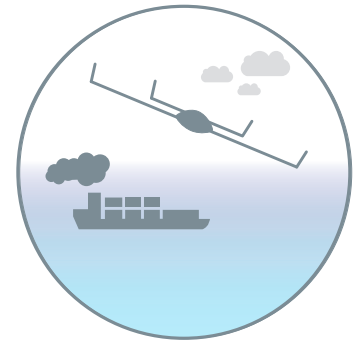


THE MARITIME CHALLENGE

Mainly resulting from the burning of fossil fuels for propulsion, ships are significant sources of a range of gas emissions, the most notable being Sulphur Oxides (SO_x), Nitrogen Oxides (NO_x) and Carbon Dioxide (CO₂). These pose different threats to the health of people and the environment. Short-term exposure to SO_x can harm the human respiratory system and make breathing difficult. As a secondary particulate matter precursor, SO_x also contributes to the formation of particulate aerosols. Particulate matter also has adverse impacts on human health. Ship generated emissions can be significant in areas subject to heavy maritime traffic. People particularly at risk are those living in port cities and coastal communities. In the EU, SO_x emissions from ships are regulated by Directive (EU) 2016/802, known as the “Sulphur Directive”. It establishes, amongst other requirements, limits on the maximum sulphur content in marine fuels. Enforcement of the Directive can be enhanced through the monitoring of ship smokestack emissions and the exchange of relevant information between the responsible administrations.



THE EMSA SERVICE – SHIP EMISSION MONITORING

Remotely Piloted Aircraft Systems (RPAS) can be used as aerial platforms for gas sensors (“sniffers”) to make measurements of the amount of SO_x in a plume being emitted by an individual ship. Based on the SO_x measurement, the sulphur content of the ship’s fuel can be estimated and compared to legal limits. The RPAS also carry sensors to assist in the identification of the vessel. This operational information can be complementary to the emission monitoring activities of Member State authorities. There are currently a range of tools available with different operational advantages.

The EMSA Service is aimed at measuring the amounts of SO_x that are emitted by individual vessels travelling into or in the European Emission Control Areas (ECAs) and, in general, territorial seas, exclusive economic zones and pollution control zones of Member States (Sulphur Directive: Article 6). The combination of real time on-site data from an RPAS, complemented by the maritime information available through the Agency and the availability of Member State Sulphur inspectors can be a cost effective solution for emission monitoring as well as deterrence.

The data flows generated by the service are provided free of charge to European Union Member States, Iceland, Norway

and the European Commission i.e. there are no contractual costs for the user. It is expected that each deployment will be for a minimum of two months. During each deployment, the RPAS will be under the command (operational instruction) of the relevant Member State authority. Actual flight control / management will be undertaken by qualified pilots from the service provider. In order to facilitate operational efficiency and effectiveness, the relevant Member State authority should provide an appropriate take-off / landing area, onsite facilities (e.g. internet, water, etc.) as well as support in obtaining the RPAS permit to fly from the national aviation authority for the deployment concerned.

It should be highlighted that the RPAS (platform and sensor payload) is multi-purpose in nature and can, in reality, be used for a range of alternative activities. These include the monitoring and detection of marine pollution including oil spills and litter, vessels and people in distress as well as the general identification and tracking of vessels of all sizes and their activities. The EMSA service is scalable so allowing support to different Member States at the same time. This is possible as the service is based on mobile units being set-up in the area of operation.

KEY CHARACTERISTICS

Advantages of using RPAS include:

- Geographical coverage of port anchorages and approaches for extended periods
- Rapid flight activation. Depending on RPAS type, flights can be launched by catapult/runway or a small physical footprint
- Flight data can be complemented with other maritime data available through EMSA
- Designed to operate in a broad range of conditions i.e. variable environmental temperature, high humidity, rain and (as there is no human pilot onboard) potentially dangerous environments
- Transponder for aircraft-to-aircraft notification to increase aviation safety.

The sensor payload includes:

- Gas sensors for SO_x
- Electro-optical cameras to record the maritime scene, e.g. photographic evidence linking the plume to vessel and/or general observing of vessel activities
- Thermal infrared cameras for plume shape identification, vessel identification, fire analysis, locating people in distress, general observation of vessel activities at night or in poor visibility conditions, support to oil slick monitoring and response operations
- AIS transponder to identify vessels and determine their position.

GENERAL TECHNICAL SPECIFICATIONS

WING SPAN/ ROTOR DIAMETER	UP TO 4 M (APPROXIMATELY)
TAKE-OFF WEIGHT / MASS	UP TO 30 KG
ENDURANCE	6-12 HOURS
RANGE	UP TO 50 KM
CRUISE SPEED	UP TO 75 KM/H
LAUNCH OPTIONS	RUNWAY, CATAPULT OR SMALL TAKE-OFF FOOTPRINT FOR VTOL TYPE
OPERATION	DAY AND NIGHT
COMMUNICATION	RADIO LINE OF SIGHT (RLOS)
MAX PAYLOAD WEIGHT	UP TO 7 KG
SENSORS	SO _x , NO _x , CO ₂ , SNIFFERS, ELECTRO OPTICAL CAMERAS, THERMAL INFRARED CAMERA, AIS TRANSPONDER
MISSION TYPES	SHIP EMISSION MEASUREMENTS, DETECTION AND IDENTIFICATION OF VESSELS, BOATS AND OPERATIONAL ACTIVITY, FIRE ANALYSIS ON VESSELS, MONITORING MARITIME POLLUTION & SUPPORT TO CLEAN-UP OPERATIONS

EMSA RPAS PORTFOLIO AND OPERATIONAL USAGE



Emission Monitoring



Maritime Surveillance



Emission Monitoring



Maritime Surveillance



Emission Monitoring & Maritime Surveillance



Marine Pollution Monitoring & Maritime Surveillance

Depending on the mission, RPAS fly close to shore, i.e. within Radio Line of Sight (RLOS) or further offshore, i.e. Beyond Radio Line of Sight (BRLOS). BRLOS operations require specialised equipment on board to communicate via satellite. All aircraft control communications are via a Local Ground Station. Depending on the payload configuration, RPAS can undertake a wide range of mission types. The marine pollution payload configuration is multi-purpose in nature, e.g. It is also suitable for other vessel monitoring and detection activities.