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EARTHNEXT: A VERY LOW EARTH ORBIT CUBESAT
MISSION FOR MULTISPECTRAL EARTH OBSERVATION

Abstract

EarthNext mission aims to provide added-value products and services for land and marine applications through the acquisition of high-resolution multispectral images, by operating a CubeSat platform in Very Low Earth Orbit (VLEO). Reduced costs for given performances, due to reduced payload dimensions and launch effort, lower implementation and operational risks, due to the lower impact likelihood with space debris and existing orbiting platforms, as well as easier disposal at end of life, without dedicated systems and strategies, are among the key benefits of VLEO orbits for Earth Observation satellites. However, associated with the mentioned advantages, several challenges need to be tackled in the mission

and system design, especially involving CubeSat platforms. Consideration must be drawn to the non-negligible effects of aerodynamic forces, with their related stability aspects, to the small communication windows and imager exposure time, resulting from the high relative ground speed, as well as to erosion effects caused by the high concentration of atomic oxygen.

Thanks to its pioneering approach and breakthrough goals, EarthNext has been selected within the ALCOR program of the Italian Space Agency. ALCOR aims at placing Italy in a condition of consolidated leadership in the CubeSat sector through appropriate investments of value, distributed between missions and technologies. EarthNext mission, funded up to phase B completion, relies on a 16Us CubeSat with 8Us allocated for the compact multispectral electro-optical payload and 8Us to the platform subsystems. These will include several state-of-the-art technologies to address the challenging mission scenario. An integrated electric propulsion system, using a safe, non-toxic, non-explosive, non-pressurised propellant, is the platform's core enabling technology. Besides this, an attitude control system able to perform slow-down maneuvers to increase time integration over target areas, an electrical power system with deployable solar arrays, a structural system able to withstand atomic oxygen erosion effects, and a state-of-the-art automation capability based on Artificial Intelligence, to overcome the constraints of conventional operation management, are further relevant EarthNext's features as the first VLEO CubeSat.

Along with Officina Stellare, prime contractor and responsible for the whole EarthNext project, AIKO Space, Planetek Italia, T4I - Technology for Propulsion and Innovation, TSD-Space and the Department of Industrial Engineering of the University of Naples "Federico II" belong to the team, which share the expertise and hold the know-how to provide an end-to-end solution, from the space segment design, development and verification, up to ground segment realization and products dissemination.