

Satellite-based Identification and Detection of Suspicious Vessels for Improved Maritime Situational Awareness

As global instability increases, countries around the world are strengthening their monitoring of ship movements operating in waters near their territories. Conventional methods relying on the Automatic Identification System (AIS), mandatory for certain vessels, have proven inadequate for comprehensively tracking ships across vast maritime areas. However, the use of satellite technology (satellite AIS, SAR satellite, etc.) allows for extensive monitoring, unaffected by weather conditions or time of day, significantly improving the efficiency and resilience of maritime surveillance systems.

Service

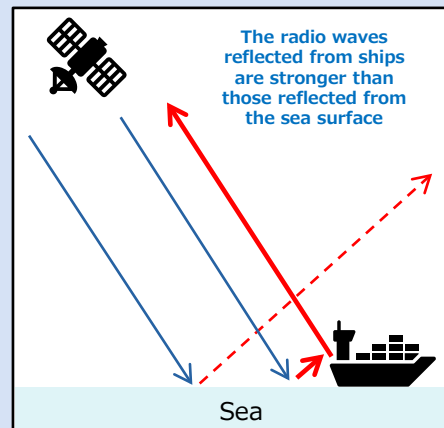
■ Service Overview

- By combining satellite AIS data, SAR imagery, and signals emitted from AIS installed on vessels, it is possible to analyze suspicious activities and identify the ships involved.

■ Observation Mechanism by Satellite

- SAR satellite imagery takes advantage of the property that smooth surfaces appear dark, while rough surfaces appear white, to detect the presence of vessels at sea.
- By additionally capturing AIS signal information via satellites and combining it with vessel data obtained from SAR satellites, it is possible to detect, identify, and monitor vessels engaging in suspicious activities without transmitting AIS signals.
- Another method involves using satellites to capture the radio frequencies emitted by vessels, allowing for the detection of the ship's location information.

Methods of Vessel Observation Using SAR Satellites

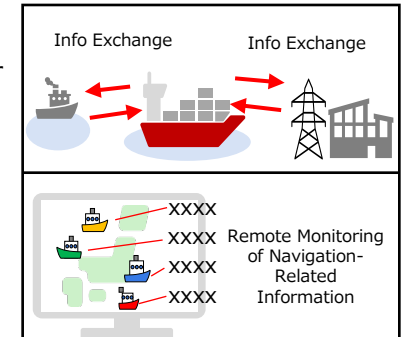


■ Comparison with Conventional Information Gathering Methods

Conventional Methods (Drone, Aerial Photography)	Satellite
<ul style="list-style-type: none"> Observations limited to specific areas On-demand observations Possible unavailable observation due to weather or local conditions High spatial resolution Information from the time of the survey only 	<ul style="list-style-type: none"> Wide-range, areal observations Regular observations (due to satellite orbit cycles) Observations possible regardless of surface (sea) conditions Low spatial resolution Past observations via archive data

■ What is the Automatic Identification System (AIS)?

- The Automatic Identification System (AIS) is a device that automatically transmits and receives vessel information (such as ship name, route, position, speed, etc.) via VHF radio waves between the ship and surrounding vessels (or ground stations). Under international conventions, it is mandatory for vessels that meet certain conditions to be equipped with AIS.
- However, many smaller vessels are not required to have this system, and some ships may deactivate their AIS to ensure safety when navigating in hazardous areas or to protect their advantages of fishing grounds. As a result, AIS alone cannot provide a complete picture of all vessel movements.



Target Users and Applications

- Maritime Security institutions/ Government ministries:** By using satellites, it becomes possible to regularly monitor vast areas and conduct remote surveillance of EEZs and territorial waters. This enables the **establishment of an efficient monitoring system** through the effective deployment of patrol vessels, aircraft, and other resources.

■ Example of Application

Detection of ships deactivating AIS signals



Source: Planet Labs