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NAVIS: PERFORMANCE EVALUATION OF THE AAUSAT3 CUBESAT USING STRATOSPHERIC  
BALLOON FLIGHT**Abstract**

**Purpose:** This paper describes the usage of a stratospheric balloon flight to test AAUSAT3, the third student satellite from Aalborg University. The experiment was carried out in October 2009, and includes a fully functional prototype of AAUSAT3 and ground station. The primary payload on AAUSAT3 is two radio receivers, designed to receive live position and identification signals from ships in open seas and around Greenland by monitoring AIS signals (Automatic Identification System) transmitted from ships.

**Methodology:** AAUSAT3 is divided into subsystems for a fault tolerant and modular design. This includes power supply, radio communication system and two AIS receivers: a hardware based receiver and a software defined receiver. All subsystems were tested during the balloon flight, and data was recorded in 24 km height for more than two hours. This paper presents detailed analysis of the AIS data, which is possible due to the highly predictable transmission interval in AIS, as well as the main data from the power supply and the communication system.

**Results:** The balloon flight resulted in more than 25000 correctly received AIS packages. For the software defined AIS receiver, 2 GB of raw intermediate frequency data was sampled and saved for further development of the software demodulator. The radio communication system successfully functioned at 9.6 kbps for the full balloon flight, which ended 200 km from the launch site. The power supply data is also presented, including current consumption and temperature of subsystems, providing a deep insight in the design choices of a low power CubeSat.

**Conclusion:** All expectations for the first real test of AAUSAT3 were fulfilled. The results presented shows that the AAUSAT3 prototype was fully functional, thus now the flight hardware and a few additional subsystems will be designed, built and tested. Participating in the balloon flight accelerated the development of AAUSAT3, as the advancement from individual prototypes to a functional distributed system was carried out in less than nine months. Currently, the aim for AAUSAT3 is a launch in the first half of 2011.