Crow’s Nest Maritime Monitoring & Security

Nations have a growing need to improve their maritime situational awareness within their territorial waters and EEZ

Sovereignty Protection
Foreign naval vessels in, or approaching territorial waters

Fisheries Protection
Vessels engaged in illegal
fishing within EEZs or controlled areas

Counter-piracy
Possible pirate vessels and historical piracy events

Environmental Protection
Vessels engaged in illegal bilge dumping, accidental oil spills

Counter-terrorism
Potential threats from inbound vessels

Counter-trafficking
Suspicious inbound vessels, or vessels traversing territorial waters

Vast regions to patrol and constrained resources are top challenges

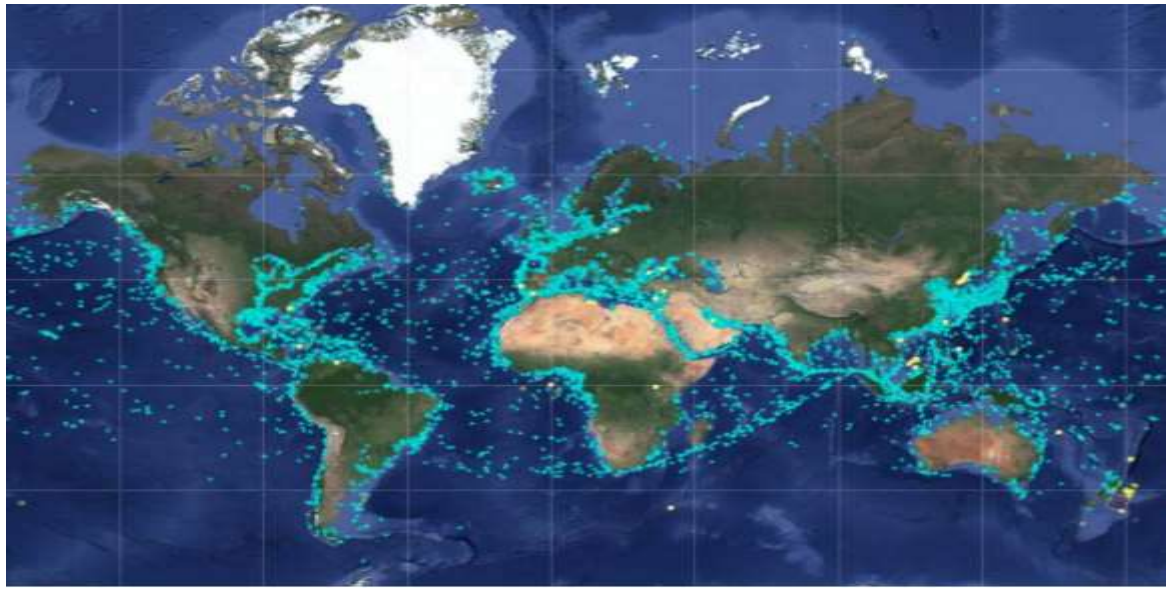
- **Broad area**:
  Monitoring large areas such as an entire EEZ to find the “needle in the haystack”

- **Managing mission resources**:
  Organizations need the ability to efficiently deploy its maritime patrol and surveillance assets to find and fix contacts of interest

- **Dynamic mission requirements**: Changing mission requirements requires a variety of assets, sensors and a flexible system to meet mission objectives

Today, AIS is the most prevalent Commercial maritime data set for vessel tracking but it has challenges

AIS contains ~200,000 reporting vessels over 24 hours…



…But does not capture the complete picture

- Only required for vessels greater than 300 tons
- Easily spoofed
- Easily turned off
- Satellite-based AIS does not work well in heavily trafficked areas

If a vessel does not want to be tracked, its AIS signal will be turned off or spoofed

Crow's Nest combines multi-sensor inputs with innovative processes shortening data to insight cycles & maximizing mission impact

Sources

VHR Optical

SAR

AIS

Other

RF, Customer Data

Innovative Processes

- AI/ML Vessel Detection
- AIS Correlation
- ***Automated tipping and cueing***
- Low-latency alerting and delivery
- Mission-Relevant Analysis

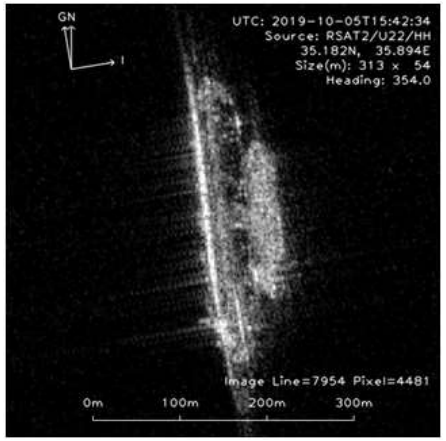
Actionable Intelligence

Dark Oil Transfer

MAXAR

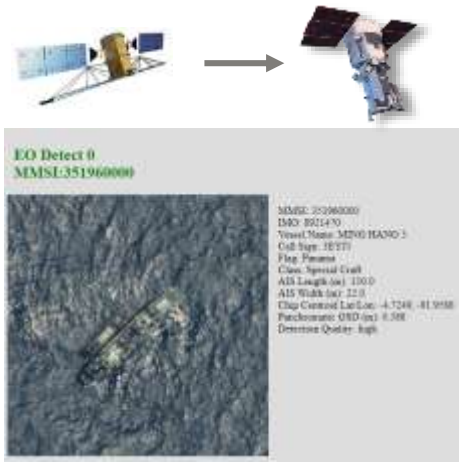
Crow's Nest Maritime Monitoring and Security (MMS) Solution provides comprehensive maritime satellite surveillance

