Addressing coastal hazards challenges using space technology applications
Caribbean/Latin America oil spill project

Plenary session #3

Coastal Hazards

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CREC

5th Symposium | Accra, Ghana | 24 – 28 October 2022

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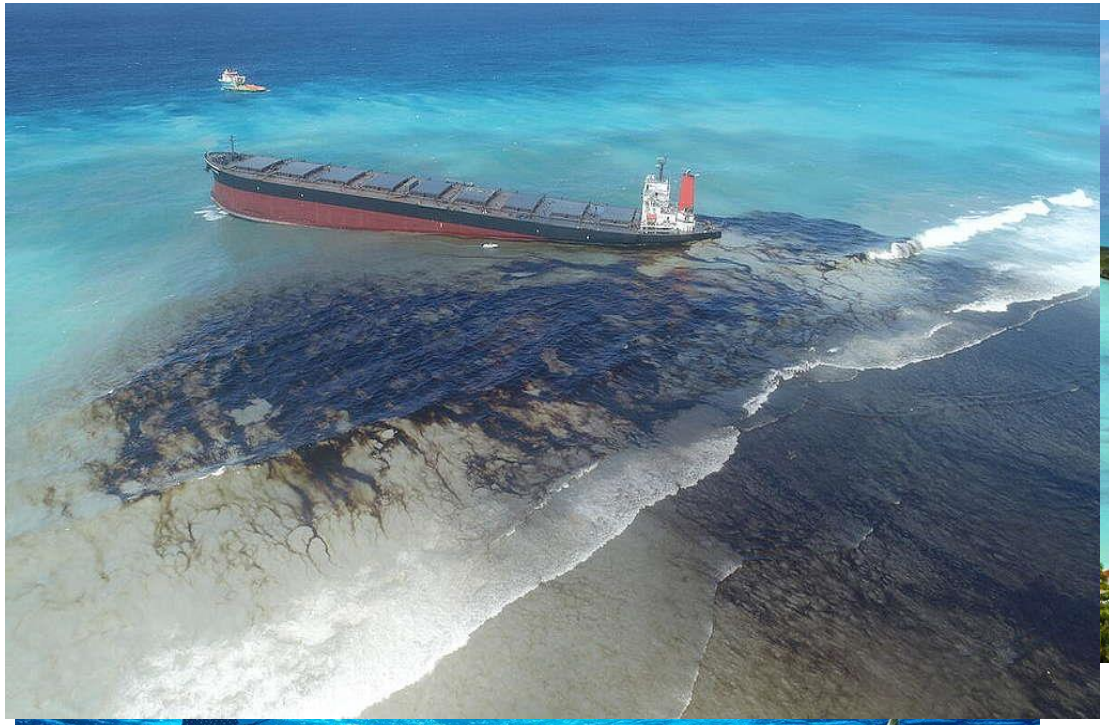
BLUE PLANET

