[3]Cat-4: a 1U Cubesat Demonstration GNSS-R Mission

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[3]Cat-4 is a novel, single-unit CubeSat mission proposed for the "ESA Fly your Satellite 2017[1]" call that implements a "Flexible Microwave Payload" to sequentially perform: dual-band (L1 & L2) GNSS-Reflectometry (GNSS-R), L-band microwave radiometry with digital Radio Frequency Interference detection and mitigation techniques, and an Automatic Identification System (AIS) receiver. With this CubeSat it is expected to monitor biomass, ice cover, and maritime/fluvial vessel traffic. It becomes thus a demonstration of the CubeSat power to perform Earth Observation missions.

Fitting this in a single unit CubeSat has required a long learning process with our first two CubeSats developed at the UPC Nanosat Lab[2], and in parallel, in the development of Remote Sensing instrumentation in the UPC Remote Sensing Lab[3]. [3]Cat-4 inherits the lessons learnt from [3]Cat-2, which evaluates different GNSS-R techniques: interferometric, conventional and reconstructed-code.

This compression is enabled by the Nadir Antenna & Deployment Subsystem, which compacts three important points: 1) the L-band Helix Antenna with the required radiation features for scientific experiments, 2) a Teflon gravity boom that promotes the nadir pointing, and 3) a deployment mechanism that enables a smooth transition.

The Flexible Microwave Payload has been physically reduced by using a small low-power Software Defined Radio solution. This technology enables the combination of different payloads in a single board with a reduced consumption.

At present, the Critical Design Review (CDR) has been successfully passed, and the manufacturing of the subsystems has started. The latest details on the mission development and of the Software Defined GNSS-R receiver will be presented at the conference.

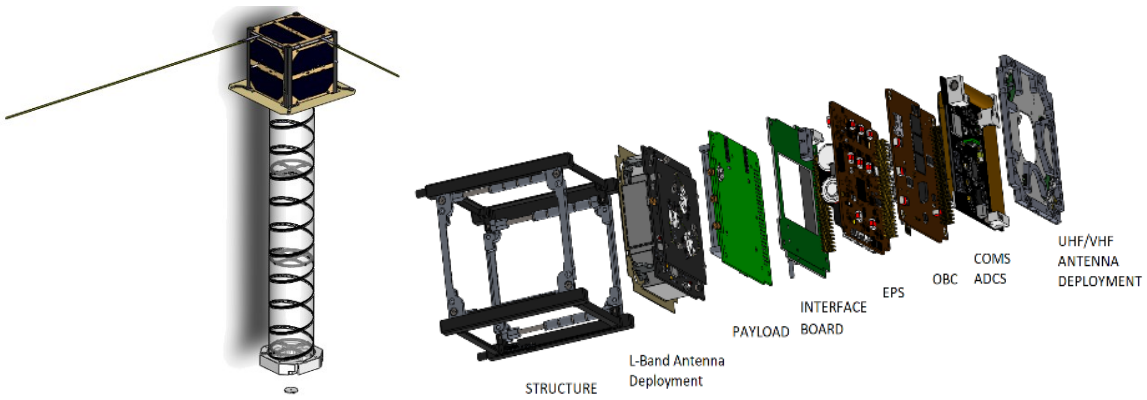

Figure 1 – Deployed [3]Cat-4 CubeSat and its subsystems

[1] http://m.esa.int/Education/CubeSats_-_Fly_Your_Satellite/Things_get_critical_for_CubeSat_teams
[2] http://nanosatlab.upc.edu/en
[3] http://www.tsc.upc.edu/rslab