Multi-Sensor SAR Vessel Detection



Adaptable broad area vessel detection coverage

Maritime Tipping & Cueing



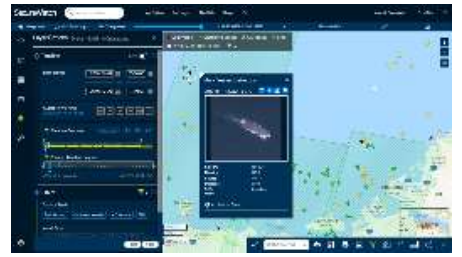
Greater insight into the vessels that matter most

Optical & SAR Port Monitoring

Monitoring plans for areas of interest

SecureWatch Maritime

In Development



Intuitive common operating picture for rapid analysis

Expert Analysis

Multi-Sensor SAR Vessel Detection Alerts provide maritime security agencies with an understanding of vessel location and characteristics

Detection Details

- Position
- Heading
- Length & Beam
- Detection Confidence
- AIS Vessel Correlation and Metadata
- SAR vessel images
- Speed & Classification
  (only in certain conditions)

Example Alert

Maxar's Maritime Tipping and Cueing engine captures optical images of vessels of interest in three different ways

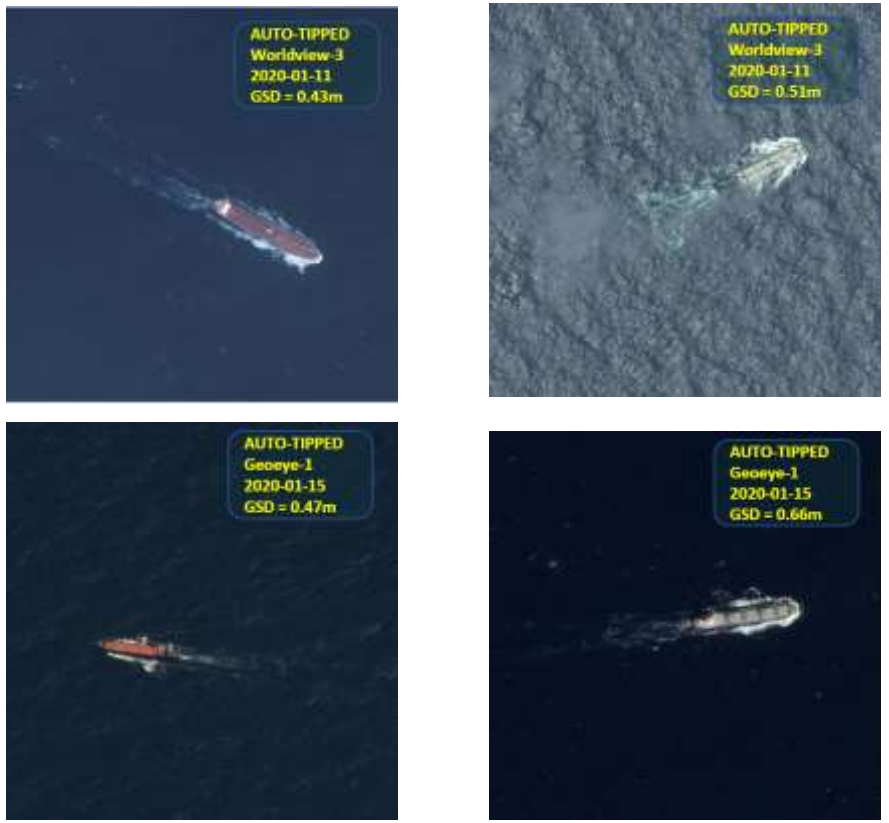
1.) Automated tipping based on customizable rulesets from the following datasets,

- AIS
- SAR VDS

2.) Machine-to-machine tipping via API,

3.) And Watchbox tipping…

...Leads to optical images of desired vessels:



Maxar's automated Maritime Tipping and Cueing workflow provides images of customer-defined vessels of interest

