

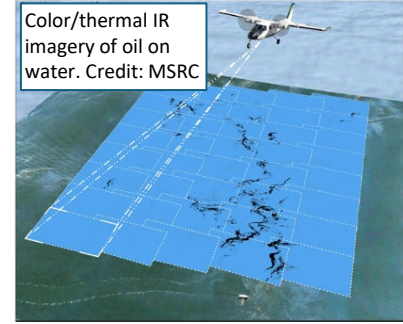


# REMOTE SENSING OPTIONS FOR OIL SPILL RESPONSE

Remote sensing is acquiring data using sensors from a distance.

Example: a Short-Range Uncrewed Aircraft System (SR-UAS) with a visible light camera taking photographs of oiled shoreline or using infrared to measure thermal heat.

The three main aerial remote sensing platforms are UAS, crewed aircraft, and satellites.



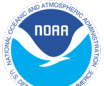
Platform	Time to Deploy	Useful for/Confidence	Limitations	Excels at	Common Sensors/Products
UAS	Hours-1 day*	Small to small/medium scale. High confidence of accurate detection, based on training.	Operate within Line of Sight (LOS) of remote operator; flight time limited by battery.	Low and slow flights capture the highest resolution images: least expensive option to deploy.	Visible Spectrum Camera: Oblique and nadir imagery Video Thermal Infrared Multispectral
Crewed Aerial	Hours-1 day*	Medium to large scale. High confidence of accurate detection, based on training.	Resolution not as high as UAS; higher altitude; requires a larger footprint (pilot, crew, observers).	Covering large areas; helicopters can hover in place to focus in on an area if need be; can hold larger sensor payloads than UAS.	Visible Spectrum Camera: Oblique and nadir imagery Video Handheld Camera Thermal Infrared Multispectral
Satellite	Days**	Medium to large scale. Reconnaissance for detecting oil slicks. Harder to identify false positives without another asset on scene.	Resolution is measured in meters; orbital satellites could take days to make a pass and collect an image.	Detecting spill extent; reconnaissance, remote portions of the AOR.	Visible Spectrum Camera Multi/Hyperspectral Ultraviolet Synthetic Aperture Radar (SAR) Polarization

\*Depending on availability of qualified operators and location of assets

\*\*Depending on satellite. Geostationary satellites can be tasked quickly, while orbital satellites could take days

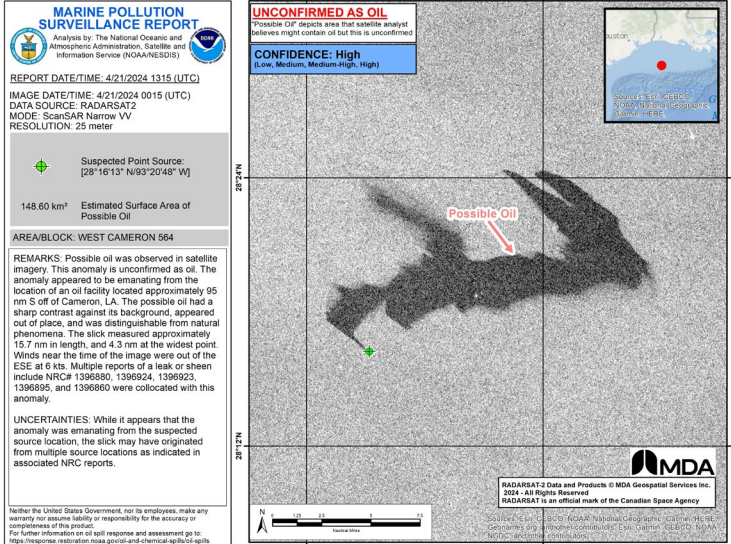
## FOSC(R) Remote Sensing Considerations:

- What resources are available in your AOR? How would you procure them (BOA/sub-contractor, PRFA, USCG, partner agencies)?
- Have you confirmed the confidence levels for remote sensing products? Prior to making tactical decisions, do you need to verify the data? Ex: Is it oil or is it an “anomaly”?
- Remote sensing may require significant data management effort to process the data into a final product. Have you (or your remote sensing provider) accounted for that?
- What is the intended end use of the data and imagery? Is it directing real-time tactical operations, briefing command, building a picture of the scope & impact, etc.? This will drive the selection of sensor, platform, and final product.

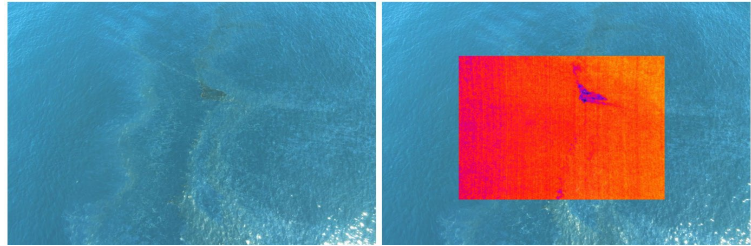


Operation	PLATFORMS			SENSORS				
	Satellite	Aerial	UAS	✓ = frequent use, ○ = infrequent use				
				Optical	Thermal	Multispectral	Polarization	Lidar
Reconnaissance	Very large area with poorly defined location	Large area with generally known location	Smaller area with generally known location	✓	✓	✓	✓	
Supplemental/ Hotspot		Large area that cannot be accessed with UAS due to VLOS limitations	Smaller area with known location	✓	○	○	○	
Detecting/ Imaging Sheens	Large area with poorly defined location	Large area with generally known location	Smaller area with generally known location	✓		✓		
Vessel/Debris Inspection			Smaller area with known location	✓				
Wildlife Detection		Large area with generally known location	Smaller area with generally known location	✓	○	✓	✓	
Environment Assessment		Large area with known location	Smaller area with known location	✓	○	○		
Aids to Navigation		Large area with generally known location	Smaller area with generally known location	✓				
Oil Characterization		Large area with known location	Smaller area with known location	✓	✓	✓	✓	✓

Figure 31. Decision matrix for which platform to use and when.



Report of potential oil slick using Satellite based SAR. Credit: NOAA



Left: Aerial image of oil on water taken from a Parrot drone. Right: Thermal image from a Parrot drone overlaid on the aerial image. The oil appears purple due to a different thermal signature from the surrounding water. Credit: NOAA

For a more in-depth look at sensors and platforms, refer to the Oil Spill Response Uncrewed Aircraft Systems (UAS) Guidance and Training Job Aid.

