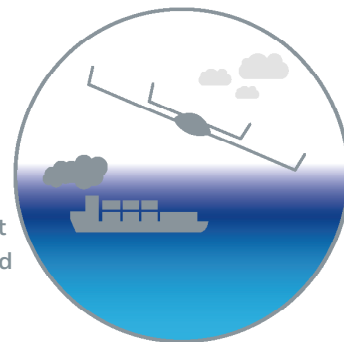


THE MARITIME CHALLENGE

In areas of dense maritime traffic, ship-generated emissions can be substantial. This is mainly due to the burning of fossil fuels and the combustion process for propulsion. Sulphur oxides (SO_x), nitrogen oxides (NO_x), carbon dioxide (CO₂) and particulate matter (PM) are all released into the atmosphere. These are harmful both to the local population and the environment. In the EU, SO_x emissions from ships are regulated by Directive (EU) 2016/802, known as the Sulphur Directive. This places limits on the maximum sulphur content in marine fuels. In order to achieve a reduction of SO_x emissions, ship owners must use fuels with reduced sulphur levels or alternatively adopt an Emission Abatement Method such as an Exhaust Gas Cleaning (EGC) system. Monitoring the emissions from a ship's smokestack by Remotely Piloted Aircraft Systems (RPAS) can help to enforce the Directive as the information provided can be shared among the relevant authorities.



THE EMSA SERVICE

Remotely Piloted Aircraft Systems (RPAS) can be used as aerial platforms with gas sensors ('sniffers') to make measurements of the amount of SO_x versus the CO₂ in a ship's plume. This relationship can ascertain the amount of sulphur content in the fuel being used on board. Based on these measurements, the sulphur content of the ship's fuel can be estimated and compared to the 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 to ensure that all vessels in transit in European waters comply with the legal requirements.

The EMSA service provides RPAS capable of measuring the amount of SO_x 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), irrespective of their flag. The combination of real time on-site data from an RPAS together with the maritime information available through EMSA, and the availability of Member State sulphur inspectors can be considered a cost effective solution for emissions monitoring as well as a possible deterrent.

The data flows generated by the service are provided free of charge to any requesting authority belonging to EU Member States, Iceland, Norway as well as to the European Commission, i.e. there are no contractual costs for the user and the service supports the execution of EU coast guard functions. Each deployment will be for a minimum of two months and the RPAS will be under the command (operational instruction) of the relevant Member State authority or agency. 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 be used for a range of 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 including identifying potentially illegal activities (i.e. illegal fishing, drug trafficking, illegal migration, etc.). The EMSA service is scalable so that it can be provided to several Member States in parallel.

SHIP EMISSION MONITORING

KEY CHARACTERISTICS

Advantages of using RPAS include:

- Coverage of sea areas (incl. SECA areas), approaches to ports and anchorage areas for extended periods
- Rapid flight activation: depending on RPAS type, flights can begin very quickly once the operation has started and the contractor has been mobilised using either a catapult or runway
- Flight data can be enhanced with other maritime data available to EMSA and integrated in EMSA systems
- Flights can take place in a broad range of conditions, i.e. variable environmental temperature, high humidity and (as there is no human pilot onboard) potentially dangerous environments, like flying in a plume.

The sensor payload includes:

- Gas sensors for SO_x and CO₂ and associated calibration
- 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 during the day or at night, support to oil slick monitoring and pollution response operations
- AIS transponder to identify vessels and determine their position.

GENERAL TECHNICAL SPECIFICATIONS

WING SPAN/ ROTOR DIAMETER	UP TO 4.2 M
TAKE-OFF WEIGHT / MASS	UP TO 38 KG
ENDURANCE	UP TO 7 HOURS
RANGE	UP TO 100 KM
CRUISE SPEED	UP TO 94 KM/H
LAUNCH OPTIONS	RUNWAY OR CATAPULT
OPERATION	DAY AND NIGHT COVERAGE, WITH BROAD RANGE OF WEATHER CONDITIONS
COMMUNICATION	RADIO LINE OF SIGHT (RLOS) DOWN LINK IN REAL-TIME
MAX PAYLOAD WEIGHT	UP TO 10 KG
SENSORS	ELECTRO OPTICAL CAMERAS, THERMAL INFRARED CAMERA, EMISSIONS SENSOR (SO ₂ , CO ₂ , %RH, TEMPERATURE AND PRESSURE)
MISSION TYPES	SHIP EMISSION MONITORING, MONITORING MARITIME POLLUTION AND SUPPORT TO POLLUTION RESPONSE OPERATIONS, IDENTIFICATION OF VESSELS AND THEIR OPERATIONAL ACTIVITY, SUPPORT SEARCH AND RESCUE OPERATIONS, IDENTIFY SUSPECT AND ILLEGAL ACTIVITIES

EMSA RPAS PORTFOLIO AND OPERATIONAL USAGE

RPAS can undertake a wide range of missions. EMSA has different RPAS types and payload configuration in its portfolio to be able to cover the different user needs. 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) using satellite communication. All aircraft control communications are via a Local Ground Station. The RPAS with their payload configuration are multi-purpose in nature, e.g. it is also suitable for other vessel monitoring and detection activities.



Maritime Surveillance



Maritime Surveillance



Marine Pollution Monitoring & Maritime Surveillance