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IAF EARTH OBSERVATION SYMPOSIUM (B1)
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CUBEHAPS. SYNCRONIZED HAPS-SATELLITE EARTH OBSERVATION

Abstract

The stratosphere is the last asset to be gained by the aerospace industry with the so-called HAPS (High-Altitude Pseudo-Satellite). The goal is to offer at regional level stratosphere-based Earth Oboservation services, with enhanced and complementary performances compared to satellites. At Stratobotic, we have a different view: no more one big and complex platform, as majority try to achieve, but many small and flexible ones operating in swarms with very flexible mission profile and very low operative costs: the platforms are used where and when is requested. To do that we develop a small and reusable hybrid HAPS solution, applying the Cubesat paradigm to stratospheric platforms, called, indeed, CubeHAPS and with the goal to activate innovative Earth Observation services. CubeHAPS capability to operate in swarms allows to split a complex payload to different smaller parts and to cover an area of interest more efficiently, as in this way it is used the optimized number of HAPS to complete the demanded tasks. In the end, a long-lasting monitoring over a specific area, with high reusability and simplicity can be granted. No complex infrastructures are needed to operate them, and the flight authorizations are clear. The company goal is to work in synergies with existing space-based and airborne solutions, filling the technological and commercial gap between the space and ground infrastructures. The paper presents last company's achievements in terms of system architecture of a constellation integrating HAPSs and satellites for Earth Observation where the two platforms collaborate on-request to increase coverage, frequency, and resolution of observations. The mission planning software is the core element which allows the proper synchronization among platforms and it shall exploit specific simulation and optimization tools in order to schedule launches and/or trajectory corrections. First scope is to alternate the two kinds of observations launching stratospheric platforms with a short notice when and where it is requested a revisit time lower than the one provided by satellites. Then it is discussed the possibility to establish innovative EO products by merging images taken by satellites and HAPS thanks to advanced super-resolution and photogrammetry techniques. Finally, the proposed EO mixed constellation is the ideal contest for the exploitation of almost-real-time tipcue operations to track ground and mid-air moving targets or event-based observations. The possibility to establish direct satellite-HAPS communication

links and the opportunity to exploit a coordinated swarm of CubeHAPS are two key-enabling technologies inthisrespect.