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Title

Review of strategies for Stratospheric Airships Low-altitude Return Phase: Challenges and Risk Mitigation Strategy

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Abstract

Stratospheric airships, also known as high altitude airships belonging to the category of High Altitude Pseudo Satellites (HAPS), are unmanned aircraft that are designed to fly at high altitudes (18 to 22km) in the Earth's stratosphere. They have the potential to be used for a variety of applications such as telecommunications, weather monitoring, and scientific research. The unique capabilities of these airships, such as the ability to stay aloft for extended periods of time and their relatively low cost and environmental impact compared to satellites or manned aircraft, have made them an attractive option for a wide range of applications.

Despite the growing interest in stratospheric airships, there is a lack of a comprehensive review of the current state of research on their design, applications, and challenges (Kaya, et al., 2018; Li et al., 2019). One of the challenges in particular of stratospheric airships is the safe descend after a prolonged flight (that could be over a month) and return to the point of departure. These challenges were particularly highlighted by Jing et al (2022). Constraints here include the unexpected meteorological changes during the last trajectory of the descend, particularly challenging also in view of the power systems available and the battery and solar cell technology still in development.

Now worldwide, in Asia as well as in Europe and in North America, Stratospheric Airships are more actively being developed; it could be of interest to compare and describe the strategies in development for the landing phases of these initiatives (as far as available). This paper aims to survey the strategies of these different initiatives, in order to describe mitigation strategies for risks in the last landing phases to the point of return. From this description, common challenges and tentative strategies for solutions are described.

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