Introducing COSTA: Tracking Marine Oil spill using Satellites in the Americas

Xiaofang ‘Bonnie’ Zhu, US NOAA

Ocean Economy and Risks of Marine Oil Spill

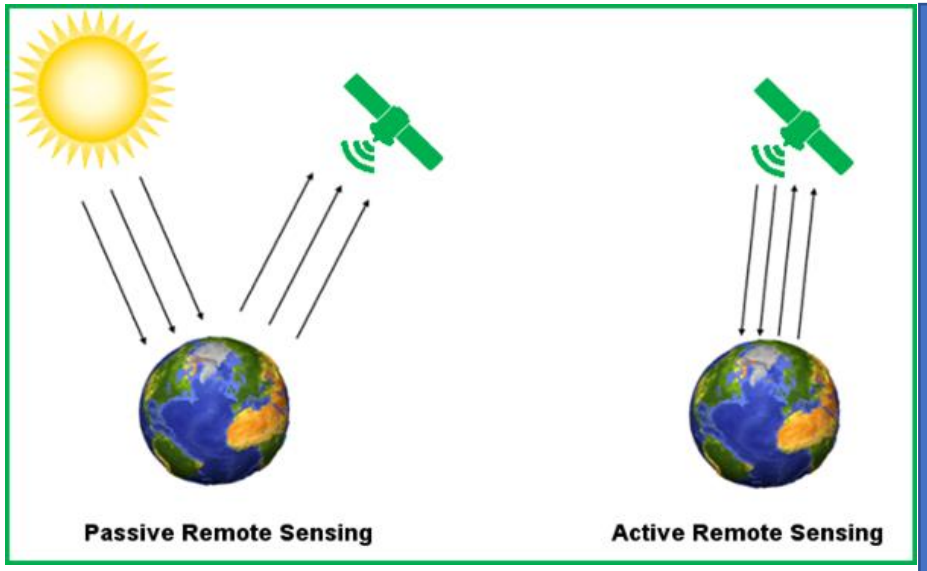


Marine Oil Spill Poses significant environmental and economical risks worldwide

- Marine oil spill is an inherent risk of the costal and offshore oil drilling industry, shipping and tourist cruise industry which can be exacerbated by aging facilities and lack of maintenance, human error and accidents, illegal dumping, as well as natural disasters including hurricanes and storm surges.
- Some notable recent incidents 2010 BP Deepwater horizon spill, 2014 oil spill in Trinidad and Tobago, the mysterious oil spill off the Brazilian coast in 2019, Mauritius oil spill in 2020, Sri Lanka oil and chemical spill in 2021, Jan 2022 Peru Callao oil spill. Plenty of smaller scale day-to-day spills are happening every day.
- Given the high density of the ship traffic, accidental spill and intentional bilge dump by ships operating in the region is also a common occurrence. The latter is an violation of the MARPOL convention.
- The ecosystem impact and economic cost of the marine oil spill is vast and can be long-term.

Satellite monitoring, a proven, timely and cost-effective way to monitor oil spills

- With the ability to image large areas with ever increasing spatial resolutions and shorter revisit times, satellite remote sensing of oil spills is a proven and effective way to monitor.
- Publicly available free satellite imagery with high enough spatial resolution (~10 meter) to monitor the spill is available.



https://grindgis.com/remote-sensing/active-and-passive-remote-sensing

Optical Sensor
Need cloud free condition, day time imaging, more color/thickness information

Synthetic Aperture Radar (SAR)
24/7 day/night, can see through clouds, grayscale imagery

Free Open-source Satellite Images

Passive sensor data (Optical)

Landsat 7 & 8 (NASA, 30m res.)

Sentinel-2A & 2B (ESA/Copernicus, 10m res.)

ASTER on Terra (NASA, 15m res.)

MODIS on Aqua & Terra (NASA, 250m res.)

S-NPP and NOAA-20 VIIRS (NOAA, 375m res)

Active sensor data (SAR)

Sentinel-1A & 1B (ESA/Copernicus, 20-50m res)

US NOAA's Satellite Based Marine Pollution Program

- Since 2009, US National Oceanic and Atmospheric Administration (NOAA)'s Satellite Analysis Branch (SAB) has established a 24/7 satellite marine pollution program to monitoring marine oil spills in the US EEZ in near real time.

Initial information from users

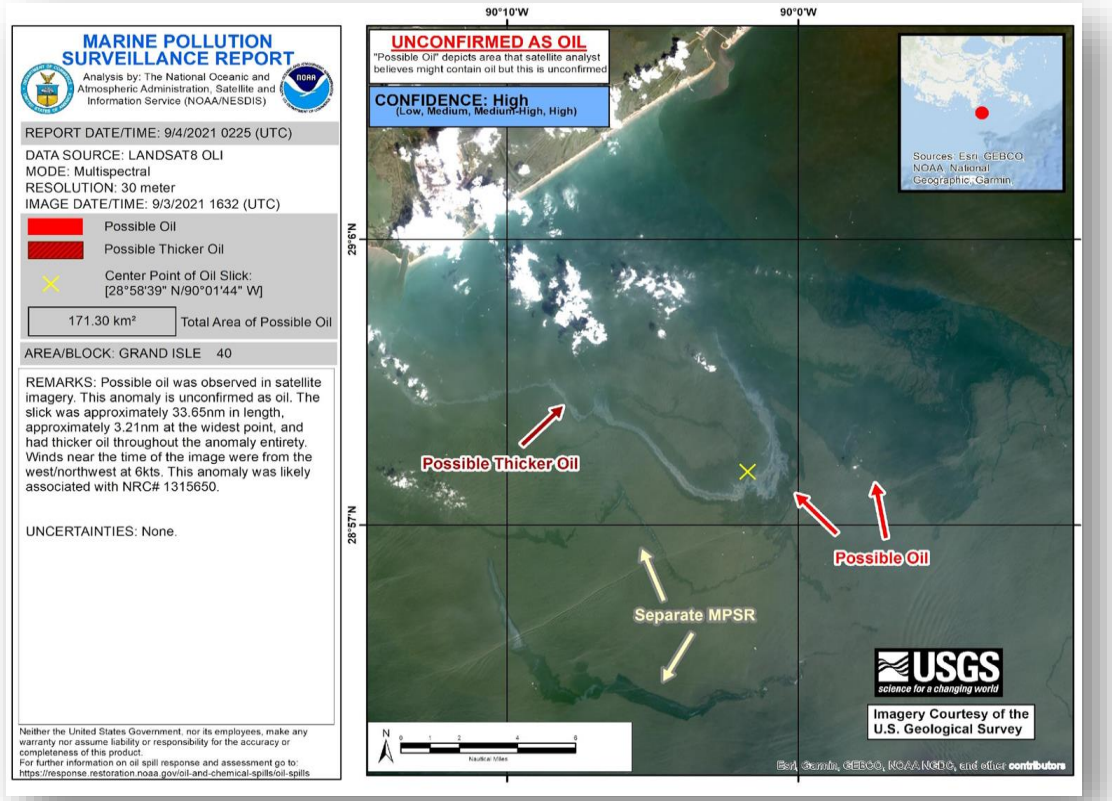
Meteorological, oceanographic and much ancillary data