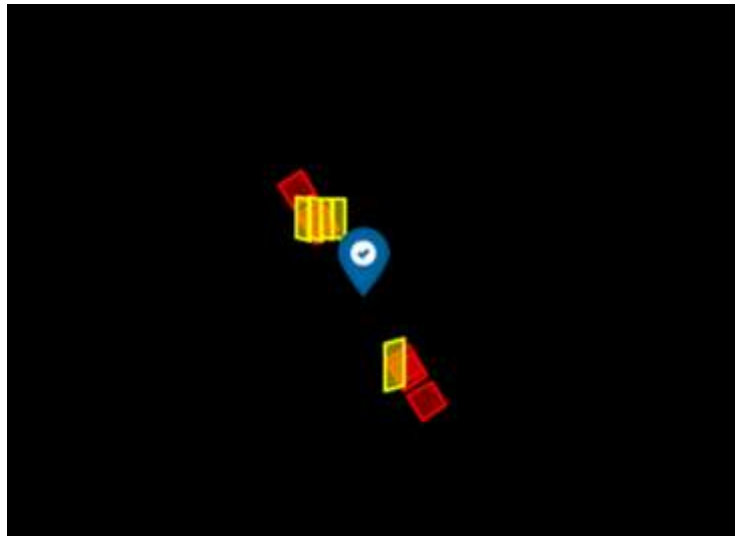
Receive Tipping Information

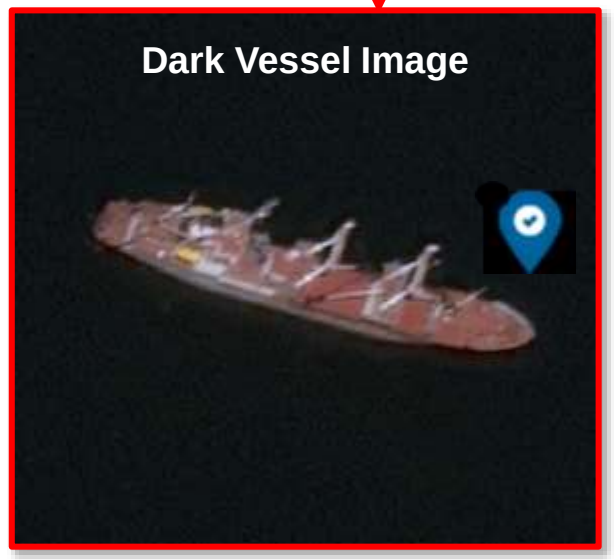
Filter Tips Applying Standard or User-Defined Rulesets

