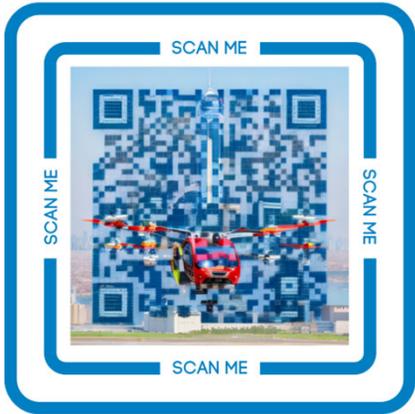


Slido: #IAM2024



In cooperation with:



BVLOS operations over high seas



Giuseppe SCANNAPIECO
EASA
Drones Section Manager - Acting



Johanna RIDDER
CAA Norway
Inspector Unmanned Aviation



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Skyports Drones Services
Regulatory and Safety Manager



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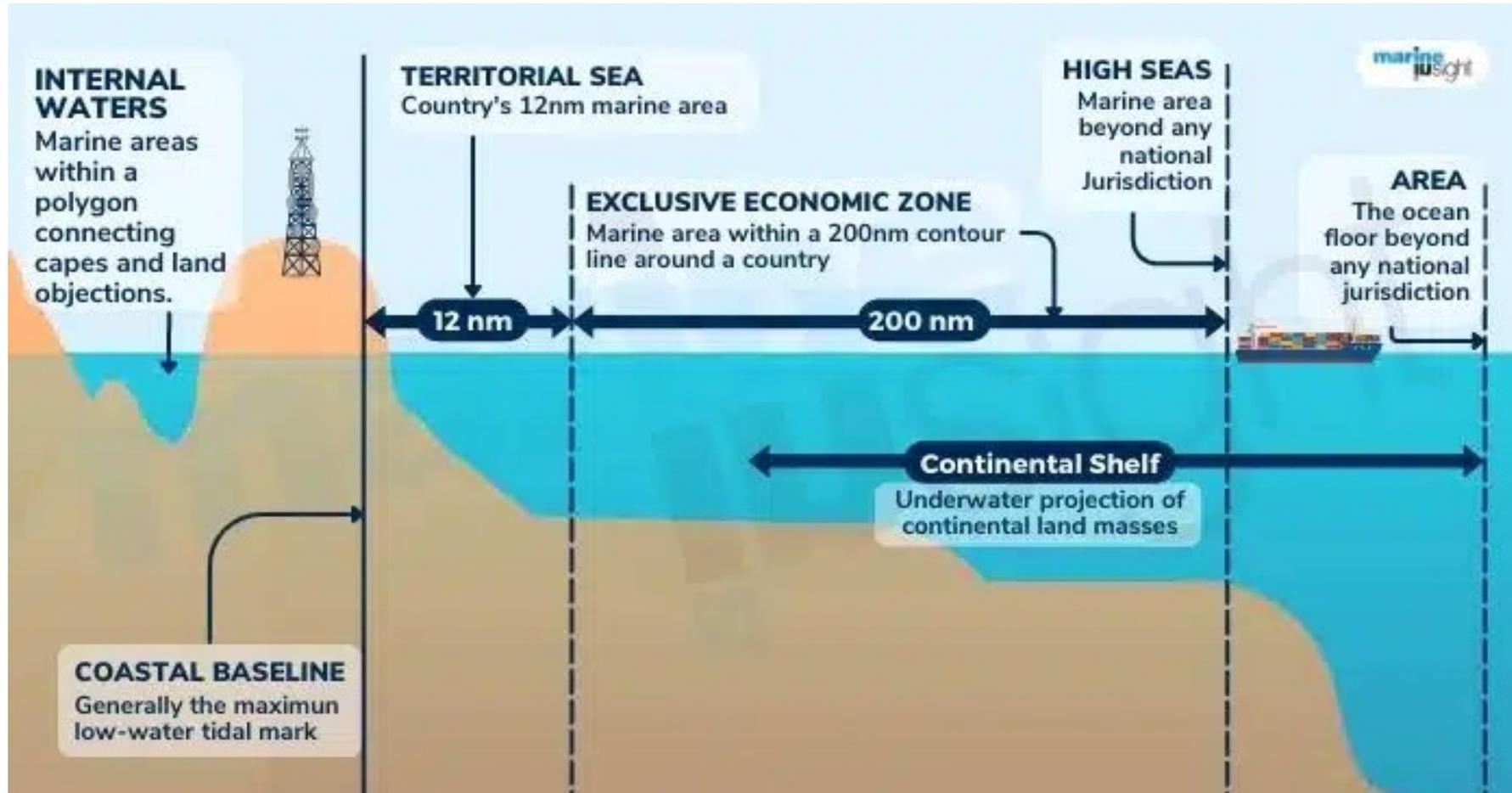
Workshop title:

BVLOS operations over high seas

Goal: identify conditions to start low-scale, low-altitude UAS operations over high seas



What are high seas?

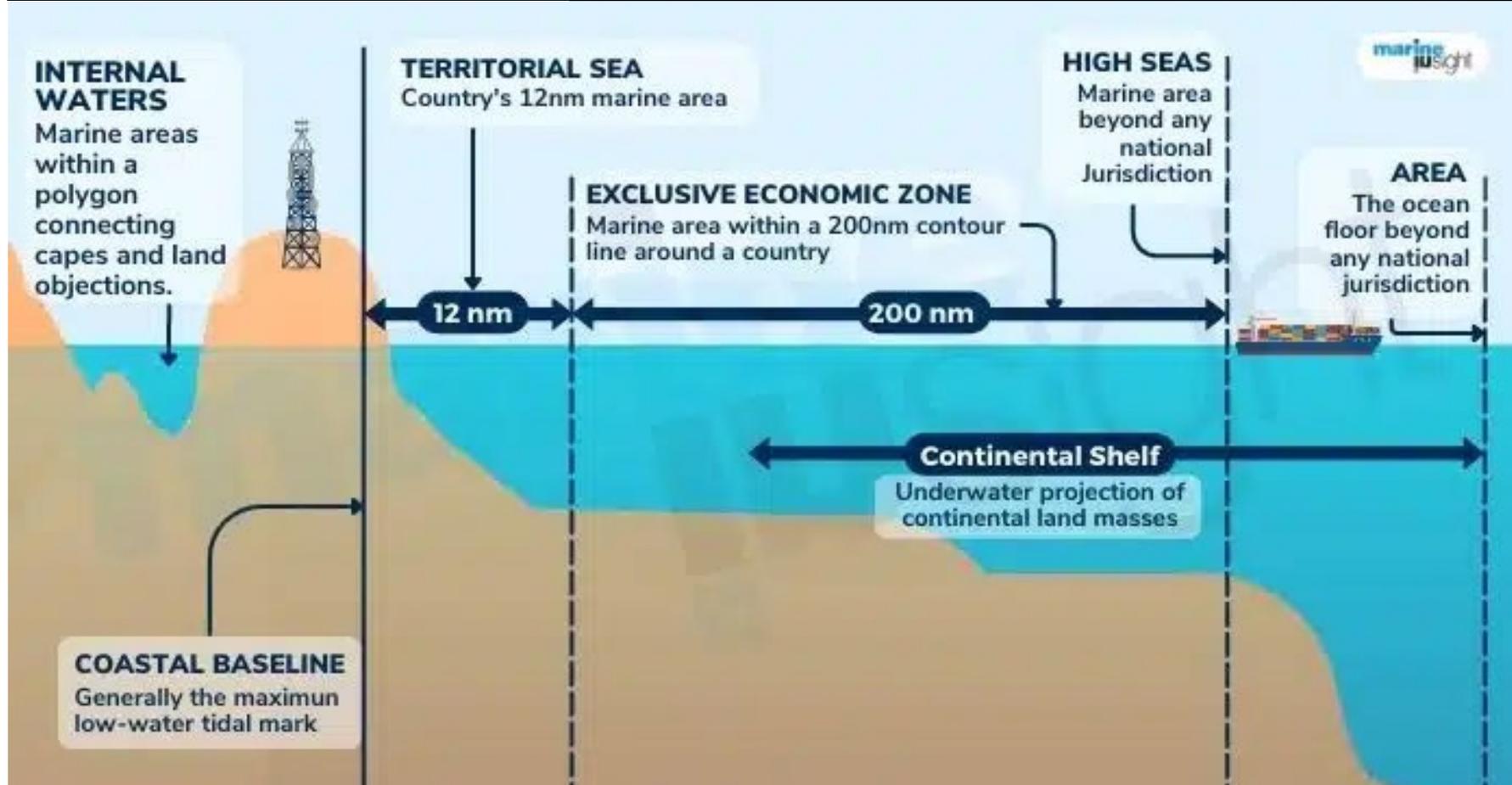


Applicable regulations

Civil Operations

State operations

Territory in which BR applies	Territory in which BR does not apply
Rules of the air: SERA Registration/operation: Reg 2019/947	Rules of the air: ICAO Annex 2 Registration/operation: ICAO Annex 2 / Annex 6
National regulations	'due regards'



