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Use of on board RPAS during oil spill response: recent evidence reinforces the benefits of RPAS to support response operations

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Remotely Piloted Aircraft Systems (RPAS) are widely considered to have the potential to contribute to successful oil spill response operations at sea. In autumn 2021, an EMSA contracted oil spill response vessel (OSRV) with RPAS on board, was requested to support an oil spill response operation. This provided an opportunity to evaluate how the RPAS was used in practice during the incident.

EMSA has established a network of OSRVs, which are on-standby and can be made available within 24 hours following a request from a Member State for pollution response support. Currently, 10 of the EMSA contracted OSRVs are equipped with RPAS and during oil spill response activities the vessels are under the operational control of the Member State affected. The RPAS are directed by the OSRV On-Scene Commander, at the behest of the national authorities in charge of the response. The RPAS installed is a vertical take-off and landing (VTOL) lightweight system, which carries a gimbal with an electro-optical (EO) and an infra-red (IR) sensor. In an emergency, a pilot is available on location within 24 hours.

On 28 August 2021, the cargo tanker *Sea Bird* collided with the rocky islet of Karavi in the Aegean Sea. The vessel sank with 150 metric tonnes (MT) of fuel oil, 50 MT of diesel oil and 700 litres of lubrification oil on board. The Greek authorities requested the EMSA contracted OSRV *Aktea* with a RPAS on board. The *Aktea* started operations on 29 August and continued over 8 days until 6 September 2021. At the start of the operation, the RPAS conducted a broad search to identify locations where oil was surfacing. In the following days, flights were directed to specific areas of interest and at the end of the operation the RPAS did a final flight to confirm that the quantities of oil on the surface had diminished.

According to the responders, the RPAS supported their operations in:

1. <u>Identification of location of wreck and surfacing pollution</u>
   The RPAS was useful at the start of the operation to locate the position of the wreck and identify where the oil was surfacing. This was particularly important given that sea conditions and currents were displacing the oil considerably. The RPAS conducted a general surveillance flight initially, enabling the response team on board to visualize the thick brown oil rising to the surface and how the oil became thinner as it spread out from the source. The RPAS footage showed lines of oil in the water moving away from the main location where oil was surfacing.

Figure 1: Trail of oil from the location where the vessel sank

Figure 2: Pollution surfacing and spreading

2. Real-time responsiveness in pollution monitoring

The response team on board were able to view live video footage from the RPAS, enabling real-time decision-making. They could direct the pilot to alter the flight path, thereby obtaining a better overview of the geographical extent and thickness of the oil was in different areas, resulting in a more efficient operation.

3. <u>Increasing the efficiency of clean-up operations of the *Aktea* and support to operational on-scene coordination of resources</u>

The information provided by the RPAS was used to direct the OSRV to the source of the oil, not only by providing coordinates on the map, but also by physically hovering over the location to mark an area. This was an advantage in the open sea, given that it can be difficult for the vessel to maintain position in rough weather conditions. The RPAS was also used to monitor the activities of the *Aktea*, for example to check behind the vessel to verify that the oil was being collected, and that the equipment was operating well.

Figure 3: The RPAS was used to check the positioning of the Aktea

The RPAS footage also provided strategic information to the overall response operation, and to support activities of other vessels in the area.

Figure 4: Other vessels involved in clean-up operations

4. Complementing data acquired by other means

The RPAS was able to provide more accurate information on what was happening in the specific localised area of activity and how much oil had spread than the manned aircraft, satellite images, or from the bridge of the vessel. In addition, it was useful for checking areas which were difficult for vessels to check, such as close to the rocky outcrops.

The type of RPAS selected by EMSA for provision of services from on board the OSRV was considered appropriate by the the response team on scene due to the following characteristics:

1) Lightweight and compact: the quadcopter RPAS was easily able to take off and land and had minimal impact on other activities taking place on board. It was smoothly integrated into the overall operations of the vessel.

Figure 5: The RPAS used on board the EMSA OSRV

2) Endurance and range: the RPAS has a range of 9km, and endurance of 35 minutes. On this occasion, the range and endurance were appropriate. It could fly further from the vessel for more general surveillance, and, during the ongoing clean-up operations, it was flown in closer proximity. In the case of a bigger spill, an RPAS with a longer range and endurance might bring additional benefits.
3) Sensors: From the EO sensor, it was possible to see that there was oil on the surface and the extent of the oil. As the leakage was not significant, it wasn't possible to categorise the spill in accordance

with the BAOAC, although it was noted that most of the visible oil could be considered 'sheen'/'metallic'. The IR sensor could identify the 'streams' of oil flowing through the water and follow the traces of oil in a current to find where the oil was originating.

4) Communications: the VHF communication worked well, and the communication between the captain, the assigned officer, and the pilot was smooth. However, although the responders on board the vessel were able to view the video stream live, it could not be transmitted to colleagues on shore. Another minor limitation was that the RPAS had to maintain radio contact with the pilot at all times, meaning it could not easily check the other side of the rocky islet where the vessel had sunk.

In conclusion, the practical use of the EMSA RPAS during this incident confirms the added value of using such technology during real life response operations.