

SMALL SATELLITE MISSIONS SYMPOSIUM (B4)
Small Satellite Operations (3)

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FLIGHT RESULTS OF THE COMPASS-1 PICOSATELLITE MISSION

Abstract

COMPASS-1, the first satellite of the FH Aachen University of Applied Sciences, was successfully launched into sun-synchronous LEO on April 28, 2008. The launch took place at the Indian space port Sriharikota, as part of the PSLV-C9 small satellite cluster launch. COMPASS-1 is a 1-kilogram CubeSat with dimensions of 10x10x10cm³. Students had carried out the design and development over a time span of about four years. Main mission objectives of COMPASS-1 were to take pictures of the Earth, to validate a GPS receiver from the German Aerospace Center (DLR), and to verify the operation of an active magnetic attitude control system.

The mission operation was initially carried out from the primary ground station in Aachen, Germany (FH Aachen University of Applied Sciences) and the secondary station in Tainan, Taiwan (National Cheng Kung University). Technical difficulties in the operation of the stations and the serious limitation in daily contact times nearly brought the mission to a premature end, when the satellite started to exhibit unexpected power failures after about one month in orbit. Fortunately with the freely support of various radio amateurs around the world the satellite had been recovered and from then on operated nominally. The network of the ham community had further helped to continue the COMPASS-1 low-cost university satellite mission, as in monitoring the satellite's health status and to ensure a continuous download of mission and health data.

Various data have been received from the COMPASS-1 picosatellite mission. This paper describes the evaluation of the temperature, power, and attitude data, which is assumed to be of particular interest for future CubeSat and picosatellite designs. Not all of the mission objectives have been met due to technical problems that were not identified during the ground testing. In overall, however, the COMPASS-1 CubeSat bus has demonstrated to be suitable for operation in space. The satellite is still operational and will be further used for educational purposes, within the DLR School-lab.