Estimate Future Location of Vessels of Interest

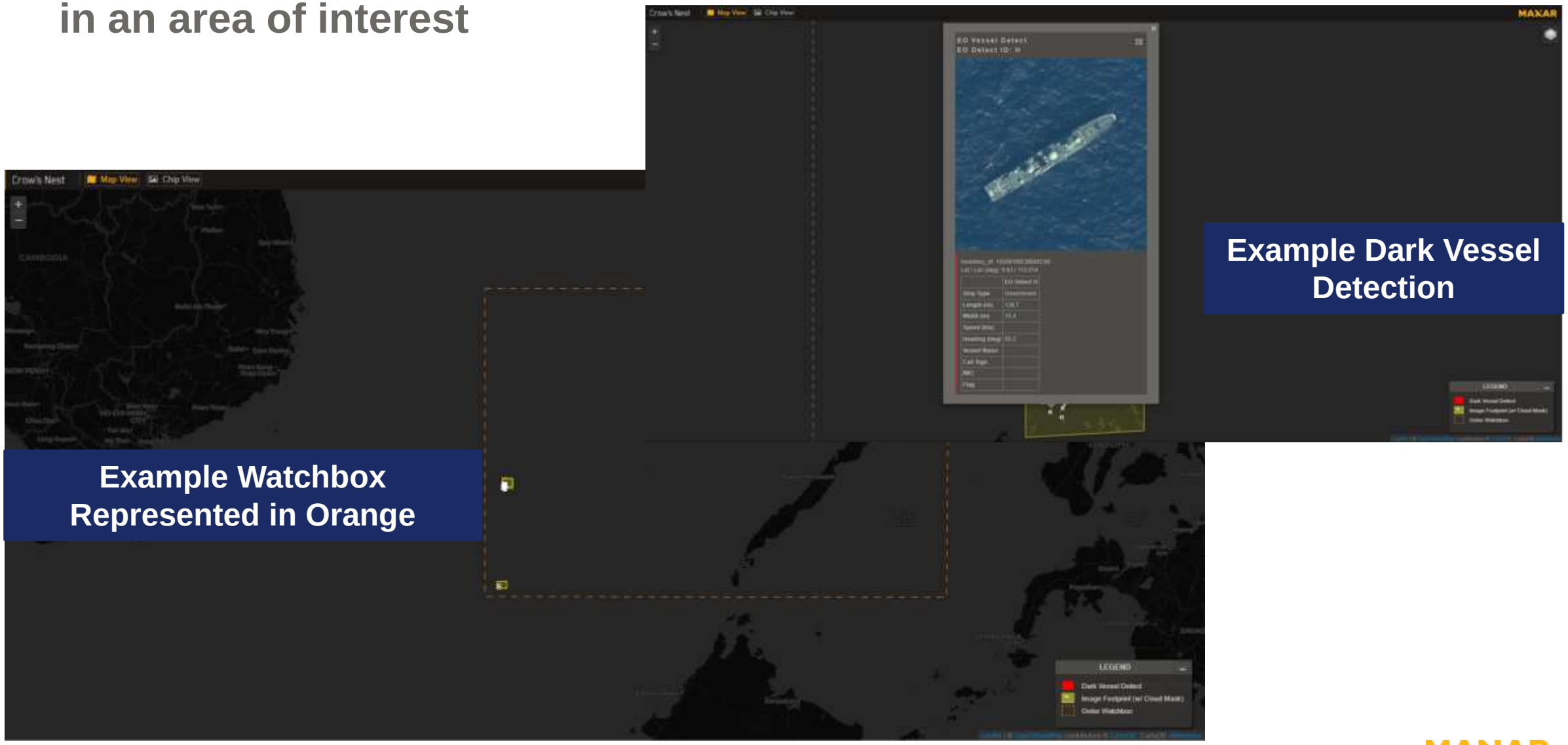
Generate Automated Tasking

Collect, Process & Exploit Imagery

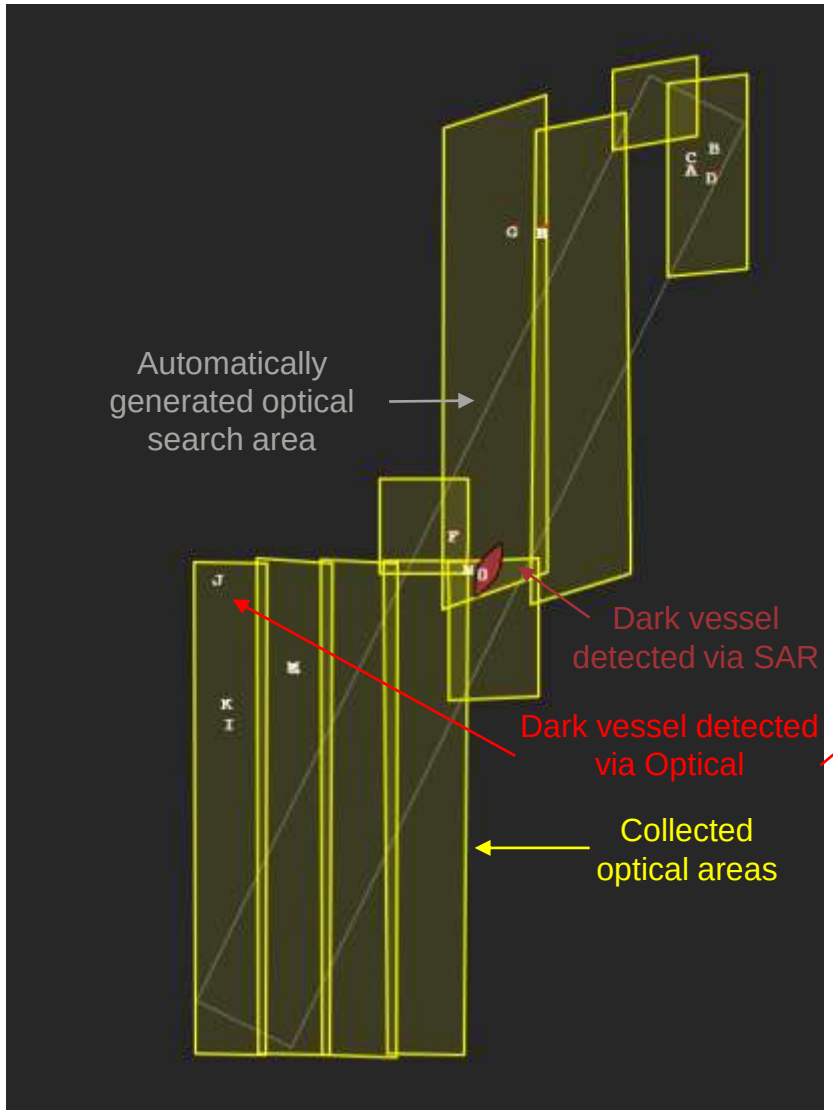




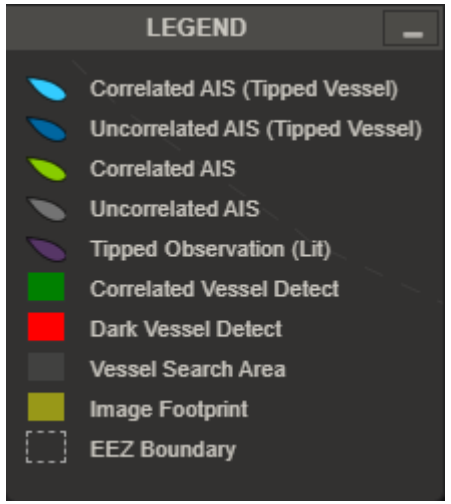
Watchbox tipping provides vessel detections for all Maxar collections in an area of interest



Sample Crow's Nest Alerts
SAR-EO Tipping, "Map View"

