50th STUDENT CONFERENCE (E2)
Student Team Competition (3-GTS.4)

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3U CUBESAT MISSION TO ASSESS VEGETATION HYDRATION STATUS AND HYDROLOGICAL INSTABILITY RISK

Abstract

The CubeSat team is a university student team based in Polytechnic of Turin which has a great tradition in developing cubesats missions. Its first launch dates back to 2012, when the cubesat e-st@r-I was delivered into orbit during Vega maiden flight; the second one, e-st@r-II, was launched in 2016, and it is still operative after being six years in orbit. Looking to the future is a necessity to continue a great tradition, and the new CubeSat team mission takes a step into one of the most pressing challenges of modern time: climate change. Climate change might have a catastrophic impact on humanity, and it requires an effort from all sectors of society to mitigate its effects. The CubeSat team contribution to the cause is to design a modular, cheap, and efficient 3U cubesat which will study the hydration status of vegetation by using an optical payload. The images collected by the onboard instrumentation are processed and enhanced through data fusion techniques and reconstruction algorithms. The idea is to use data obtainable in different frequency bands and from different images, and to combine them to have a more refined and high-resolution final data set. These algorithms would allow to collect higher quality data without requiring a higher quality (and thus more expensive) equipment. The novelty of this work is in these reconstruction algorithms applied in a educational CubeSat mission. Then, these data are sent to the CubeSat team ground station to assess the terrain hydration status. At this point, physical and propagation models are used to estimate the firing and the hydrologic instability risk. That helps identifying the best mitigation strategies and preserving the environment. The CubeSat team goal is to increase awareness on the theme and to encourage the academic community to focus on climate change researches.