Iowa State University

CySat NOAA Licensee Public Summary

CySat-1 is a 3U CubeSat whose primary objective is the education of STEM to undergraduate students at Iowa State University. Students designed, fabricated, and tested the satellite hardware and software used in *CySat-1*. The science payload is composed of a Software Defined Radio (SDR) radiometer used for measuring soil moisture on Earth.

Cysat-1's SDR is a PicoZed SDR 2X2 System-On-Module (SOM) commercial off-the-shelf (COTS) component manufactured by Avnet. It is configured as a Dicke radiometer operating between 1.40 and 1.425 Ghz, and will be able to measure soil moisture for a 4,372 (109.323 km x 40 km) square kilometer area per measurement at the nadir. The radiometer will have an angular resolution of 110.267 kilometers as well as a system gain of 50 dB. The radiometer system has an antenna gain of 15-20dB and a pointing accuracy of ±5 degrees.

Cysat-1 uses an onboard flight computer for controlling the data acquisition on this mission. This will be initiated by the *CySat* team via uplink commands sent from the Iowa State University ground station. The data sent to the ground station will not be encrypted due to the use of amateur radio frequencies as well as the lack of pictures or video being sent to Earth. The requirement for encryption of data has been waived, and all data will be sent in a packet, plain-text format.

Cysat uses a COTS Attitude Determination and Control System (ADCS) produced by CubeSpace. This will align the CubeSat with Earth, which is detected with magnetometers and cameras with a 150 degree field of view, 1 Hz update rate, and a 1MP resolution CMOS plate. The CubeSat itself will be deployed from the International Space Station (ISS), meaning that it will have an inclination of 51.6 degrees, a perigee of 406 km and apogee of 411 km, and 15.5 revolutions per day. The payload of this satellite is expected to be active for a year at most. No images will be acquired from this mission.

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