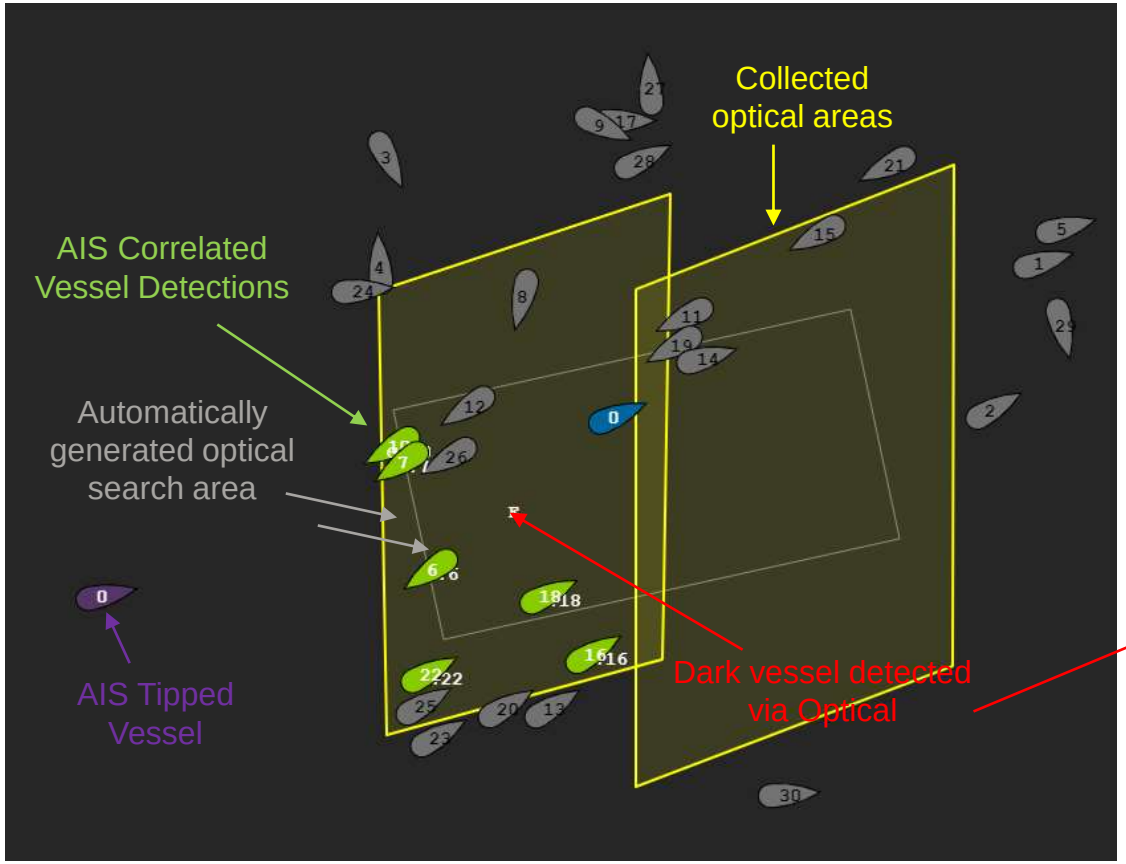


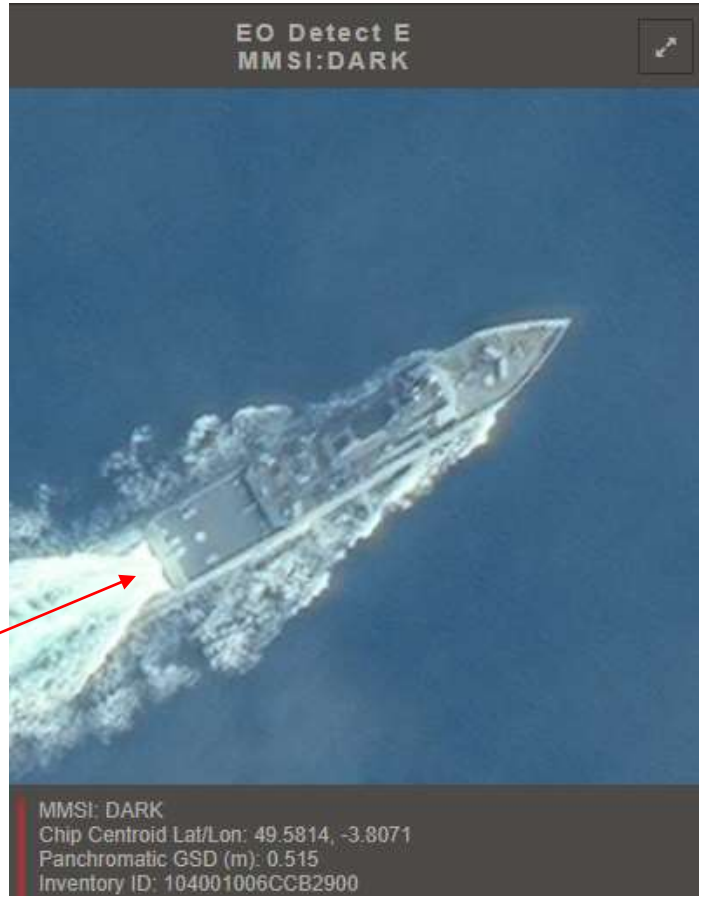
Clicking on Dark Icons Provide Optical Vessel Pop Ups

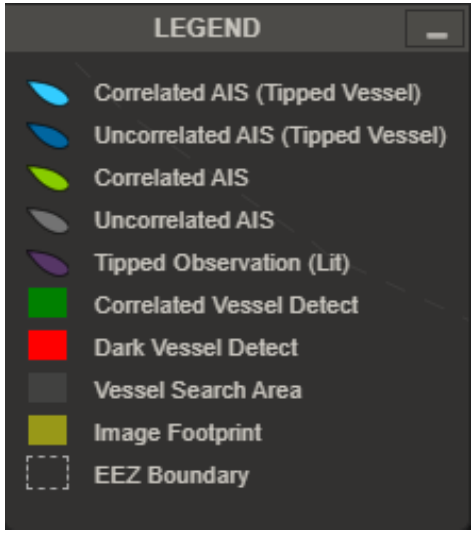


Note: not all data represented in legend was detected in example at left

Sample Crow's Nest Alerts
AIS-EO Tipping, "Map View"

