

29th IAA SYMPOSIUM ON SMALL SATELLITE MISSIONS (B4)
Interactive Presentations - 29th IAA SYMPOSIUM ON SMALL SATELLITE MISSIONS (IP)

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PROJECT APTAS - DEVELOPMENT OF A 1U CUBESAT PAYLOAD FOR INDEPENDENT
CALIBRATION AND TESTING OF EISCAT3D.

Abstract

There are many interesting aspects of Earth's upper atmosphere and near space environment to study. The 3D radar developed and built by EISCAT (EISCAT3D) will expand these possibilities and become a powerful tool to study these phenomena.

Industry collaboration between universities and startups or traditional companies can provide opportunities to mitigate this challenge, and often spark new technologies or innovative ways to utilize current technologies for new ventures. Therefore, Luleå University of Technology's first Cube-Sat (APTAS) has been working in co-operation with EISCAT to develop a payload to perform independent, redundancy testing for the radar system.

The payload will provide the ability to perform an independent form of testing for EISCAT3D. To achieve this, APTAS' very high frequency antenna will send a predefined signal to the instrument. The

received signal will be compared to its predicted value, allowing studies of how the instrument performs. Since normal satellite function uses the ultra high frequency band, the operation of the payload will not interfere with other satellite activities.

Due to the fact that APTAS' main scientific objective is earth observation, a significant portion of the 1U satellite was allocated to camera optics. Because of this, a traditional board did not fit, since the optics dominate most of the satellite's internal space. The solution was to adapt the payload board to fit around the camera lens, which was made possible by an in-house, custom fitted design based on APTAS' unique geometrical restraints.

This paper will discuss in detail the development and manufacturing of this payload, and more broadly how development of small-sat payloads can be designed, built, and managed by student organisations. In addition, the paper will cover the challenges attributed to the development of a student-led CubeSat and corresponding recommendations for possible improvements. Finally, the importance of proper and thorough documentation within a project involving a high rate of member rotation and quick development will be further highlighted.