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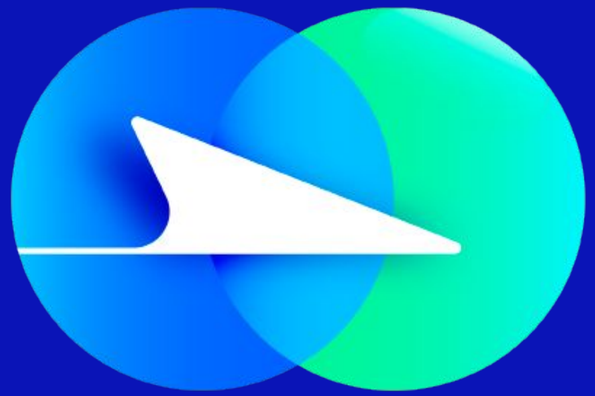

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A EUROPEAN INITIATIVE FOR A SUSTAINABLE FUTURE

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RefMap Clustering Event 2025

Advancing Sustainable Aviation & Urban Air Mobility

AIRSHIP: Autonomous Electric Ground-Effect Cargo Craft

Zorana Milosevic, Universidad Politécnica de Madrid

AIRSHIP
UNMANNED WIG VEHICLE TRANSPORTATION

29–30 July 2025, Athens, Greece

A bit about me

- PhD in Automation & Robotics
- Studies & research:
  - Universidad Politécnica de Madrid, Spain
  - Tampere University, Finland
  - University of Belgrade, Serbia
- Developing autonomous robotic systems
  - Underwater, mining, flying
- AIRSHIP Project Coordinator

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Autonomous Flying Ships for Inter-Island and Inland Water Transport

- HORIZON-RIA project
- 5 M€
- TRL 4-5
- 48 months, 01.01.2023-31.12.2026
- 7 partners

POLITÉCNICA

Tampere University

TAL TECH

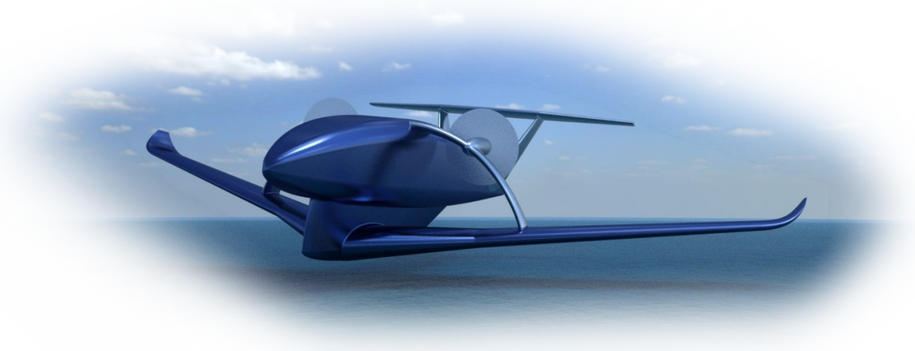
UNIVERSITÄT LUXEMBURG

LPRC | LA PALMA RESEARCH CENTRE

INESCTEC

TRISOLARIS ADVANCED TECHNOLOGIES

Main Objectives



Lay the foundation for a new class of vehicle

- UWV – Unmanned WIG Vehicle
- Fully electrical unmanned system

Solve technological challenges

- Stable low altitude flight
- Advanced control algorithms: adaptive, RL
- Obstacle avoidance
- Limited weight and space
- Zero-emissions power system: integration of solar energy and fuel cells

New business models

- Compare AIRSHIP technology to traditional shipping, road, rail
- Estimate the potential profit of the transport
- Possible cargo routes
- Legal aspects

Sustainability

- Environmental footprint
- Ethics
- Social impact

Raise awareness

- Educate on flying ships

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Short history

- Ground effect vehicle / ekranoplan
- Toivo Kaario - first prototype 1935
- Biggest ever - Caspian Sea monster 1966