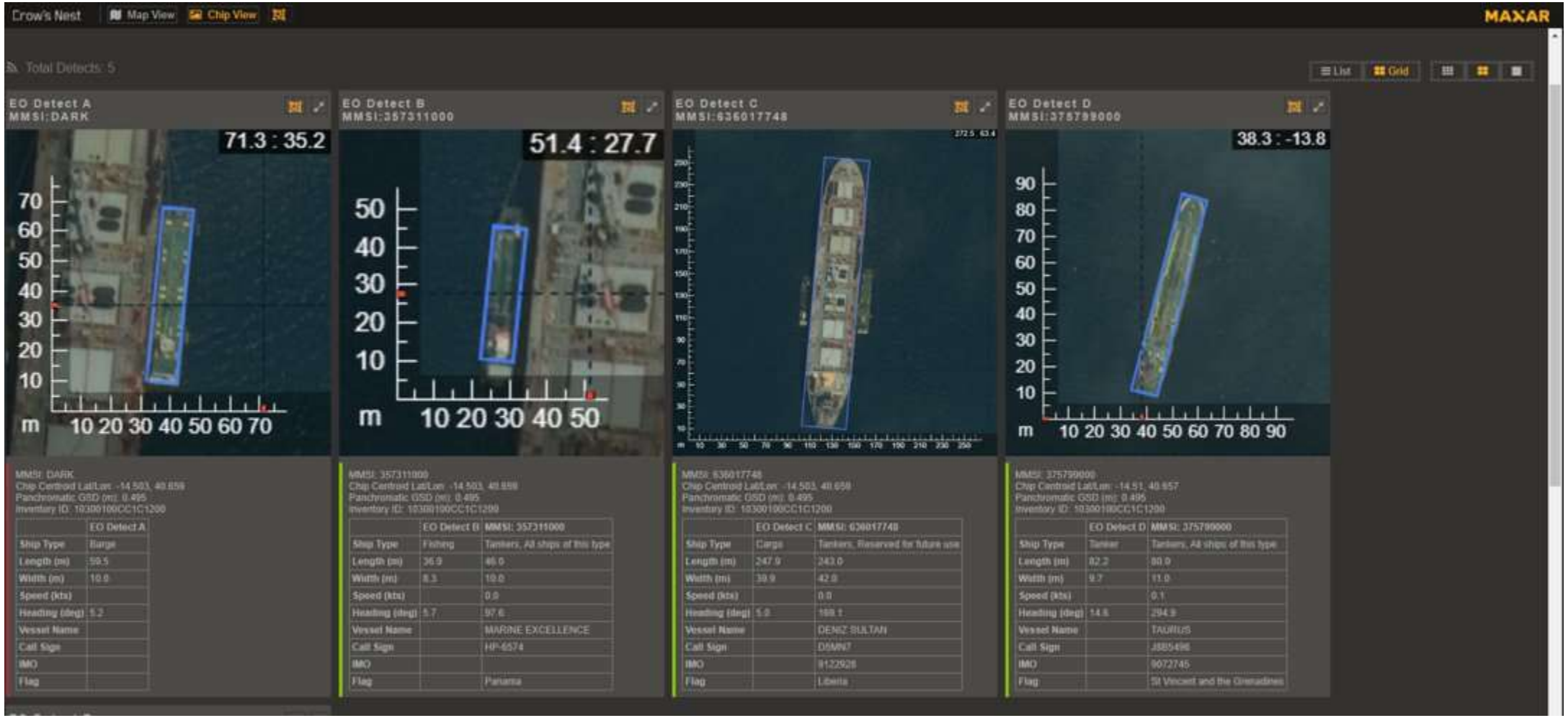






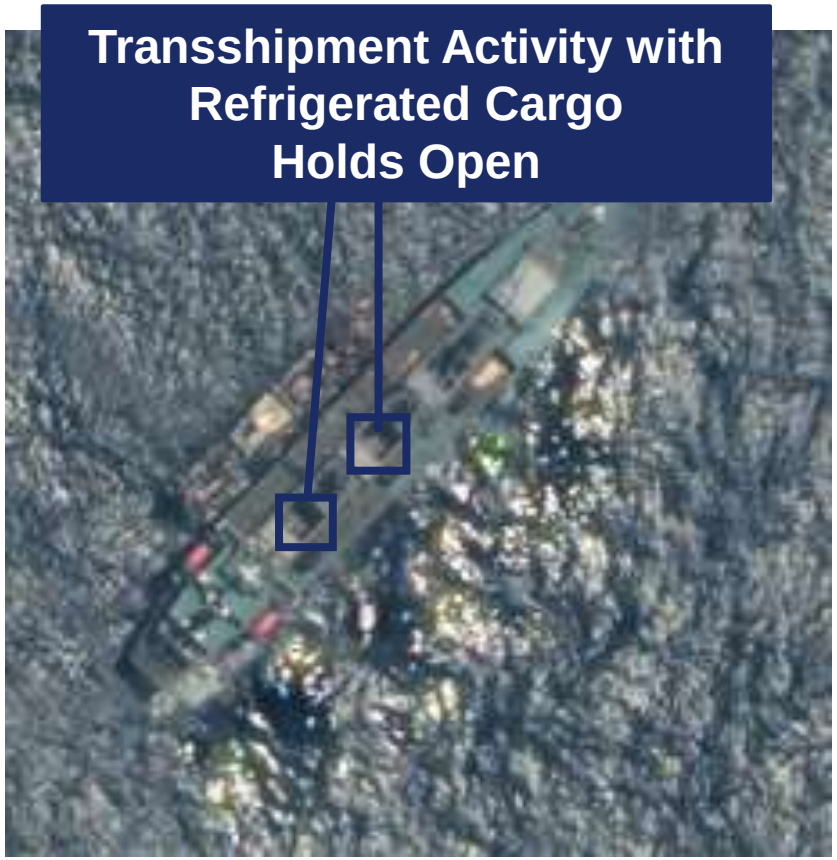
Clicking on Dark Icons Provide Optical Vessel Pop Ups