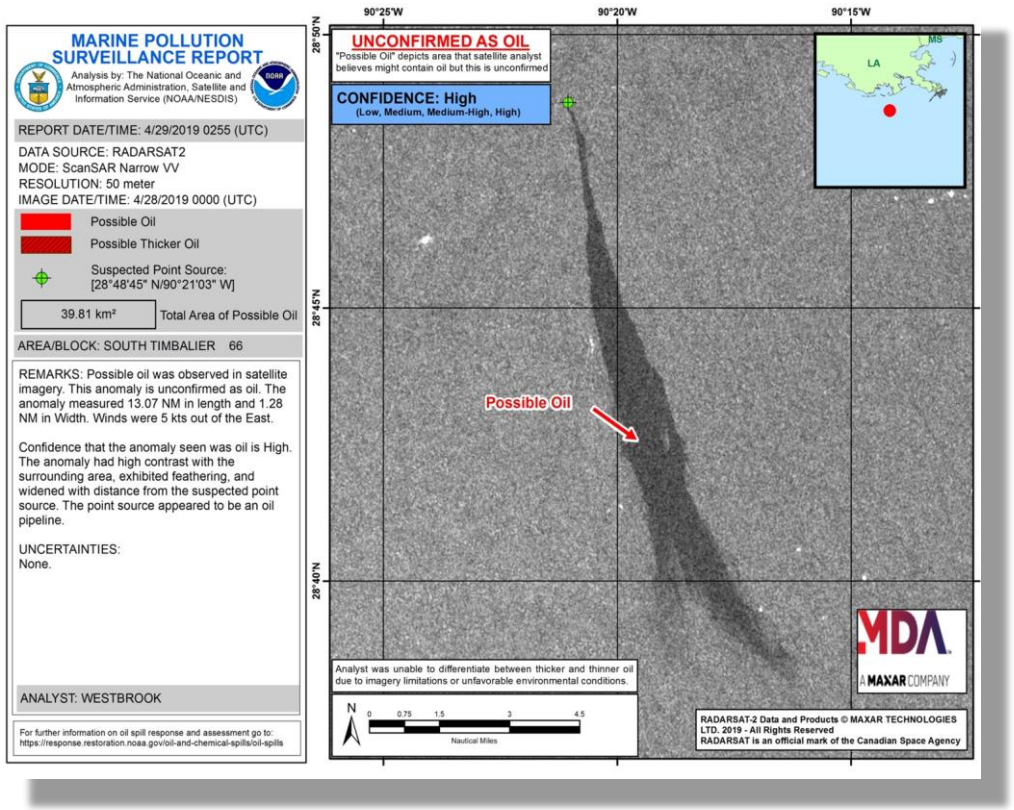
Integrative, interactive oil operations = actionable information

New information acquired as needed.

Specialized questions and concerns of responders addressed.