Provisions of the Chicago Convention



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Article 8 – Pilotless aircraft

- **No aircraft capable of being flown without a pilot** shall be flown without a pilot over the territory of a contracting State **without special authorization by that State** and in accordance with the terms of such authorization. Each contracting State undertakes to insure that the flight of such aircraft without a pilot in regions open to civil aircraft shall be so controlled as to obviate danger to civil aircraft.

Article 12 – Rules of the air

- Each contracting State undertakes to adopt measures to insure that every aircraft flying over or maneuvering within its territory [...] shall comply with the rules and regulations relating to the flight and maneuver of aircraft there in force[...]. **Over the high seas, the rules in force shall be those established under this Convention.** Each contracting State undertakes to insure the **prosecution** of all persons violating the regulations applicable.

Article 31 – Certificate of airworthiness

- Every aircraft engaged in **international navigation** shall be provided with a **certificate of airworthiness** issued or valid by the State in which it is registered.

Point 4.6.b) – VFR flights

- Shall not be flown at a height less than 150 mt (500 ft) above water

Point 5.1.2.b) – IFR flights

- Shall be flown at a level which is at least 300 m (1 000 ft) above the highest obstacle located within 8 km of the estimated position of the aircraft

Appendix 4 – General operating rules

- An RPA shall not be operated over the high seas without **prior coordination with the appropriate ATS authority.**

Appendix 4 – Certificates and licenses

- An RPA shall have a **certificate of airworthiness** [...] in accordance with Annex 8
- An operator shall have an **RPAS operator certificate** [...] in accordance with Annex 6
- **Remote pilots shall be licensed** [...] in accordance with Annex 1

High seas BVLOS UAS operations

Shore-to-rig & rig-to-rig cargo delivery conducted over North Sea



Overview of the operation

- Skyports Drone Services and Norwegian energy firm Equinor, have partnered to trial electric drone deliveries to oil installations in the North Sea since 2023
- The highly automated cargo drone flies distances >100km, operating cargo deliveries between Equinor's processing centre site in Mongstad on the west coast of Norway and installations in the Gullfaks oil field in the North Sea, as well as intra-installation
- On-demand drone services offshore have been piloted from the Remote Operations Centre on shore (in Bergen)



High seas BVLOS UAS operations

Shore-to-rig & rig-to-rig cargo delivery conducted over North Sea



Strategic deconfliction

- Coordination with local aviation stakeholders, including air navigation service providers (ANSPs), aircraft operators, and helicopter emergency medical services (HEMS) to ensure their operations were not disrupted by UAS activities, especially for emergency services aircraft involved in search and rescue, national security, policing, and medical aid
- In case of conflicts, Skyports developed a temporary operating instruction (TOI) with input from stakeholders, allowing operators to access the airspace with both ample and short notice, particularly for emergencies
- NOTAM & AIP AIRAC SUP issued

The ICAO rules for drone operations over high seas are ambiguous

Article 12
Rules of the air
Each contracting State undertakes to adopt measures to insure that every aircraft flying over or maneuvering within its territory and that every aircraft carrying its nationality mark, wherever such aircraft may be, shall comply with the rules and regulations relating to the flight and maneuver of aircraft there in force. Each contracting State undertakes to keep its own regulations in these respects uniform, to the greatest possible extent, with those established from time to time under this Convention. Over the high seas, the rules in force shall be those established under this Convention. Each contracting State undertakes to insure the prosecution of all persons violating the regulations applicable.

Article 31
Certificates of airworthiness
Every aircraft engaged in international navigation shall be provided with a certificate of airworthiness issued or rendered valid by the State in which it is registered.

