Remotely Operated Surface Vehicle for Oil Spill Response

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EXTENDED ABSTRACT

We have developed a remotely operated surface vehicle (ROSV) to deploy herders and gelled gasoline for *in situ* burning. We are expanding upon its capabilities to allow for remote sensing to identify, characterize, and track slicks. The final system will be deployable from ship or helicopter, transit to spill locations using GPS with control transferred to a remote operator once slicks are located. The ROSV can travel at speeds up to 100 kph (depending on sea states), have at least an 800 km range, and at least 12 hours of operation before refueling. The system will include a collision avoidance system to reduce risk of interaction with marine life, offshore obstructions, and other boats in the area. In addition to a 360º camera that allows "virtual reality" type remote operation, it will have additional above surface and below water cameras and lighting.

In situ burning will be performed using an onboard herder supply and delivery system. A conceptual drawing is shown in Figure 1. Once slicks are thickened with herders, an onboard system that delivers burning gelled gasoline will ignite them. The herder delivery and gelled gasoline capacities will allow the ROSV to treat hundreds of barrels of oil before resupply. The system includes a tethered unmanned aerial vehicle to provide the "bird's eye perspective" necessary for effective herder delivery and burn operations. Conventional burning with booms has inherent limitations related to oil collection (encounter rate, travel speed, and environmental conditions) significantly limiting its effectiveness. This new system will be deployed faster and access separate patches of oil quicker than boom-based systems to thicken and burn greater oil volumes in more varied environmental conditions while keeping personnel safely off the water.

The ROSV also provides a capable and flexible platform for remote sensing. It has at least a 100 kg payload capacity for instruments beyond those currently installed on or planned. Remote sensing systems will include those installed for the ISB application (tethered unmanned aerial vehicle equipped with visible and infrared cameras, collision avoidance, surface and underwater cameras, GPS, and long-range communications). We will add systems for real-time slick

thickness characterization and VOC monitoring. In addition, the ROSV prototype will have an articulating arm capable of deploying many other sensors for development activities. Additional instruments / systems can be added as long as they can fit within the constraints of the ROSV – power limits, weight/size, ruggedness.

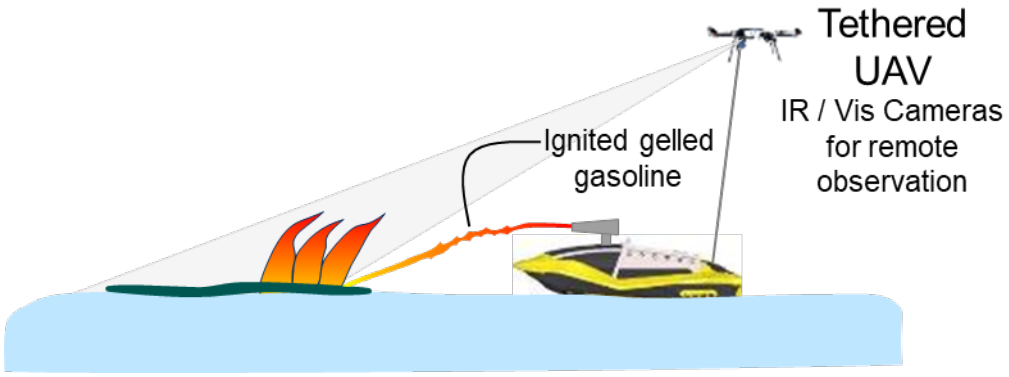

Figure 1. Conceptual drawing showing the ROSV with tethered UAV applying gelled gasoline to ignite a slick already thickened with herders.

Our vision is for the ROSV to provide an advance scout for remote sensing in addition to being a platform for responding with ISB. It will identify slick locations quickly and safely (without putting personnel on the water). Once a slick or slicks are located, the ROSV can then characterize them by mapping the thick and thin portions to allow tactical response decision making. Further, the VOC monitor combined with other instruments (e.g., an IR camera on the tethered UAV) will provide the potential for the system to track oil slicks in darkness and through storms. This in turn would reduce the time required to relocate oil slicks lost overnight.

We believe the ROSV not only provides a robust and safe platform for rapidly applying ISB but also a platform for remotely sensing, characterizing, and tracking oil slicks. This presentation will describe development and testing of the ROSV.