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Ground effect in Nature

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SOURCE

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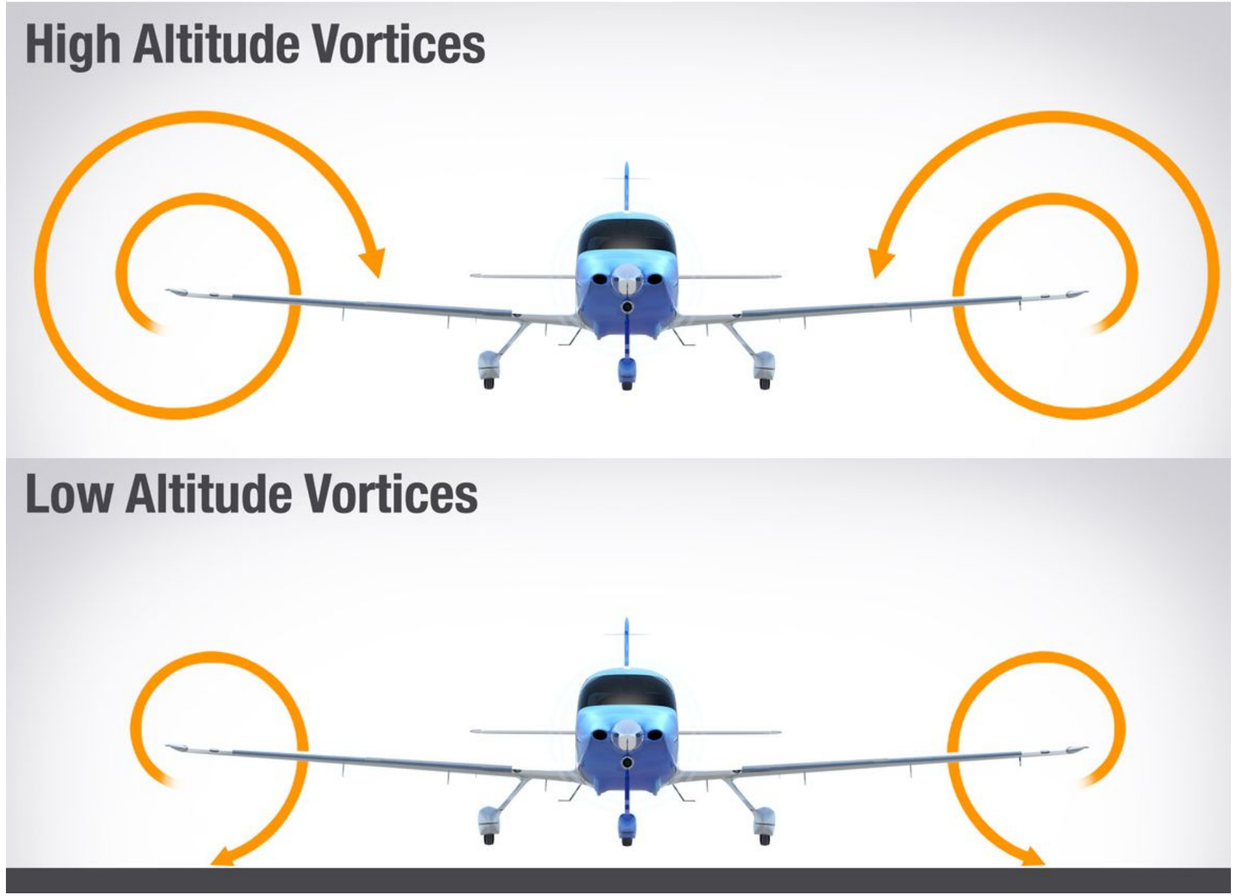
Ground Effect