Analysts who are trained with the program analyzes mostly free satellite imagery for accidental and intentional oil discharges, create the Marine Pollution Surveillance Report (MPSR), notify Federal and State Agencies including USCG and oil facility inspectors from DOI. Reports are publicly available at https://www.ospo.noaa.gov/Products/ocean/marinepollution/

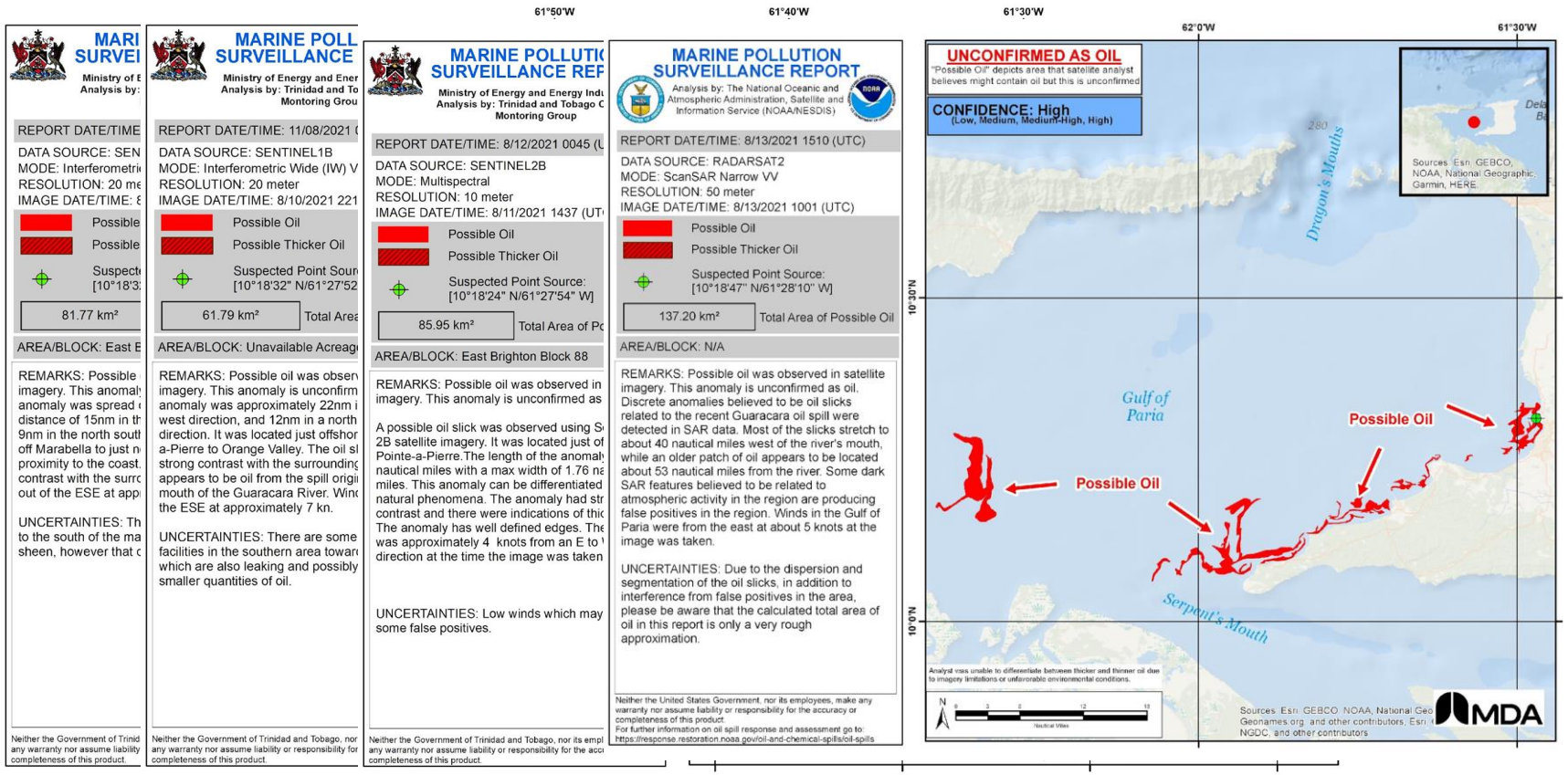




COSTA: Collaboration for Oil Satellite Tracking in the Americas

- The Americas region faces similar marine oil spill issues given its vibrant oil and shipping industry and vital marine resources many countries rely on. Satellite oil spill monitoring capabilities such as the one developed in the US NOAA are needed and have been requested by countries in the region.
- The COSTA program answers this need by coordinating efforts to form a regional alliance to train and establish a near real time satellite oil spill monitoring and analysis network, for marine oil spill early detection, mitigation and response in the Americas region.
- **Trinidad and Tobago** is the first country trained and has fully establish their operational oil monitoring program since July 2021. They have plans to monitor larger areas than their own EEZ in the future.
- **Mexico** and **Peru** has finished their training in August 2022, and are transitioning to operations.
- **Eight central American countries through SICA** (Central America Integration System) and **Colombia** have expressed interest in joining COSTA.