Article 8
Pilotless aircraft
No aircraft capable of being flown without a pilot shall be flown without a pilot over the territory of a contracting State without special authorization by that State and in accordance with the terms of such authorization. Each contracting State undertakes to insure that the flight of such aircraft without a pilot in regions open to civil aircraft shall be so controlled as to obviate danger to civil aircraft.

Chicago convention, 1944

- Authorities in different countries interpret and implement rules differently
- Beside a restrictive, literal interpretation, one can also argue for a more flexible approach
- The rules should be put into their historical context and can be interpreted accordingly



REGULATION (EU) 2018/1139 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL
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REGULATION (EU) 2018/1139 of the European Parliament and of the Council

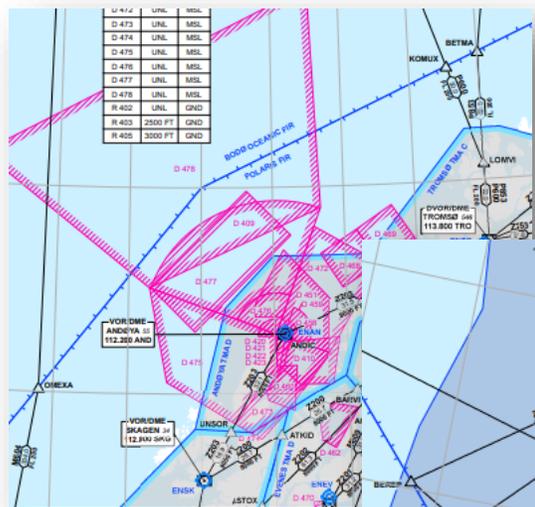
COVER REGULATION TO IMPLEMENTING REGULATION (EU) 2019/947
COMMISSION IMPLEMENTING REGULATION (EU) 2019/947
of 24 May 2019
on the rules and procedures for the operation of unmanned aircraft systems
Regulation (EU) 2019/947

EASA Basic regulation (2018)

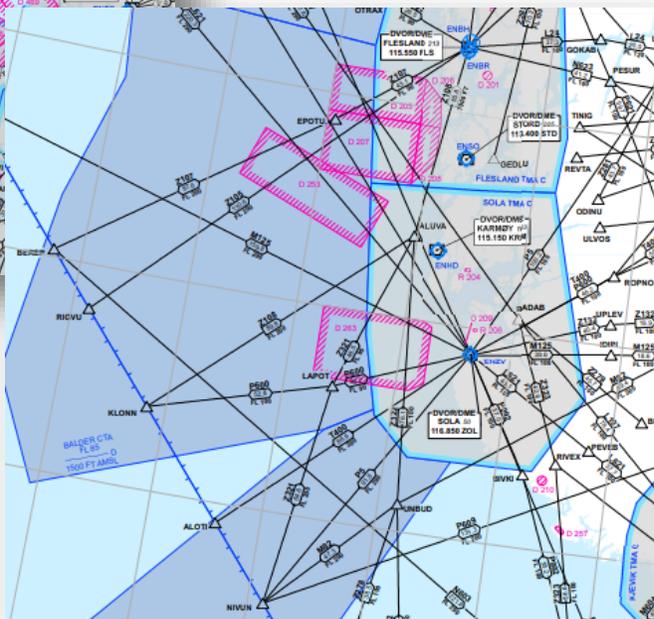
EASA UAS regulations (2020)



Appropriate air risk mitigations need to be put into place



From: Enroute chart – Northern Norway



From: Enroute chart – Southern Norway

- BVLOS operations in uncontrolled air space are challenging to address, over land and water
- A combination of different mitigations should be applied, depending on the type of operation and local conditions
- Danger areas may be one out of several mitigations, in addition to means for electronic conspicuity, monitoring of other air traffic, etc