- Decreased drag
- Less power
- More payload



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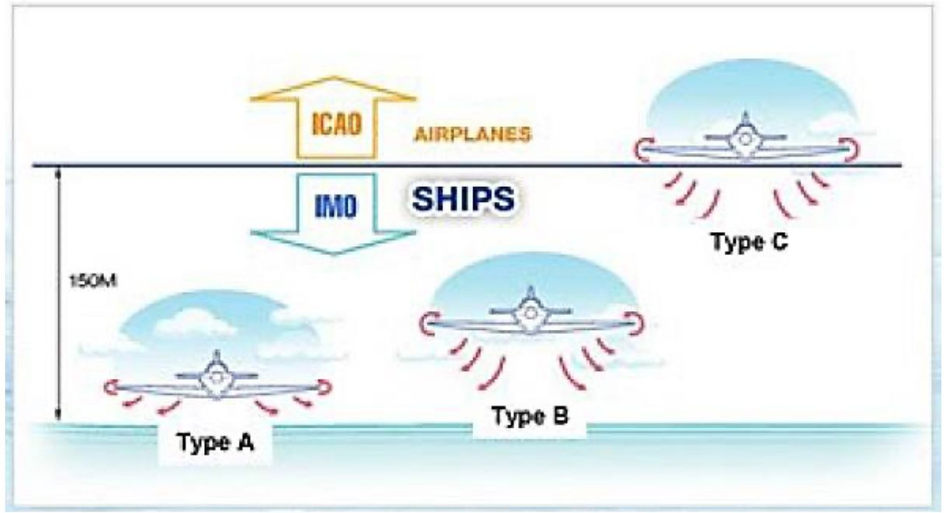
Flying ship – UWV

- **U**nmanned **W**ing-In-Ground **V**ehicle
- Operating close to surface
- Faster than a ship
- More payload than an airplane

A plane or a ship?

