

# SATELLITE DATA TO METHANE ACTION: REDUCING EMISSIONS IN NIGERIA



Through the Methane Alert and Response System (MARS), UNEP's International Methane Emissions Observatory has facilitated concrete methane action in Nigeria.

MARS is the first global satellite detection and notification system providing actionable data on major methane emissions around the world.



In June 2024, UNEP's International Methane Emissions Observatory (IMEO) detected large methane emissions in the Niger Delta using data from the EMIT sensor onboard the International Space Station (ISS). The source was thought to be a gas plant.

and taken action to resolve it. After identifying the defective equipment responsible for the leak, the operator shut down the facility and made necessary repairs. UNEP's IMEO confirmed emissions are no longer detected by satellite and continues to monitor it.

MARS, managed by UNEP's IMEO, exists to identify large emissions like this and enable targeted action to resolve them. Shortly after detection, IMEO sent a MARS notification with information on the emissions to the Nigerian government as well as the operator of the facility, as it was a member of UNEP's Oil and Gas Methane Partnership 2.0 (OGMP 2.0).

The leak was observed emitting at an average of 4.5 tonnes per hour (based on archival satellite observations). Every hour, that much methane has the same near-term climate impact as over 80 passenger vehicles driven for an entire year.

Within a few weeks, ENI, the operator of the facility at the time, informed UNEP's IMEO that thanks to the MARS notification, it had identified the cause of the emissions

Swift action in response to this MARS notification was essential for preventing this leak from continuing and demonstrates how credible data can be translated into climate action when put in the right hands.

**Figure 1**  
Satellite images of emissions pre- and post-MARS notification. Plumes are from NASA EMIT sensor.



**2023-12-23** Wind speed ↗ 1.35m/s



**2024-04-20** Wind speed ↗ 2.08m/s



**2024-06-22** Wind speed ↗ 1.46m/s



**2024-08-22** Wind speed ↗ 1.75m/s

## MARS HAS FOUR COMPONENTS



1

### METHANE Detect and Attribute

UNEP's IMEO works with global mapping satellites to identify very large methane plumes and conducts further analysis with high-resolution satellites and datasets to identify the source of emissions. After detecting a plume, IMEO also investigates archival satellite data to provide context about how long and at what rate emissions have been occurring. Additionally, IMEO requests further satellite images from space agency partners to confirm details and status of the emissions.

On 22 June 2024, through MARS, UNEP's IMEO detected large oil and gas methane emissions in the Niger Delta Basin via the International Space Station's EMIT sensor. Review of archival satellite data revealed emissions were present at this location as early as December 2023.



2

### ALERT Notify and Engage Stakeholders

UNEP's IMEO works to notify governments and companies of large emissions events happening across their jurisdictions or operations. It continues this engagement as more information becomes available.

On 26 and 27 June 2024, UNEP's IMEO sent a MARS notification with information on the detected emissions to the Nigerian government, as well as to the oil and gas operator of the facility at the time, Eni.\* The notification included information on emission events observed from space, including detailed information on their location, size and potential sources. In this case, the source, which was emitting more than 1.5 tonnes of methane per hour at the time of notification, was thought to be from a gas plant.

\*In the weeks following confirmation of this mitigation, ownership of the facility has shifted to a non-OGMP 2.0 company. When assets are divested to non-OGMP 2.0 members, OGMP 2.0 loses the connection to the agents of change that is essential for transparency and mitigation. This includes the ability to directly receive MARS notifications from UNEP's IMEO.



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### RESPONSE Stakeholders Take Abatement Action

It is up to notified stakeholders to determine how best to respond to the notified emissions and share their actions with UNEP's IMEO to demonstrate verifiable climate action.

Within 12 days, ENI responded, acknowledging receipt of the notification. A few weeks following this initial communication, ENI informed IMEO that it had identified the source of the emissions as a defective piece of equipment (an inlet scrubber of a sales gas compressor unit) and had taken action to resolve the leak. Mitigation action included the shutdown of the compression station and the replacement of the ring joint that caused the methane leak.



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### SYSTEM Track, Learn, Collaborate, Improve

UNEP's IMEO continues to monitor notified locations for future emissions as mitigation efforts proceed. Data and analyses are made public 30 days post detection on the MARS data portal.

Since the initial notification, UNEP's IMEO has continued to monitor the site and confirmed via subsequent satellite imagery from the same sensor on the International Space Station that major emissions are no longer detected at the location. The leak was observed emitting at an average of 4.5 tonnes per hour (based on archival satellite observations). Every hour, that much methane has the same near-term climate impact as over 80 passenger vehicles driven for an entire year. IMEO is continuing its engagement with the government of Nigeria and industry actors to raise awareness of MARS, build capacity for methane action, and to address new emission events as they arise.



In implementing MARS, UNEP's IMEO collaborates with various institutional partners, including the World Bank, International Energy Agency, the Climate and Clean Air Coalition, Universitat Politècnica de València, the Netherlands Institute for Space Research and the Committee on Earth Observation Satellites.

Based on satellite data used by MARS, it is not possible to confirm the presence of minimal methane emissions at a given location. Rather, this data can confirm the absence of emissions at levels higher than a given satellite's detection limit, which varies based on the technology, ground conditions and the weather.