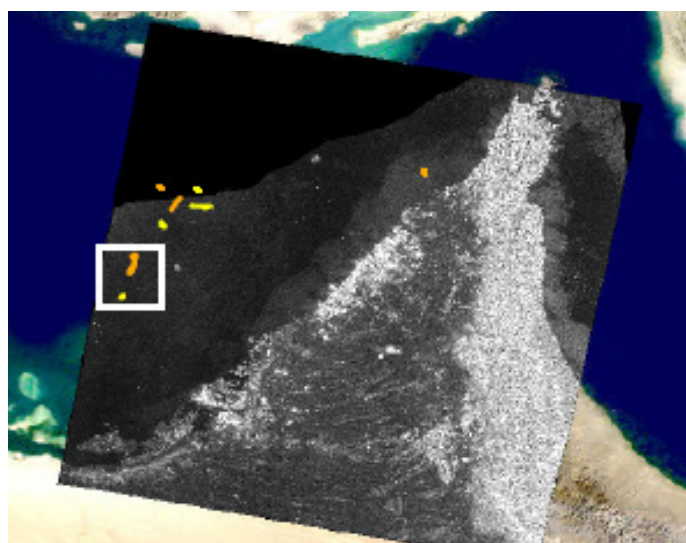


Satellite Remote Sensing: A key tool for enhancing spill response awareness and strategy development

Surveillance is an essential component in the development of a spill response strategy. In any spill event situational awareness is vital for informing good decision making. Satellite remote sensing (SRS) is a surveillance tool that can be readily used to provide synoptic and strategic information to the response. Oil Spill Response Limited (OSRL) and MacDonald, Dettwiler and Associates Ltd (MDA) have an agreement in place to provide access to future acquisitions & historic radar and optical imagery. The agreement provides OSRL's members with access to remote sensing expertise, vital response information with GIS ready products to develop situational awareness.



OPERATIONAL BENEFITS

Synthetic Aperture Radar (SAR) imagery from satellites has proved a valuable tool for a response. It can provide a synoptic view of an incident that can assist with directing response operations and accurately tasking further surveillance activities.

- Satellite-based RADAR provides wide area coverage – 90,000 km² standard, up to 250,000 km² available.
- RADAR is all-weather day/night imaging that is different from optical satellite sensors.
- Satellite imaging combined with expert analysis to provide actionable information.
- Proven technology is widely accepted and understood by regulatory agencies, operators and other incident stakeholders.
- 24/7 operations for dedicated customer support.
- GIS-ready products, including ArcGIS shapefiles, GoogleEarth KML/KMZ, GeoTIFF imagery.
- The active pulse reacts with surface textures and provides information that other methods cannot in the offshore environment.
- Key information includes oil on water detection and ship and rig detection.
- Analysis of wind patterns – both speed and direction.

