

52nd IAF STUDENT CONFERENCE (E2)
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PROJECT IGNIS: CUBESAT-BASED EARTH THERMAL OBSERVATION USING COTS IMAGING
TECHNOLOGY**Abstract**

IGNIS (Infrared Geological Nano Imaging System) is an ongoing project led by a group of students at the University of Naples "Federico II". The main goal is to develop a 3U CubeSat by adapting a Commercial Off-The-Shelf (COTS) thermal camera to the space environment, combining an educational and an Earth Observation program.

The mission's purpose is to acquire thermal infrared remote sensing data for mapping the surface temperature of an area of interest. The target of this work is the Campi Flegrei area, a vast volcanic territory located northwest of the city of Naples: the increasing high-risk scenario makes its constant monitoring necessary due to hazardous volcanic phenomena that might damage the numerous populated centers close to the city of Naples.

By adapting the COTS thermal camera and exploiting the multiple advantages of a miniaturized satellite, IGNIS may be the perfect combination of education and innovation. It allows the students to put into practice their theoretical knowledge by designing innovative and low-cost space technologies.

In addition, IGNIS intends to be a dedicated mission and a potential new data source for the National Institute of Geophysics and Volcanology (INGV), which currently relies mainly on data collected from ground stations and occasionally from satellites in orbit for other purposes.

Indeed, IGNIS plans to offer a basis of comparison of the data collected and the ground-based ones, offering a resolution commensurate with the other satellites' and, thanks to its mission-dedicated orbit, a higher data collection frequency. A sun-synchronous orbit has been chosen: by using an infrared camera, it is necessary to acquire data during the night time. Moreover, a preliminary decay analysis conducted

using the open-source GMAT, with drag atmosphere and solar radiation pressure as main factors, showed a lifetime of 1.5 year.

The project team is currently involved in the Phase A of the mission: thus, the paper deals with its pre-design concept. The success of the mission should prove the reliability and feasibility of COTS applications in this field, to ensure future developments. For this reason, IGNIS aims to be the pioneer of a series of dedicated, cost-effective missions using COTS instrumentation to face local issues, such as the risk prone Campi Flegrei area, with high quality and frequency of collected data.