



HABAIR - A New hybrid platform for aerial and oceanic observation

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Aerial and oceanic observations are often performed by remote sensing centered on satellite-born technology. This approach has restrictions resulting mainly from high costs, limitations on satellite coverage and resolution as well as the impossibility to upgrade or change onboard instrumentation.

High altitude balloons (HAB) have been used as low-cost observation platforms that allow to carry scientific instruments across the atmospheric column up to a near space environment. The applications of this platforms include the collection of atmospheric data, aerial imaging and test the feasibility of several systems under high altitude condition. However, this approach has also limitations resulting from poor flight control and uncertain payload retrieval, particularly when the mission is conducted near or above the sea. Alternatively, unmanned air vehicles (UAV) are used for remote sensing but, despite being controllable, UAVs have limitations in terms of range and autonomy. There is still the lack of a platform that offers low cost missions, flexibility on payloads as well as precision and long term analysis of specific locations.

HABAIR is the concept for an aerial hybrid platform for long term monitoring, and precise payload delivery. The proposed solution consists of anHAB that will passively carry an UAV as payload. When required, the UAV can be released and auto piloted to a predetermined location. The ability to control the UAV downwards allows integral payload recovery and reuse or precision payload placement.

Therefore, the HABAIR platform incorporates the low cost and high cargo capabilities of an aerostat that travels passively through the atmosphere to quickly reach targeted areas, but with low positional accuracy. When HABAIR reaches the target surroundings an UAV glider is released and initiates a controlled descent towards the intended coordinates, leveraging on UAVs navigation and positioning capabilities.

These two fundamental elements, HAB and UAV, together expand significantly the working envelope of these solutions and allow the rapid deployment of the proposed hybrid platform, as well as mission planning, resulting in an inexpensive solution to accomplish scientific missions. This solution can help to improve the bridge between space and surface instrumentation, adding to the available satellite information the detailed long-term analysis of targeted areas and allow the acquisition of data otherwise unreachable in a cost-effective manner. The use of this platform is particularly interesting in regions such as the Azores archipelago, dominated by vast areas of ocean and intense volcanic activity, as it can provide a low-cost solution for atmospheric sounding and monitoring, ocean surface monitoring, transport of scientific payload to remote areas of the ocean and place instrumentation on harsh environments such as volcanic areas or volcanic plumes.