



Data Fusion

Lesson 1.5

07/01/2020

DISTRIBUTION STATEMENT A. Approved for public release: distribution unlimited.



Lesson 1.5 Learning Objectives

Upon successful completion of this lesson, the student will be able to:

- Identify maritime vessel references outside of SeaVision
- Understand how SeaVision tools coupled with external references can be used to provide a more accurate maritime picture
- Identify cases when data sources could be deemed unreliable (AIS Data Validation)





External Maritime References

- Global Fishing Watch
- International Maritime Organization
- Marine Traffic

Ever Calm Download Print Close

Source: LONG RANGE AIS
Time: 2020 Jun 22 10:44:20 UTC
Age: 5h 8m 10s ago
Position: 17° 25' 12" N, 111° 22' 41" E
Speed: 16 kts
Heading: 28°
Course: 28°
MMSI: 355537000
IMO Number: 9866598
Flag: Panama
Call Sign: H30A
Ship Type: 7-Cargo
Length: 171 m
Beam: 28 m
Draft: 9.3 m
Navigation Status: 0-Underway(Engine)
Destination: Hkhkg
ETA: 06/23 @ 10:00 UTC



History Trail 

DR Vector

[Vessel Details](#)

[Add Vessel to List](#)

  

3

DISTRIBUTION STATEMENT A. Approved for public release: distribution unlimited.

- These are supplemental websites that an operator may use to help define the regional maritime picture. More data sources coupled with SeaVision tools can provide a more detailed view of the maritime environment.
- These three sites are the most used by SeaVision operators and there are other various sites that the operator can search for to aid in data fusion.
- Some sites offer free readily available public data; others may require a paid subscription.



Global Fishing Watch

- Global Fishing Watch promotes ocean sustainability through greater transparency
- Visualize, track, and share data about global fishing activity in near real-time and for free
- <https://globalfishingwatch.org/>



4

DISTRIBUTION STATEMENT A. Approved for public release: distribution unlimited.

- Global Fishing Watch is an independent, international, non-profit organization originally set up through a collaboration between three partners: Oceana, an international organization dedicated to protecting and restoring the ocean; Sky Truth, experts in using satellite technology to protect the environment; and Google, who provide the tools for processing big data.
- Datasets and Code: advanced data analytics and code sets may be downloaded and compared to SeaVision track history for a more in-depth analysis. (This will be covered in the SeaVision Analyst Course of Instruction).



International Maritime Organization (IMO)

- United Nations specialized agency with responsibility for:
 - Safety and security of shipping
 - Prevention of marine and atmospheric pollution by ship
 - <http://www.imo.org/EN/Pages/Default.aspx>



5

DISTRIBUTION STATEMENT A. Approved for public release: distribution unlimited.

- The IMO created a level playing-field so that ship operators cannot address their financial issues by simply cutting corners and compromising on safety, security, and environmental performance. This approach also encourages innovation and efficiency.
- Maritime Knowledge Center (MKC) Current Awareness Bulletin (CAB):
 - The aim of the MKC CAB is to provide a monthly digest of news and publications focusing on subjects and themes related to the work of the IMO. Each CAB presents headlines from the previous month.
- Various topics and documents on Marine safety and Maritime security.



Marine Traffic

- Provides free, near real-time information to the public regarding vessels' positions and movements
 - Ports
 - Traffic
 - Voyage details
- Displays most countries around the world along with a series of related services
- <https://www.marinetraffic.com>



6

DISTRIBUTION STATEMENT A. Approved for public release: distribution unlimited.

- Marine Traffic
 - Vessel Information Basics
 - Use the Marine Traffic tools to explore past and updated vessel positions
 - Access the progress of any vessel's voyage and explore port calls all over the world



AIS Review

- Autonomous tracking system for the exchange of navigational information between AIS-equipped terminals
- Identifies and locates vessels and provides an aid to navigation
 - Enables vessels to "see" each other more clearly in all conditions
 - Aid to search and rescue
 - Aid to maritime security

7

DISTRIBUTION STATEMENT A. Approved for public release: distribution unlimited.

- Class A – mandated for all vessels 300 gross tons (GT) and above engaged on international voyages as well as all passenger ships
- Class B – provides limited functionality and intended for non-Safety of Life at Sea (SOLAS) vessels. Primarily used for vessels such as pleasure craft



AIS Considerations

- The IMO requires AIS use by all vessels >500GT, for any vessel >300GT that is on an "international voyage," and for all passenger vessels
- Large fishing vessels are assigned a unique Maritime Mobile Service Identity (MMSI) number
 - Some vessels use a number that is not assigned to them
 - Multiple vessels simultaneously broadcasting the same MMSI number make them indistinguishable from one another without closer inspection
 - Vessels can also manipulate their GPS location by tampering with the system ("spoofing")

8

DISTRIBUTION STATEMENT A. Approved for public release: distribution unlimited.

- Ship spoofing - where an AIS message is broadcast giving details of a non-existent ship including its identity, location, and cargo type. For example, spoofing a ship of one nation into the territorial waters of a hostile nation, leading that nation to take countermeasures.
- Aid-to-navigation spoofing - where details of a fake aid-to-navigation, such as a buoy warning of hidden shoals, are broadcast to force a ship to change its course. This might be done to force a vessel into a region where it can be hijacked.
- Collision spoofing - collision avoidance is one of the primary uses of AIS. By providing spoofed details of a vessel on a collision course, an attacker can force the captain of a ship to change course to avoid the anticipated collision.
- AIS-SART spoofing - search and rescue is another of the primary uses of AIS. This attack works by generating a spoofed Search and Rescue Transponder (SART) signal, which gives details of a vessel or person in distress.
- AIS hijacking - it is also possible to override signals being sent by vessels by broadcasting a higher-power signal at the same time and frequency. The attacker can then change some details of the original message, for example to suggest that the vessel has a nuclear cargo in an area where such cargoes are illegal.



AIS Considerations Cont.

- The accuracy of AIS information received is only as good as the accuracy of the AIS information transmitted
- Overreliance on AIS can cause complacency on the part of the watch stander
- Users must be aware that erroneous information might be transmitted by the AIS from another ship
- Not all ships are fitted with AIS
- AIS might be switched off by a certain vessel, thereby negating any information that might have been received



AIS Data Validation

- General Situational Awareness
 - Track Coverage vs Time
 - AIS Considerations
 - Dark
 - Errors (not Spoofing)
- SeaVision Tools
 - Vessel History
 - Port call History
 - Vessel Details
 - Time Machine and Playback
- External References
 - IMO Map
 - Global Fishing Watch
 - Marine Traffic

The screenshot displays the SeaVision interface for vessel 'Sheng Le C'. The top window shows real-time AIS data, and the bottom window shows a detailed registration table.

REGISTRATION	
Falship ID	37508
Name	Sheng Le C
IMO Number	9124146
Call Sign	H9GJ
MMSI	371778000
Flag	Panama
Operator	Guangzhou Seaway International
Subtype	Bulk Carrier
Gross Tonnage	18108



Data Fusion Summary

- External References
 - International Maritime Organization
 - Global Fishing Watch
 - Marine Traffic
- AIS Validity
 - Errors
 - Manipulation
 - Spoofing
- Data Validation
 - Use situation awareness
 - Use SeaVision tools
 - Not every case is intentional



Questions?

