

Countering High-Altitude Platforms: Defending Against a New Generation of Aerial Threats

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Abstract: The development of high-altitude platforms (HAPs) is increasing military interest in the “edge of space”, the atmospheric volume below the Kármán line. Operating at tens of kilometres of altitude, HAPs occupy an airspace traditionally considered the boundary between aeronautics and astronautics, providing an alternative to low Earth orbit satellites and conventional airborne assets. The distinct advantages of HAPs—such as a broad line-of-sight, high endurance, and (limited) manoeuvrability—give them the potential to be a game-changer for the next-generation of aerial warfare. Although atmospheric and technological constraints severely limit the payload of fixed-wing HAPs, it cannot be ruled out that at least some of these systems will be able to serve as weapons platforms or otherwise be used for targeting.

This presentation will assess the challenges of countering HAPs due to their variety of types, unconventional altitude, speed, manoeuvrability and endurance. Existing countermeasures, primarily designed for conventional aircraft or low Earth orbit satellites, may be ill-suited for this high-altitude domain. Anti-HAP systems, possibly combining surface-to-air missiles, high-altitude interceptors, directed energy weapons and non-kinetic operations, will be examined for their viability and limitations. In particular, four aspects of anti-HAP warfare will be discussed: detection, identification, rules of engagement and engagement. Each of these aspects is associated with specific constraints, mainly related to technical limitations, legal ambiguities and/or operational procedures.

By examining HAPs as a versatile asset for near-space operations, the presentation will contribute to the discourse on high altitude airspace as a contested domain and inform about the evolving hybridisation of air and space-based military power.

Bottom-line-up-front: As the use of HAPs in military operations is likely to increase, the development of effective countermeasures will be essential to maintain the warfighting edge.

Problem statement: What are the main technical challenges of countering the HAPs? What are the main operational constraints? What are the main regulatory limitations?

So what?: This presentation aims to advance the understanding of HAPs and their implications for air defence. It highlights key challenges in countering these platforms and explores potential solutions, offering insights for both researchers and military professionals.

ENDNOTES:

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