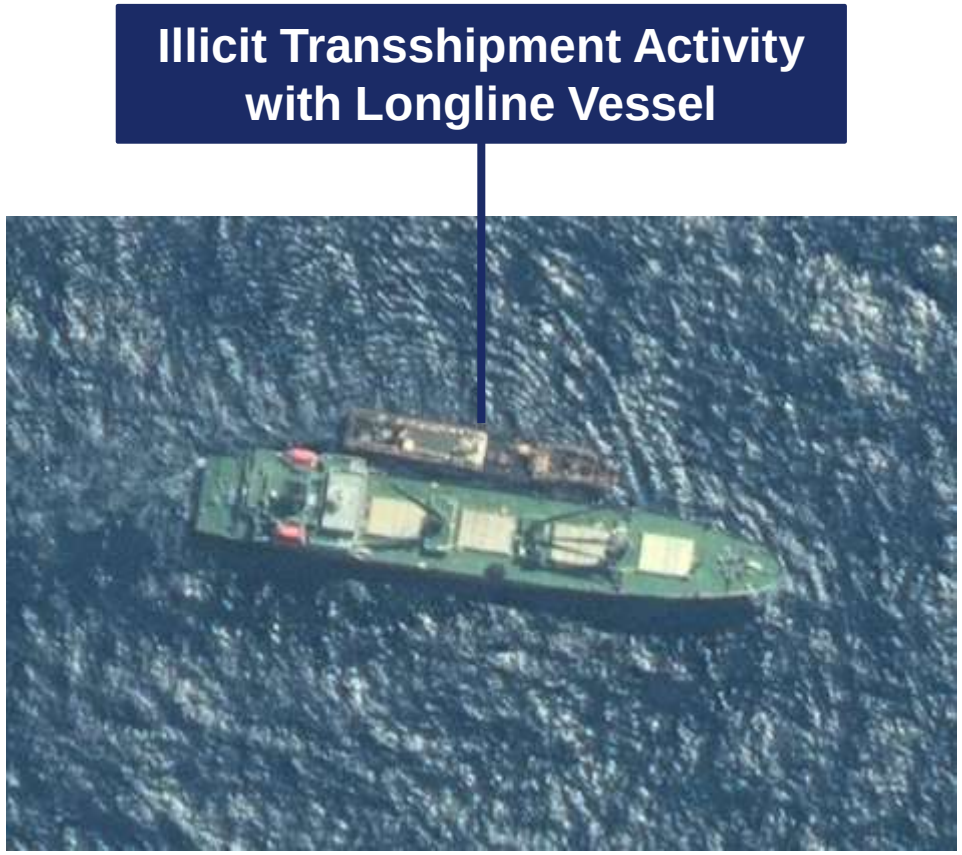
Sample Crow's Nest Reports
Vessel Image Chips "Chip View"



Clicking on Vessel Cards Brings User to Location of Vessel Within SecureWatch Allowing for Additional Exploitation

Example #1 – *Identifying Transshipment*





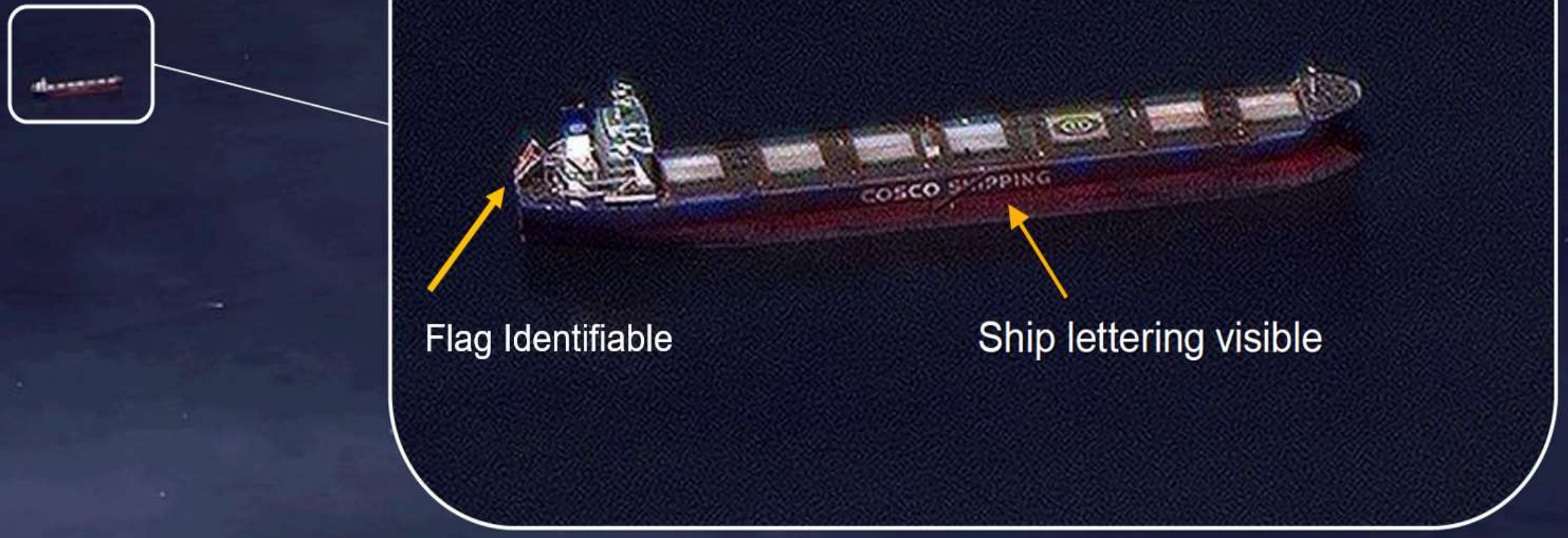
Example #2 – *Identifying Fishing Activity*