Ongoing work at ICAO

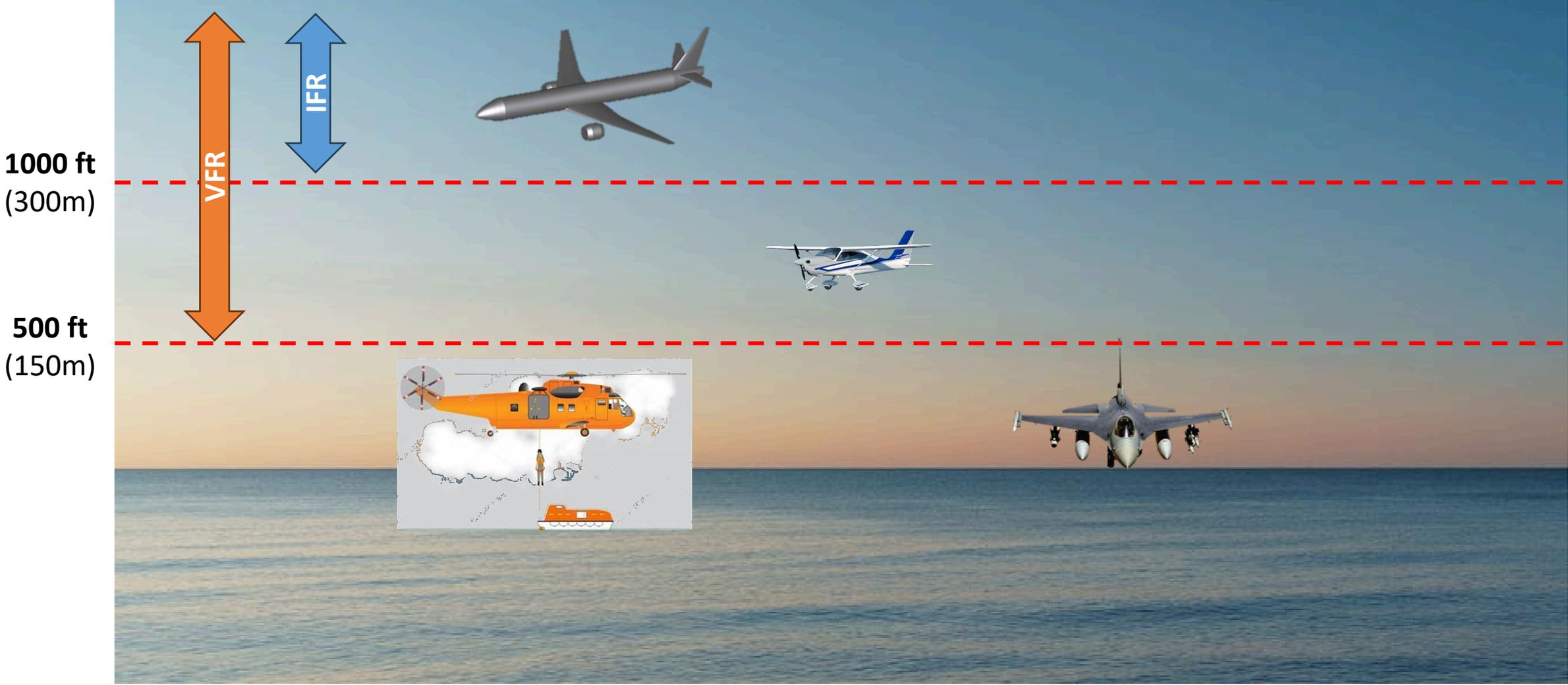
Report of the Thirteenth Air Navigation Conference (ANC/13 – 2018)

Recommendation 5.2/1 — Very low altitude operations

(f) develop a solution to enable States to authorize operations of non-certificated UAS over the high seas, using parameters to be defined in a transparent manner, including investigating the maximum altitude at which these operations would be allowed.