- IMO classifies it as a ship
- Interacting with the surface

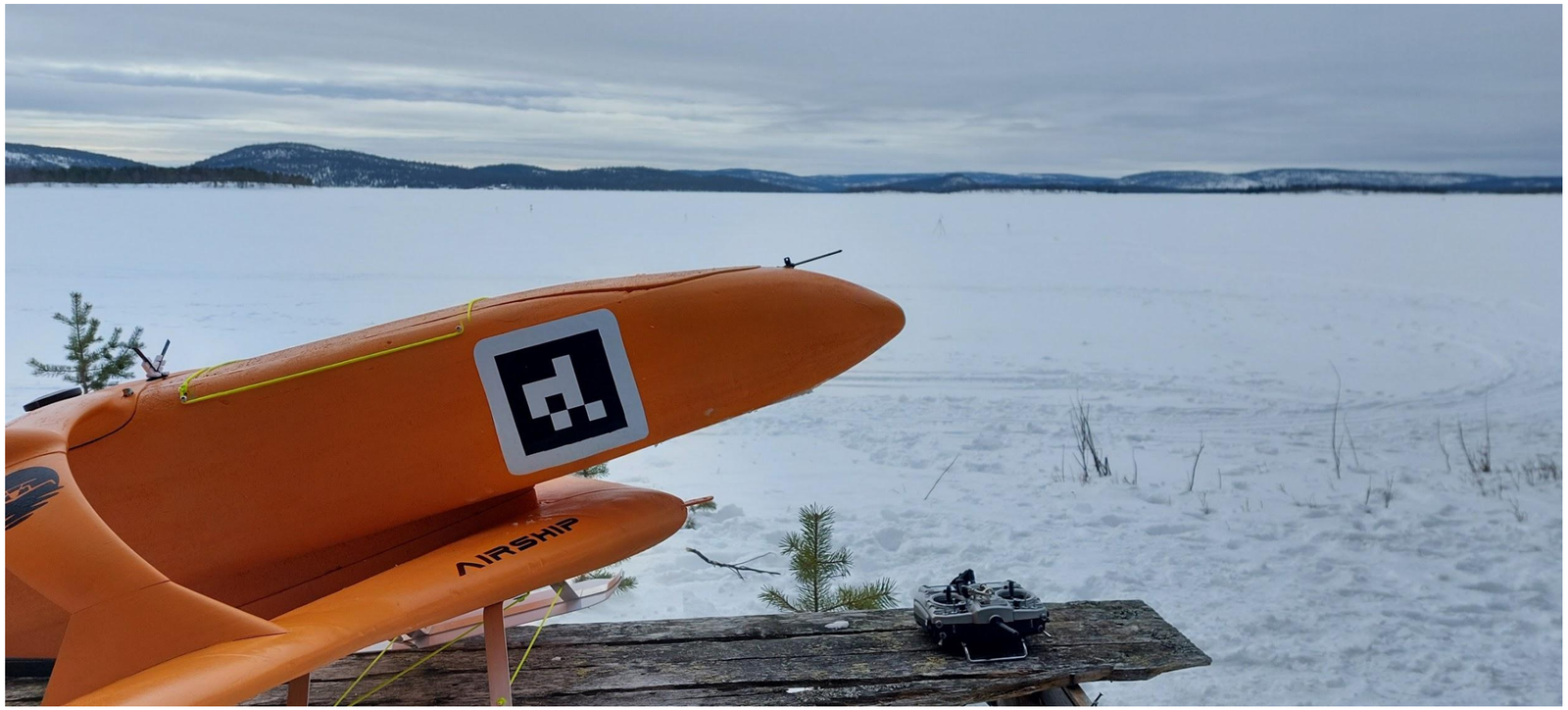


Take off & Landing

- From water to water

Access to areas without infrastructure

- Floods
- Volcano eruption
- Humanitarian catastrophe
- Any area with water access

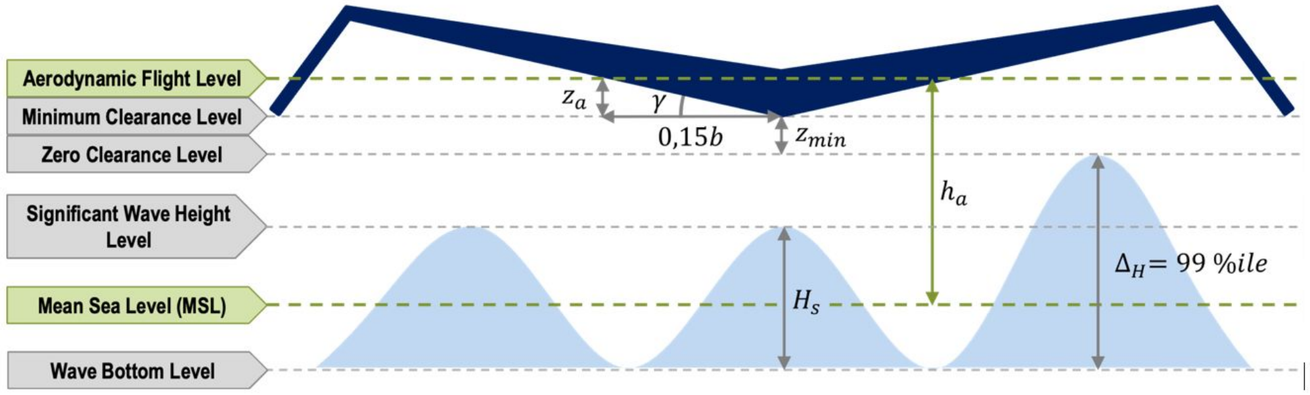


Autonomous Operations

- Sensors for situational awareness
  - Radar, lidar, stereo-cameras, GNSS, INS
- Obstacle avoidance
- Optional remote control

