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AALTO-1 CUBESAT: THREE YEARS IN ORBIT

**Abstract**

Aalto 1, a three-unit CubeSat, built by students of Aalto university is the first Finnish satellite. The cubesat which was launched on June 2017 fulfilled many educational, technological and scientific objectives. It carries three experimental payloads: Aalto Spectral Imager (AaSI) designed by VTT technical research center in Finland is based on a piezo-actuated tunable Fabry-Perot Interferometer (FPI) to take images of the Earth in visible and near-infrared wavelength bands. Radiation monitor (RADMON) built by Turku University is an energetic particle detector which measures electron energies in the 0.7-10 MeV range and protons in the 10-200 MeV range. Electrostatic Plasma Brake (EPB) by Finnish Meteorological Institute is deorbiting technology which employs the coulomb drag interaction between the ionosphere and a long-charged tether in order to decrease the orbital altitude.

The platform designed by Aalto university consists of in house developed subsystems as well as commercial subsystems. The platform consists of a cold-redundant onboard computer (OBC) running Linux, Ultra High Frequency (UHF) and S-band radios, a navigation system based on GPS, an Electrical Power Subsystem (EPS) and an Attitude Determination Control Subsystem (ADCS), the latter two being commercially procured. The satellite was designed for two years in the orbit.

Aalto-1 was launched in sun-synchronous polar orbit at an altitude of about 500 km. The satellite platform partly fulfilled its requirements and allowed to either perform or attempt the experiments.

Although attitude control was partially functional, AaSI and RADMON were able to acquire valuable measurements. EPB was successfully commissioned but the tether deployment was not successful.

In this paper, we present the current status of Aalto 1 mission and key flight results of the instruments.