Purse Seine Fishing

Fishing Vessel Loitering

Actively Fishing – Line Visible

Example #3 – *Agile Satellite Allows for Vessel Identification*



Chesapeake Bay, US | 2 May 2020, WV03 | 62 Degrees Off-Nadir Collection

MAXAR

Example #4 – *Vessel Identification*

Similar Vessel Shape and Draft

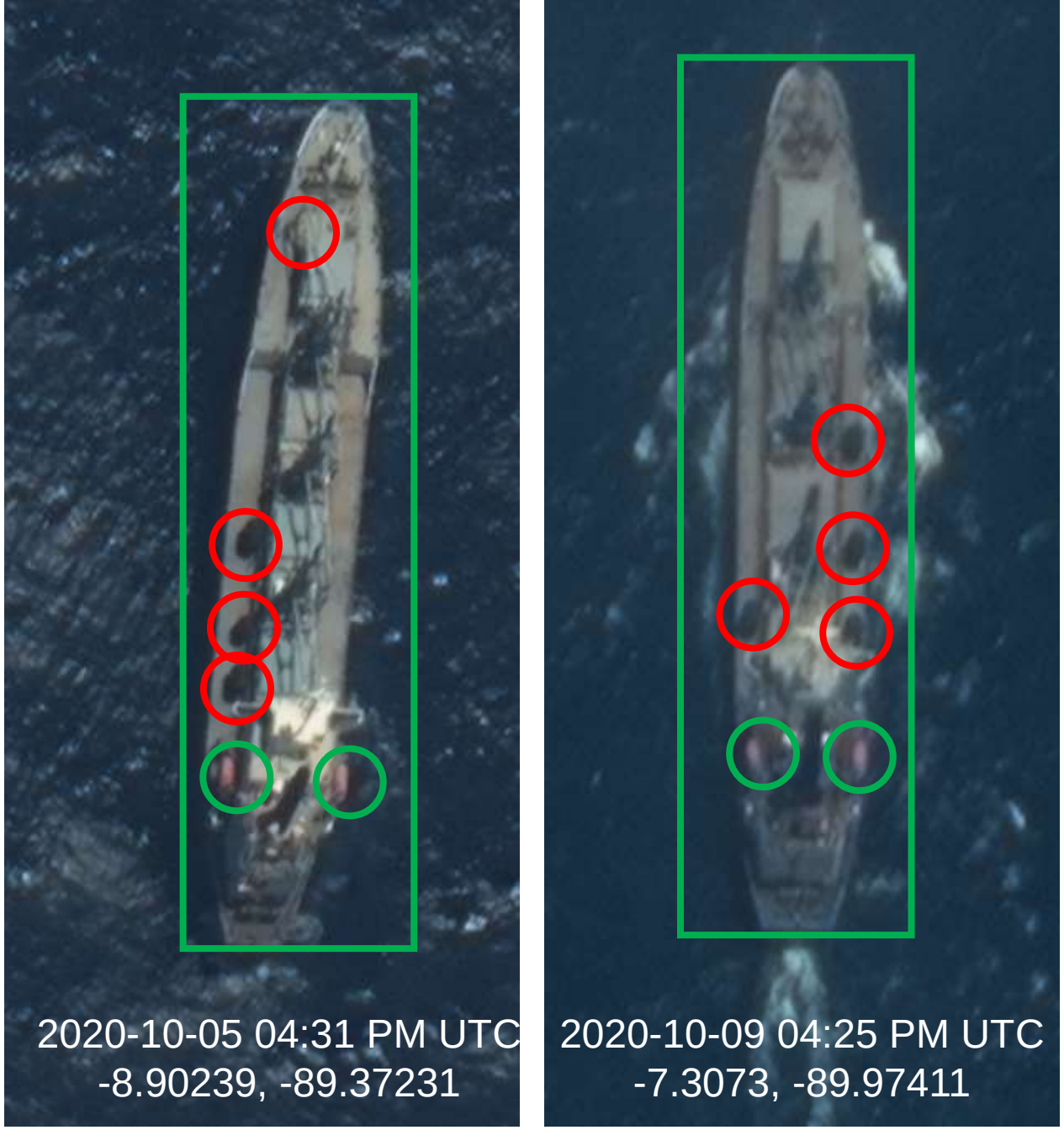
Similar Lifeboat Arrangement

Dissimilar deck structures

Conclusions:

Same Vessel Class

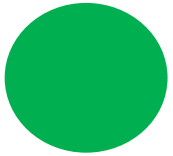
Different Individual Vessel



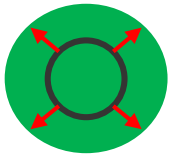
MAXAR.COM

Crow's Nest Maritime Tipping and Cueing API supports five low-latency tipping modes

1.) *Customer* provides stationary, static polygon Tasking Area (TA)

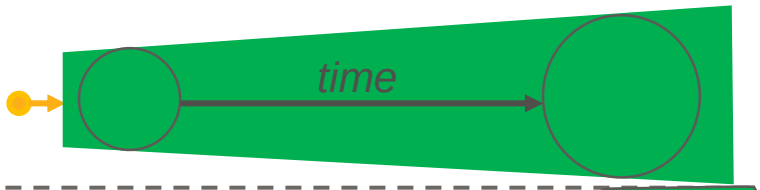


2.) *Customer* provides stationary, expanding polygon TA

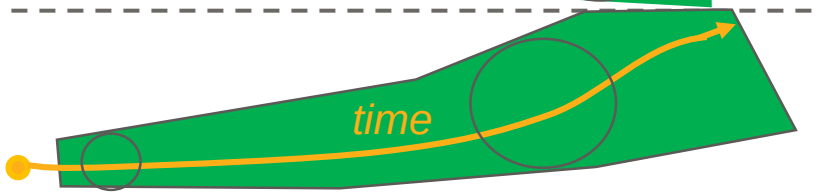


TA expansion rate over time

3.) *Customer* provides moving point target with heading and speed, *Maxar* determines TA



4.) *Customer* provides moving point target with predicted path, *Maxar* determines TA



5.) Customer provides moving polygon target with predicted path and associated TA

Tipping timeline from AIS transmission to optical vessel detection output of ~4 hours; applicable for API tipping