

## **Observation of Gravity Waves From a Small Satellite by Means of an Infrared Camera**

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The NUTS (NTNU Test Satellite) is a satellite being built in a student CubeSat project at the Norwegian University of Science and Technology. The project was started in September 2010 and is a part of the Norwegian student satellite program run by NAROM (Norwegian Centre for Space-related Education). The NUTS project goals are to design, manufacture and launch a double CubeSat by 2014. The satellite will fly two transceivers in the amateur radio bands. Final year master students from several departments are the main contributors in the project.

As a main payload, an infrared camera designed to observe gravity waves in the middle atmosphere is planned. Gravity waves, created by air blowing over mountains and weather phenomena, propagate throughout the atmosphere and drive the large scale flows in the middle atmosphere. Despite this their properties are poorly understood, mainly due to a lack of observational data. At an altitude of about 90 km in the atmosphere we find a layer of OH molecules that emit short-wave infrared radiation. When gravity waves propagate through this layer wave patterns in the radiation intensity are observed. Ground observations have found the wavelength of these patterns to be around 20 km and wave phase speeds to be around 25 m/s. But such observations have been limited to a few ground stations, and the possibility for global coverage that observation from a satellite offers would be a useful contribution to further research.

We discuss the design of a camera system and observation schedule to derive global data on the wave parameters of wavelength, intensity, phase speed and direction within the Cubesat constraints of available power, weight, size and download data rate. The choice of an off-the-shelf infrared camera is also considered, as well as signal processing algorithms for image restoration and compression.

Preference for presentation: oral

Most suitable session: Scientific instruments/sensors on CubeSats (Session 2)

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