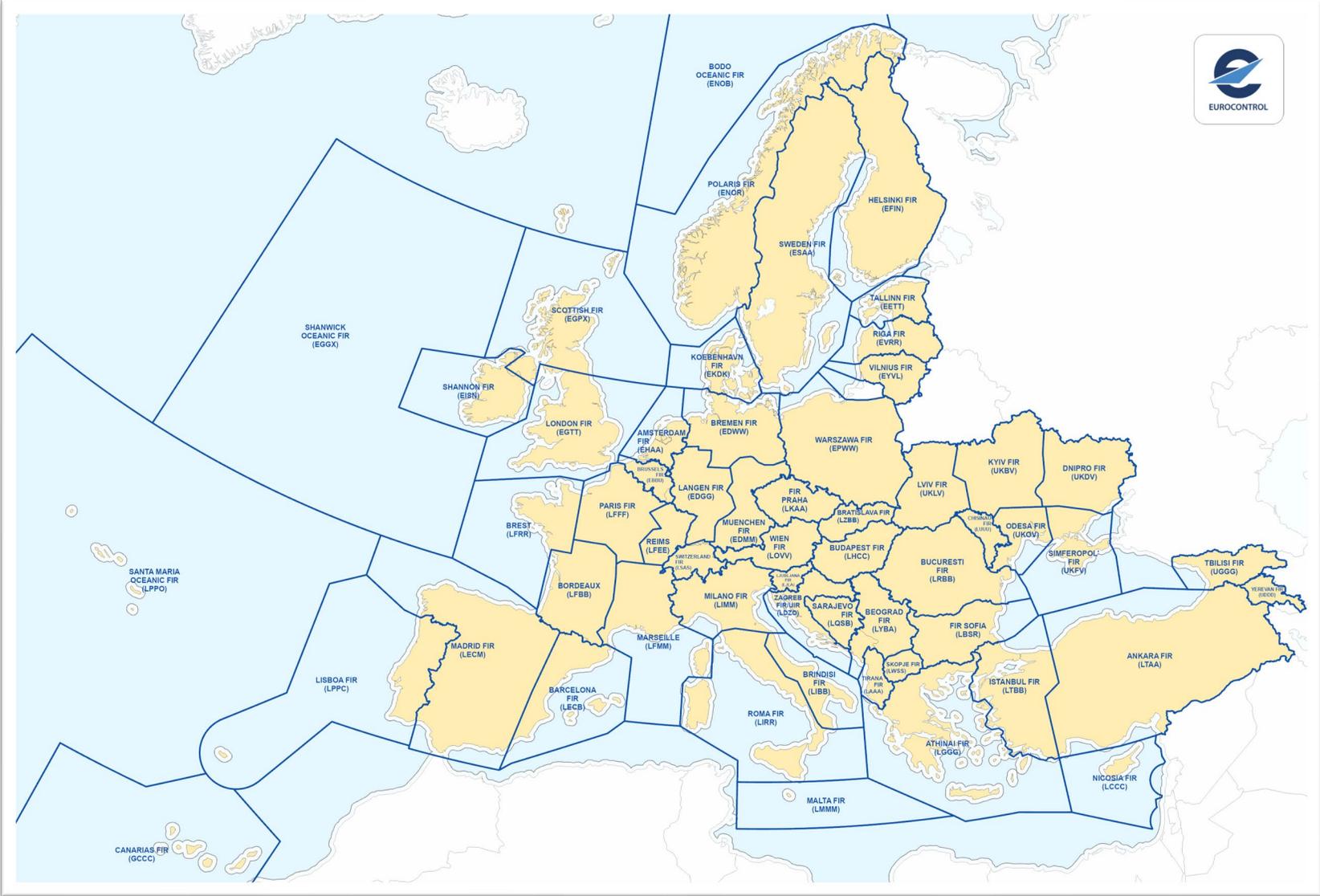
The airspace above water... from the side



Military and State aircraft are not required to comply with ICAO Annex 2

The airspace above water... in flight

FIR in the lower airspace



A possible equation...

