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Nineteenth Intergovernmental Meeting on the Action Plan for the Caribbean Environment Programme and Sixteenth Meeting of the Contracting Parties to the Convention for the Protection and Development of the Marine Environment of the Wider Caribbean Region

Virtual 26 to 30 July 2021

## A PILOT PROGRAM FOR SATELLITE OIL SPILL MONITORING FOR THE CARIBBEAN REGION

*For reasons of public health and safety associated with the COVID-19 pandemic, this meeting is being convened virtually.  
Delegates are kindly requested to access all meeting documents electronically.*



## A Pilot Program for Satellite Oil Spill monitoring for the Caribbean Region

### **Background**

In recent years, the Wider Caribbean and adjacent regions have faced challenges from oil spill incidents, including an event where oil washed up on thousands of kilometers of Brazil's coastline from an unknown source<sup>1</sup> (Figure 1) and multiple spills originating from Trinidad and Tobago<sup>2,3</sup>. Illegal dumping of oil-contaminated waste by ships operating in the region is also a common occurrence<sup>4</sup>.

Despite these known risks, the Wider Caribbean lacks an operational oil spill surveillance service. Oil spills, such as in the case of the 2019 Brazil incident, are often identified only after oil reaches environmentally sensitive coastal areas. The time lag between the oil spill occurrence and notification to the government authorities and enforcement agencies is critical. Without effective monitoring of the oil spill incident, this prolonged time lag results in missed opportunities to identify oil spill sources and responsible parties, less effective mitigation, as well as more severe environmental damage.



*Figure 1. Oil seen washed up a Brazilian beach in late 2019.*

With the ability to image large areas with ever increasing spatial resolutions and shorter revisit times, satellite remote sensing of oil spills is proven and among the best ways to monitor ocean oil spills. Publicly available satellite imagery with high enough spatial resolution (~10 meter) to monitor spills is available. Various government agencies and institutions in the United States, Canada, and Europe are leveraging the imagery data to set up monitoring programs for their respective regions. The Satellite Analysis Branch (SAB) of the U.S. National Oceanic and Atmospheric Administration (NOAA) is one of them, and has been monitoring the U.S. EEZ for accidental and intentional oil spills from oil facilities, illegal vessel discharge, and shipwrecks since 2009.

In May 2018, a Workshop on 'Sargassum and Oil Spills Monitoring Pilot Project for the Caribbean Sea and Adjacent Regions' was organized by the Intergovernmental Oceanographic Commission

<sup>1</sup> <https://www.bbc.com/news/world-latin-america-50223106>

<sup>2</sup> <https://www.thedodo.com/the-worst-oil-spill-in-trinida-397538962.html>

<sup>3</sup> <http://curacaochronicle.com/local/oil-spill-also-reaches-the-abc-islands/>

<sup>4</sup> <https://www.nytimes.com/2019/06/04/business/carnival-cruise-pollution.html>

(IOC) of UNESCO and held in Mexico City<sup>5</sup>. During the meeting, participants from many Caribbean countries expressed a strong interest in setting up a regional Caribbean-wide oil spill monitoring system. This project is the direct brainchild of that meeting. The plan is to:

1. Train Regional Satellite Analysts who will be responsible for performing oil spill surveillance using freely available satellite data, as well as connect with regional users to disseminate products and receive feedback; and
2. Set up A GIS-based oil spill information webpage that will host information such as past oil spills or other information as requested by end users.

### **Pilot Program at Trinidad and Tobago**

The Caribbean is a large region with many countries and stakeholders. It is determined that the best way to proceed with the project will be to first set up a regional pilot program which focuses on smaller areas. Trinidad and Tobago is a good candidate given its abundance of oil facilities and monitoring needs. The pilot program, although smaller in scale, involves initial hardware and software setup, training of locally based analysts by SAB, and user outreach. The end result will be to produce timely and value added Satellite Oil Spill Analyses, similar to those from NOAA SAB, to the regional users<sup>6</sup>.

In late February 2021, after an internal discussion with the project partners, the IOC Sub-Commission for the Caribbean and Adjacent Regions (IOCARIIBE) reached out to Institute of Marine Affairs (IMA) of Trinidad and Tobago to inquire if there was an interest in a satellite oil spill training course and subsequently setting up a regional satellite oil spill monitoring program. Subsequent meetings were held where NOAA SAB described the publicly available satellite imagery for oil spills and demonstrated reports when accidental or intentional oil leaks were detected using satellite imagery. As a result, IMA agreed to join this pilot program with great enthusiasm and indicated a satellite oil spill monitoring program is much needed in Trinidad and Tobago. Two more Trinidad and Tobago agencies, the Ministry of Energy and Energy Industries (MEEI) and the Environmental Management Authority (EMA) also joined IMA to participate in the training provided by NOAA, as well as the monitoring program.