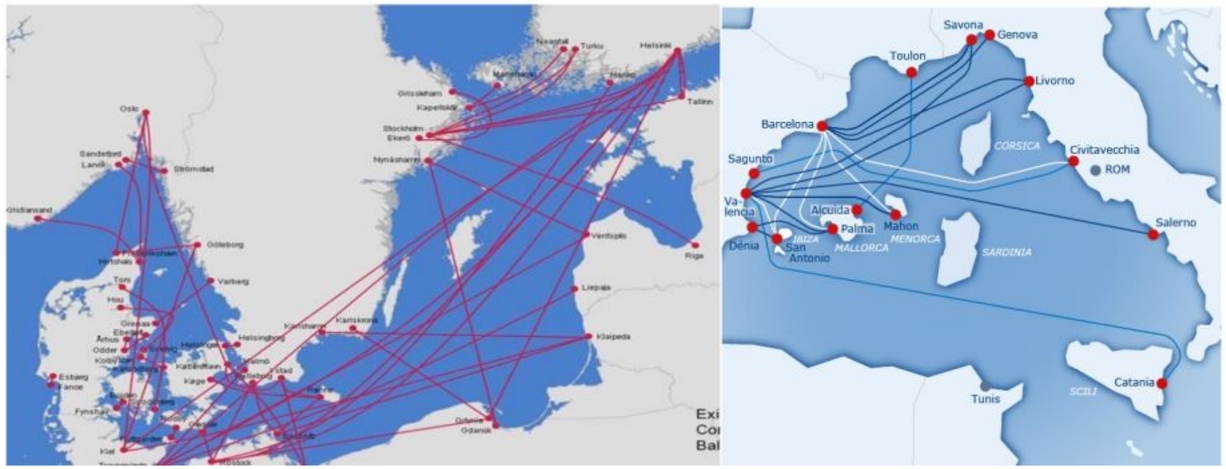
Seaworthiness

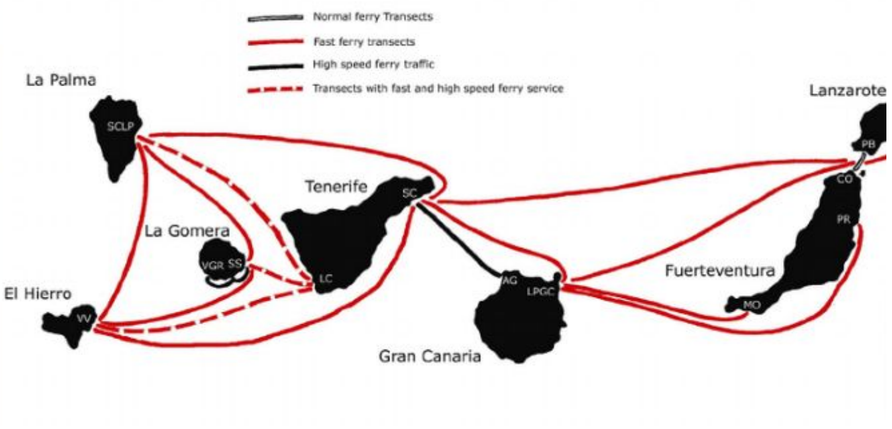
- Optimal flying height is half of the wingspan
- Can fly higher in case of heavy seas
- Control system will handle rogue waves



Ideal locations

- Mid-range distances
  - Mediterranean sea
  - Canary islands
  - Greek islands





Examples of shipping lines in Baltic Sea, Mediterranean Sea and between Canary islands.

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Future

- Design scalable between 5m and 25m
- Payload between 50kg and 7 tons

AIRSHIP prototypes

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Parameter	CC / Commercial Concept	A-1 / Technology Demonstrator
Scale	1 : 1	1 : 5
Wingspan	25 m	5 m
MTOW	16 000 kg	120 kg
Payload	7 000 kg	20 kg
Cruise speed	120 kn (220 km/h)	55 kn (100 km/h)
Cruise power	350 kW	1,5 kW
Take-off speed	65 kn (120 km/h)	40 kn (70km/h)
Take-off power	1000 kW	4,5 kW
Range	1000 km	–
Lift-to-drag ratio	18,5	–

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thank you
for your attention!

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For more information:
www.refmap.eu

Q&A / Closing

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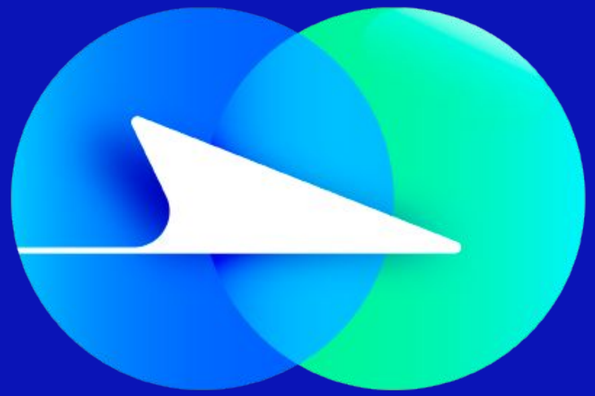

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