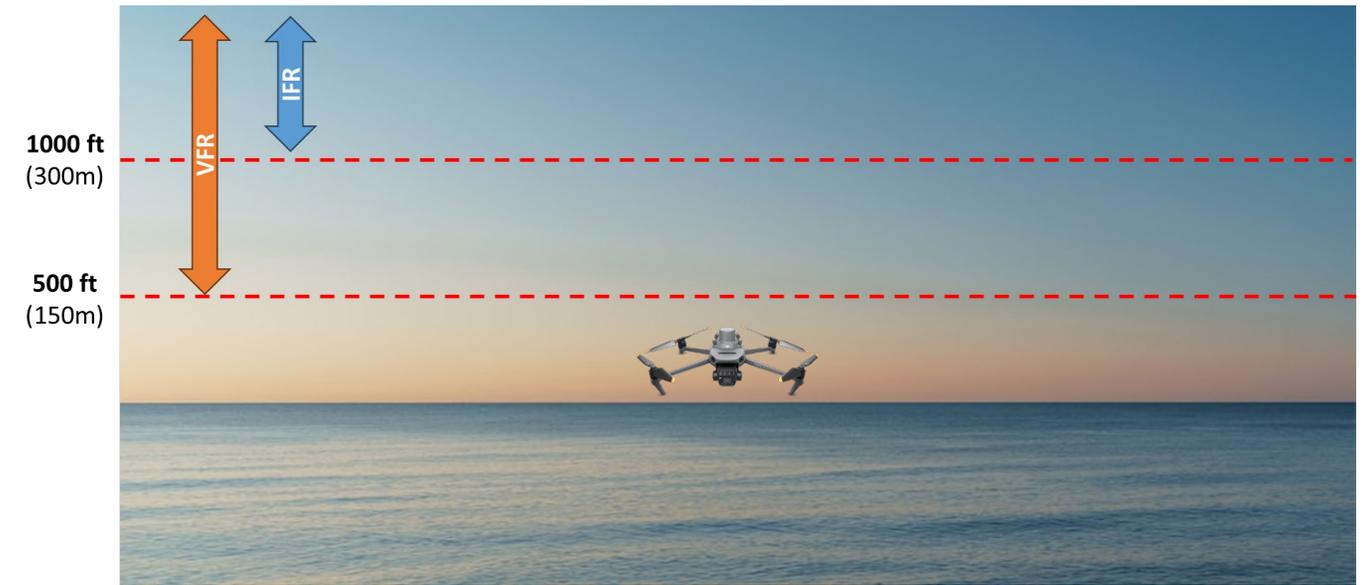


+ SORA +

Appendix 4 – General operating rules
 ➤ An RPA shall not be operated over the high seas without **prior coordination with the appropriate ATS authority.**



- [CofA + AOC + RPL] =



Questions

- Does the equation have a solution? Is it the only one? - **ALL**
- Is the risk assessment methodology sufficient? – **JOERN / JOHANNA**
- How to authorise a UAS operation over the high sea? - **JOHANNA**
- Need / possibility of segregated airspace? – **JOERN**
- Responsibility of the different stakeholders for the operation? – **HARRY**
- What considerations for other users of low-altitude airspace? – **JOERN / HARRY**
- Need for vertical / lateral containment? – **JOERN / JOHANNA**
- What are the essential enabling technologies (GPS/barometer – transponder)? – **JOERN / HARRY**
- Do we need a dedicated coordination mechanism between stakeholders? – **JOERN / HARRY / JOHANNA**
- What will be the impact of the operational limitations on possible use-cases? - **HARRY**
- What other use-cases will require further evolution of the ICAO and EASA regulations? – **HARRY / JOERN / JOHANNA**
- Should the identified solution evolve into an amendment to regulation or to AMC&GM? – **GERLI**
- Data acquisition about manned a/c encounters
- What can we (Europe/EASA) provide to ICAO to develop SARPS for UAS operations over the high seas? – **ALL**

Jörn Jaeger

Jörn has been working in the field of ATC and airports for more than 25 years. He started his career in turnkey airport projects before moving to the German air navigation service provider DFS Deutsche Flugsicherung, where he held various positions, including in the development of UTM concepts and systems, before becoming Head of Airspace and Vertiports at Volocopter, where he prepared initial VTOL operational concepts as well as first routes and vertiports for the launch of commercial eVTOL operations worldwide. In June 2024, Jörn returned to DFS and took over responsibility for air traffic control procedures and regulations for future forms of mobility, incl. UAS and U-Space. Jörn has also been involved in various standardisation and regulatory activities, including the EASA Rulemaking Taskforce 0230, dealing with ATM/SERA, U-Space and Vertiports, the Eurocae WG-112 Subgroup 7, which developed the concept of operations for VTOL aircraft, and as technical advisor to the ICAO Vertical Flight Infrastructure Working Group. He was also recently appointed as a German member of JARUS to support the Air Risk Task Force.

Harry Au

Is the Regulatory and Safety Manager in Skyports. He is responsible for preparing regulatory submission and securing operational authorisation for UAS operations (including BVLOS operation over high seas). Before joining Skyports, he worked in the unmanned aircraft office in Hong Kong Civil Aviation Department. He is also a qualified dangerous goods expert and ISO lead auditor

Johanna Rider

Has been working as an Inspector for Unmanned Aviation at the CAA Norway since 2019. In this role, she has also been involved in the implementation of the European drone regulations in Norway and have been Norway's member in the EASA UAS TeB and LUC Task Force. My background is from outside of aviation. I have a PhD in mathematics and worked within research on nonlinear partial differential equations and numerical analysis.