On May 17th 2021, 18 trainees from IMA, MEEI and EMA, divided into three groups, started the satellite oil spill virtual training program with SAB. The training will run through early July. The training covers background information about synthetic aperture radar (SAR) and optical imagery for oil monitoring, data portals and data acquisition, GIS software and product generation, as well as hands-on training on examining satellite imagery, drawing oil polygons, and issuing reports. After the training, it is expected the three agencies will host a joint operational oil monitoring program with the trained personnel, while NOAA SAB will provide an initial support phase for a few months when SAB analysts help monitor the Trinidad and Tobago area in parallel and will be available for consultation if needed. The final plan for the operational monitoring is still in discussion.

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<sup>5</sup> [http://www.ioc-unesco.org/index.php?option=com\\_oe&task=viewEventRecord&eventID=2270](http://www.ioc-unesco.org/index.php?option=com_oe&task=viewEventRecord&eventID=2270)

<sup>6</sup> <https://www.ospo.noaa.gov/Products/ocean/marinepollution/>

## **Project Partners**

### **A. Ministry of Energy and Energy Industries, Environmental Management Authority, and Institute of Marine Affairs, Trinidad and Tobago**

The following agencies are participating in the NOAA SAB satellite oil spill training and plan to jointly operate an operational oil spill monitoring program for the Trinidad and Tobago area.

#### **i. Ministry of Energy and Energy Industries**

The Ministry of Energy and Energy Industries (MEEI) is responsible for overseeing the operation of the National Oil Spill Contingency Plan (NOSCP) in Trinidad and Tobago. The NOSCP is the main tool that supports oil spill response preparedness in Trinidad and Tobago, which assigns the MEEI the responsibility for the clean up, prevention, abatement and combating of oil pollution within the country's territory. Measures under the NOSCP include mitigating the impact of oil spills and the acquisition and deployment of surveillance and monitoring technologies to ascertain liability in the event of a spill. The MEEI is also involved in managing mystery spills that occur within Trinidad and Tobago's waters. For this reason, MEEI is installing two radar systems to assist with detection of oil spills.

#### **ii. Environmental Management Authority**

The Environmental Management Authority (EMA) is a statutory authority established in 1995 by the Government of Trinidad and Tobago to address the nation's growing environmental concerns. Under the Environmental Management Act, Chap. 35:05, the EMA has responsibility for developing and implementing laws, policies, programmes and standards for effective management of the environment; promoting educational and public awareness programmes; coordinating environmental management functions performed by persons in Trinidad and Tobago; and monitoring compliance with environmental requirements. The EMA also responds to emergency incidents and spills in collaboration with other government agencies and provides technical and investigative support to the response teams.

#### **iii. Institute of Marine Affairs**

The Institute of Marine Affairs (IMA) is a governmental agency in the Ministry of Planning and Development. The IMA is engaged in coastal and marine scientific research and provides policy guidance and advice to a wide range of stakeholders. Under the National Oil Spill Contingency Plan, the IMA has the responsibility for fingerprinting of oil samples and the development of a data bank of oil samples. The IMA is collaborating with the MEEI in the two tower SAR systems and will be assisting in their operation. The IMA has been designated as the Remote Sensing Centre for the Caribbean by the Caribbean Community (CARICOM). In addition, under the Cartagena Convention Land Based Sources of Pollution (LBS) Protocol, the IMA has been designated as an LBS Regional Activities Centre (RAC). In this function, the IMA and RAC REMPETIC are working together towards implementing project activities towards oil spill response in the region as a means of integrating the work of the LBS and Oil Spill protocols.

**Project role:** The three agencies will:

1. Provide personnel with GIS or oil response background and personnel time to receive satellite oil analysis training from SAB.
2. Provide computer equipment and GIS software to use in the training and for later monitoring.
3. Plan and coordinate an operational oil spill monitoring program between the agencies, and with SAB's support if needed.