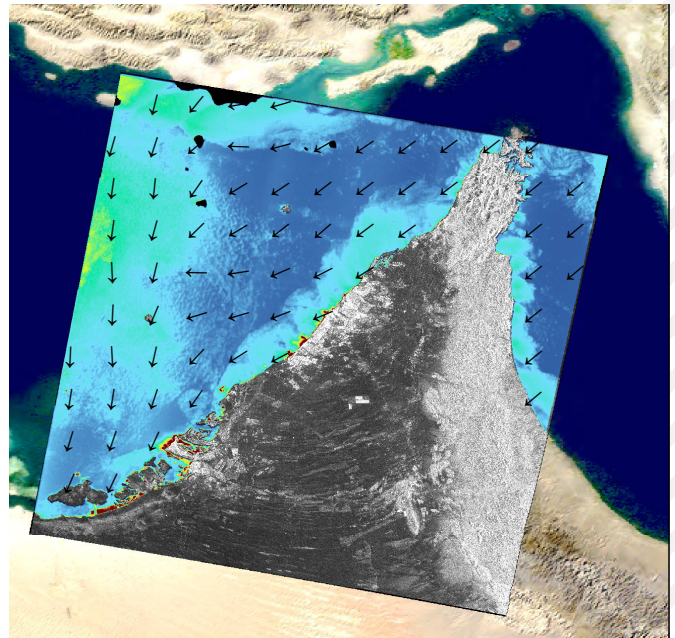
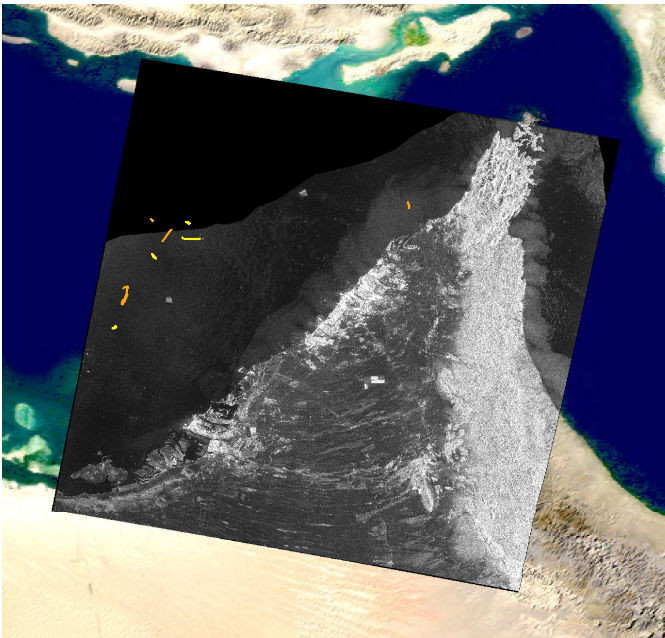
LIMITATIONS

SATELLITE PARAMETERS

The primary satellites used in this service will be RADARSAT-1 and RADARSAT-2, which are in a polar, sun-synchronous orbit, which takes approximately 101 minutes. The revisit period for RADARSAT-2 depends on the area of interest's beam mode, incidence angle and geographic location. In general, revisit is more frequent at the poles than at the equator. The service can also use additional available satellites to support more rapid revisit when needed. Satellite-based RADAR provides wide area coverage – 90,000 km² standard, up to 250,000 km² available. Key information includes oil on water detection and ship and rig detection.

ENVIRONMENTAL PARAMETERS

Slick detection is best when wind speeds are between approximately 3m/s and 12 m/s. When wind speeds are low, the ocean surface appears smooth relative to the SAR wavelength. Hence, the backscatter from the ocean surface resembles the backscatter from the slick. When wind speeds are high, wind-induced surface roughness dominates the radar backscatter. Experienced analysts and automated extraction of wind speed and direction from imagery provide confidence levels and an information benefit even in non-ideal environmental conditions.



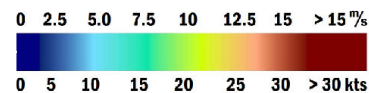
Confidence Category

- █ 1. HIGH - Probable instance of oil
- █ 2. MEDIUM - Possible instance of oil
- █ 3. LOW - Possible anomaly
- █ 4. Anomaly Event

Id	Latitude	Longitude	Confidence	Area_km	Dist_km
2	25.7129	54.11633	2	0.6	14.98
1	25.80229	55.67153	2	1.4	11.72
3	25.6244	54.20943	2	2.1	14.73
8	25.23177	53.95225	2	8.5	19.91
4	25.70096	54.32707	3	1.4	13.64
6	25.48627	54.12946	3	2	16.96
5	25.59975	54.36366	3	3.3	14.3
7	25.06326	53.88943	3	2	22.79

Wind Extraction from SAR

Wind Speed



Wind Direction



THE SATELLITE SERVICE

Available 24/7, 365 days a year, OSRL can mobilise the Synthetic Aperture Radar or Optical Satellite imagery through our standardised processes, providing fast acquisition and product delivery. The service provides rapid tasking directly with the provider and near real-time information delivery in GIS-ready data formats.