Notable Oil Spill Events supported by COSTA partners : Guaracara Pipeline Oil Spill in May 2021



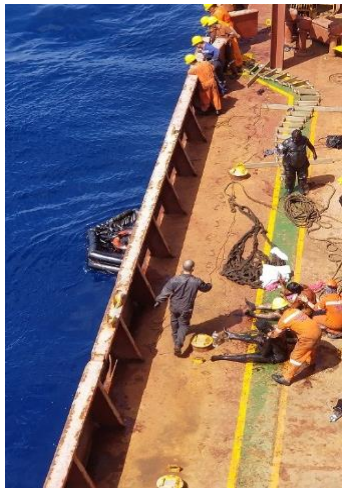
- A pipe line burst near Pointe-A-Pierre on August 7th, 2020
- Trinidad and Tobago fully executed the operational satellite response and showed others in their government the critical value of this type of satellite data.
- COSTA members are expected to support each other if there is a major spill in any of their waters, so NOAA/SAB provided secondary support.

Significant Guaracara oil spill August 2020 in Trinidad and Tobago

Notable Oil Spill Events supported by COSTA partners : Sunken M/V Cetus Oil Spill in May 2021

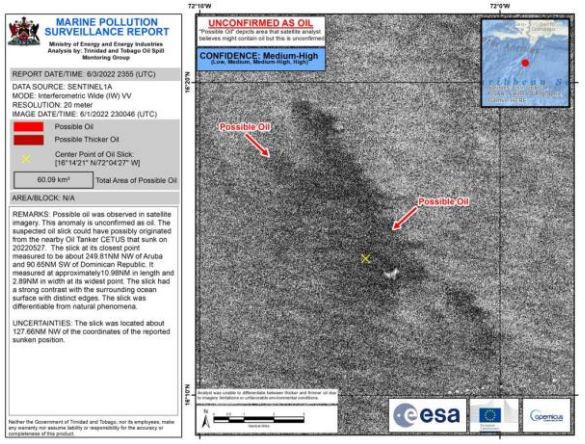
- On Friday May 27th 2022 , **Oil Tanker M/V CETUS** sunk in position 14-45.00N 070-31.0W (130 Nautical Miles North West of Aruba) leaving a considerable oil spill.14 persons were rescued and two persons lost.
- COSTA satellite imagery support from IMA in Trinidad and Tobago were requested on Friday night June 3rd.
- Upon request on June 3rd, IMA generated three MPSRs based on Sentinel 1 and sentinel 2 imagery from June 1st and June 2nd. The reports were used by Dutch Caribbean Coast Guard in Aruba as well as Jamaica for oil spill response.
- NOAA received formal support request for international support on June 8th, and ordered commercial Radarsat2 imagery to support the event, while working together with IMA. By then, no further oil anomaly was detected.
- Cutting the response time of satellite support by 5 days, this event has demonstrated the advantage of having local satellite monitoring capability in the Caribbean region.

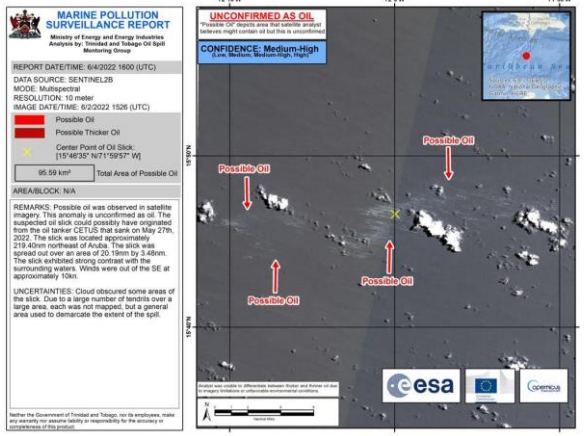
M/V Cetus Oil tanker



Crews were being rescued, covering in oil

Picture of the oil spill





Summary

- Satellite imagery are powerful tools to help track marine spill and aid in oil spill response. United States NOAA has developed a analyst driven satellite oil spill monitoring program utilizing mostly freely available images.
- Collaboration for Oil Satellite Tracking in the Americas, or COSTA program aims to form a regional alliance to train and establish a near real time satellite oil spill monitoring and analysis network in the Americas region. So far organizations from three countries have been trained and one country has set up an operational monitoring program, similar to NOAA's.
- The near term focus of COSTA is for the America region. Information brochures are available.

Questions? Thank you!

Please email Xiaofang.zhu@noaa.gov or Emily. smail@noaa.gov

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