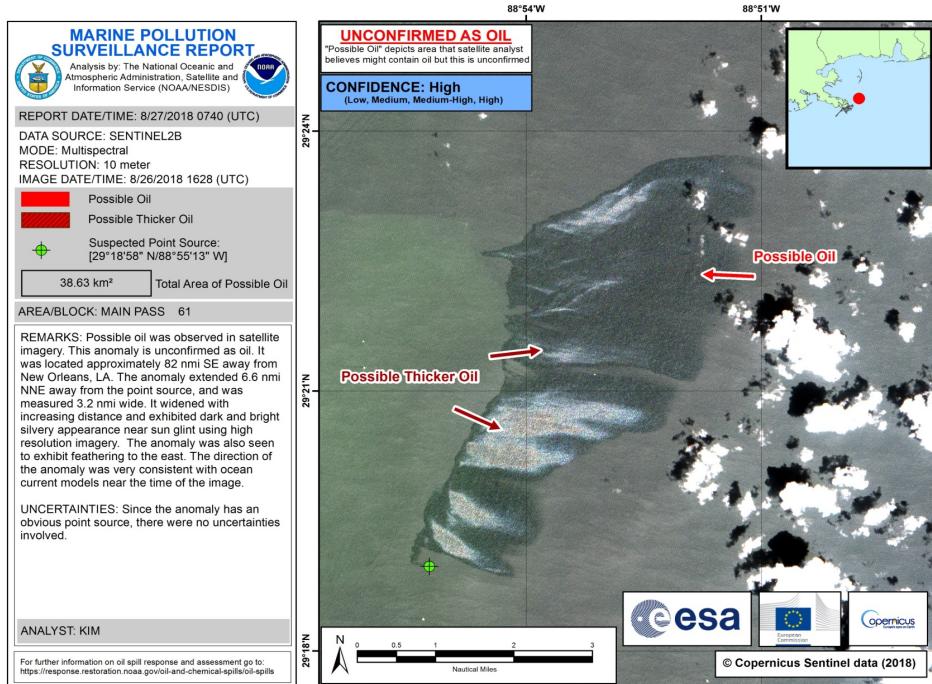
## **B. Satellite Analysis Branch**

The Satellite Analysis Branch (SAB) resides in the U.S Department of Commerce National Oceanic and Atmospheric Administration (NOAA) National Environmental Satellite Data and Information Service (NESDIS). A Marine Pollution Surveillance Program was set up in SAB to provide satellite-based analyses of oil spill incidents since 2009. The official product of the oil monitoring is called a 'Marine Pollution Surveillance Report' or MPSR (Figure 2). The product is created primarily using publicly available moderate to high resolution optical imagery and Synthetic Aperture Radar (SAR) imagery. SAB produces MPSRs for both potential intentional pollution violations and accidental oil discharges from oil facilities, as well as from vessels engaging in 'illegal bilge dumping'. SAB has worked with international partners in Canada, Mexico, and Taiwan to improve their oil spill monitoring capabilities or coordinate monitoring efforts. SAB has been tasked occasionally with international oil spill disaster and incidence monitoring through requests made from foreign governments via the U.S. Department of State, including on previous oil spills in the Caribbean. SAB is particularly interested in helping neighboring regions, including the Caribbean, to establish oil monitoring capabilities, to better track illegal vessel dumping, and to coordinate on larger oil spills.

**Project role:** NOAA SAB will provide:

1. Guidance about hardware, software and procedures tailored to the budget and needs of the pilot project agency, which is scalable as the program transitions to operations.
2. Training to local staff members to produce oil spill analysis reports.
3. Expert guidance on satellite detection of oil spills.

In the longer term, the hope is that SAB and its Caribbean oil spill analysis counterparts will have an ongoing collaboration, working jointly on cross-border spills, sharing/exchanging new techniques, technology, and datasets, and perhaps even providing mutual backup support.



*Figure 2. A sample Marine Pollution Surveillance Report (MPSR) from the NOAA Satellite Analysis Branch showing an anomaly from an oil facility using freely available 10m resolution Sentinel 2 optical imagery.*

**C. GEO Blue Planet Initiative:** The Group on Earth Observations (GEO) Blue Planet Initiative is a network of ocean and coastal-observers, social scientists and end-user representatives from a variety of stakeholder groups. A primary role of GEO Blue Planet is to identify societal information needs and provide networking services between society and the ocean observing community in order to develop information and services to meet these needs. In a 2018 workshop on implementing and monitoring the Sustainable Development Goals in the Caribbean, GEO Blue Planet identified oil spill monitoring as a priority for the Caribbean and is subsequently working to bring partners together who can address this issue.

**Project role:** GEO Blue Planet will provide networking and coordination support for the project including communications and overall management of the kick-off phase of the project.

**D. IOCARIBE IOC UNESCO:** IOCARIBE is a regional subsidiary body of the Intergovernmental Oceanographic Commission (IOC) of UNESCO. It is the IOC Sub-Commission for the Caribbean and Adjacent Regions and is responsible for the promotion, development and co-ordination of IOC marine scientific research programmes, the ocean services, and related activities, including training, education and capacity development in the Caribbean and Adjacent Regions. In establishing its programmes, it takes into account the specific interests and needs of the Member States in the region. IOCARIBE can be envisaged as an international networking system created by the Governments of Member States, for the coordination and promotion of marine and coastal sciences and associated operational services in the region.

**Project role:** IOCARIBE will work with member countries to promote the development and uptake of regional oil spill surveillance. IOCARIBE will also support regional coordination and networking of marine and coastal monitoring services in the region.

**E. RAC-REMPEITC Caribe:** The Regional Marine Pollution Emergency, Information and Training Centre - Caribe contributes to the sustainability of the marine environment in the Wider Caribbean Region by assisting countries to implement international conventions created to reduce pollution from ships. REMPEITC is a Regional Activity Centre of the Caribbean Environment Programme (UNEP-CAR/RCU). Established in 1995, RAC/REMPEITC-Caribe is hosted by the government of Curaçao and staffed with subject matter experts voluntarily seconded by states signatory to the Cartagena Convention. RAC/REMPEITC-Caribe assists countries in the Wider Caribbean Region to prevent and respond to pollution in the marine environment through:

- Developing and assessing national and multilateral contingency plans,
- Training and workshops,
- Technical support and consultancy, and
- Information and public awareness.

**Project role:** The RAC/REMPEITC will help the group connect to regional users to aid in dissemination of the product.