



Unattended Maritime Systems (UMS) Optical Subsystem Assessment Event (AE) Problem Statement

Problem Statement: SOF desires optical subsystem designs for Unattended Maritime Systems (UMS), in particular the SV-3 Wave Glider. The prototype optical subsystems will be integrated onto the SV-3 in time for a demonstration at a test event in July 2022.

Operational Use Scenario: The optical subsystem will be used to detect and possibly classify vessels at sea. The optical subsystem will be provided a line of bearing to look for suspected vessels, the subsystem will capture images of the vessels for exfiltration.

General Conditions: Open Ocean

Unique Conditions: Systems will be subjected to sea states of 2-5 over prolonged periods of time, along with water intrusion in excess of 30 mins.

Standards/Desirements:

1. The contractor shall propose and provide the sensors, processing hardware, and software capabilities to support the deployment of the optical sensing payload. The target vessel is the SV-3 Wave Glider.

2. The contractor shall submit designs for a two-tiered optical subsystem with the following specifications. Tier 1 is intended for long range detection while Tier 2 is intended for close-in situational awareness. Both Tiers will be operating simultaneously.

2.1 Optical Subsystem Tier 1.

- Utilize a commercial off the Shelf (COTS) high resolution camera that can detect vessels of interest at a range of 5 Nautical Miles (NM).
- Ability to classify vessels at a range of 3 to 4 NM.
- Incorporate a 3-axis gimbal.
- Provide at least a 10X optical zoom.
- If the selected camera system itself is not already rated at IP68, it will be enclosed in a lightweight, waterproof enclosure.
- The lightweight enclosure is not to affect the center of gravity of the wave glider to cause excess roll.
- Gimbal system shall be investigated to determine stabilization reliability with the SV-3's low frequency, high amplitude motion profile in a sea state of 2/3 with the objective of achieving sea state of 3/4.
- Subsystem will have the ability to accept Pan/Tilt/Zoom commands from an outside source and provide imagery to an external communications subsystem.

UNCLASSIFIED



2.2 Optical Subsystem Tier 2.

- Utilize COTS, high resolution, fixed Field of View (FoV) cameras.
- Camera resolution will be at least 1080p (T), 2160p (O).
- Low light performance shall be useable imagery at 0.001 lux (T), and 0.0001 lux (O).
- This configuration will entail two to six cameras and be positioned to support high pixel density in a 360-degree azimuth and $\pm 60^\circ$ elevation (T).
- Areas of interest from the wide FoV will be detected, extracted with digital zoom, and sent via an Iridium datalink to be overlaid onto an operation's center terminal.

3. System Architecture Design

3.1 The contractor shall create a high-level system architecture design with associated design and data-flow document. The design will comply with Modular Open Systems Approach (MOSA) principles.

3.2 The contractor shall procure all necessary equipment to demonstrate the optical capabilities onboard the SV-3 Wave Glider.

UNCLASSIFIED