degrees per second. At an altitude of 71 km the nosecone was jettisoned. The payload reached its apogee in 175 km. The REXUS-4 mission was the maiden flight of a new developed Service System. It has the capability to supply five experiments with 1 Ampere at 28 Volt power and serial data interface for up- and downlink. The service system provides GPS position and velocity data, 3-axis acceleration data and rotation rates from 3-axis rate gyros. A standard TV channel can be used by one experiment. After the successful demonstration of the new REXUS service system on the REXUS-4 flight, it will now be implemented into the REXUS/BEXUS student programme. This German-Swedish student programme offers annual flights for student experiments on sounding rockets and stratospheric balloons. This paper will give a short overview on the development of the REXUS service system and points out the advantages of using standard interfaces for student experiments. Further it will contain a description of the REXUS-4 vehicle, the mission, the campaign and the experiments. Two experiments will be described in more detail. During the ballistic flight the MIRIAM experiment of the University of Armed Forces in München and the Mars Society Germany was separated from the main payload to test a balloon system that will be used for the entry of a probe in the Martian atmosphere in the future. Several cameras on the REXUS-4 payload as well as cameras and telemetry on the MIRIAM flight system monitored the separation and inflation during the ballistic flight phase. The VERTICAL experiment from the Technical University München verified the startup procedures of the CubeSat MOVE and its solar panel deployment under real spaceflight conditions. The paper will contain analyzed flight results.