

ABSTRACT

"MAAT-NEXT: Zero-Emission Stratospheric Airships for Sustainable Transport and UAV-based Services"

Summary:

Building upon insights from Rome Aerospace 2025, this talk will present MAAT-NEXT, the evolution of the Multibody Advanced Airship for Transport (MAAT) concept, integrating renewable energy, Al-driven autonomy, and digital twin technology to redefine sustainable, high-altitude airship operations for various applications.

Key topics will include:

- UAV Airships & Firefighting Applications: The potential for autonomous unmanned airship systems in firefighting, cargo logistics, and persistent aerial surveillance.
- Aerokinetic & Renewable Energy Harvesting: Innovations in solar-wind hybrid energy and hydrogen fuel cells to ensure continuous stratospheric operations, also low altitude energy generation using cables for transmission to ground.
- Surveillance & Security: High-altitude airships as platforms for border monitoring, disaster response, and atmospheric research.
- Mars & Space Applications: Feasibility studies on high-altitude airships for planetary exploration, including Venusian atmosphere missions and Mars UAV deployment.
- Advanced AI & Digital Twin Technology: AI-driven autonomous docking, flight optimization, and predictive maintenance for future airship networks.
- Funding & Strategic Partnerships: Exploring opportunities with NASA, DARPA, ESA, and private aerospace investors to support research, prototype development, and commercialization.

MAAT-NEXT is set to revolutionize sustainable aviation, emergency response, and high-altitude surveillance with scalable, cost-effective solutions. Unlike conventional high-altitude UAVs (e.g., Loon, Airbus Zephyr), MAAT-NEXT integrates hybrid renewable energy and AI-driven autonomy for extended operational efficiency. The first UAV airship prototype is expected to undergo initial testing in the near future.

A roadmap for prototype development, testing, and commercial deployment, aligned with Horizon Europe and ESA funding opportunities, will be outlined, setting the stage for collaborative innovation in zero-emission aerial mobility and UAV-based services.