GNSS and AIS Weaponization

GEOPOLITICAL IMPLICATIONS FOR NATO IN THE ERA OF STRATEGIC COMPETITION

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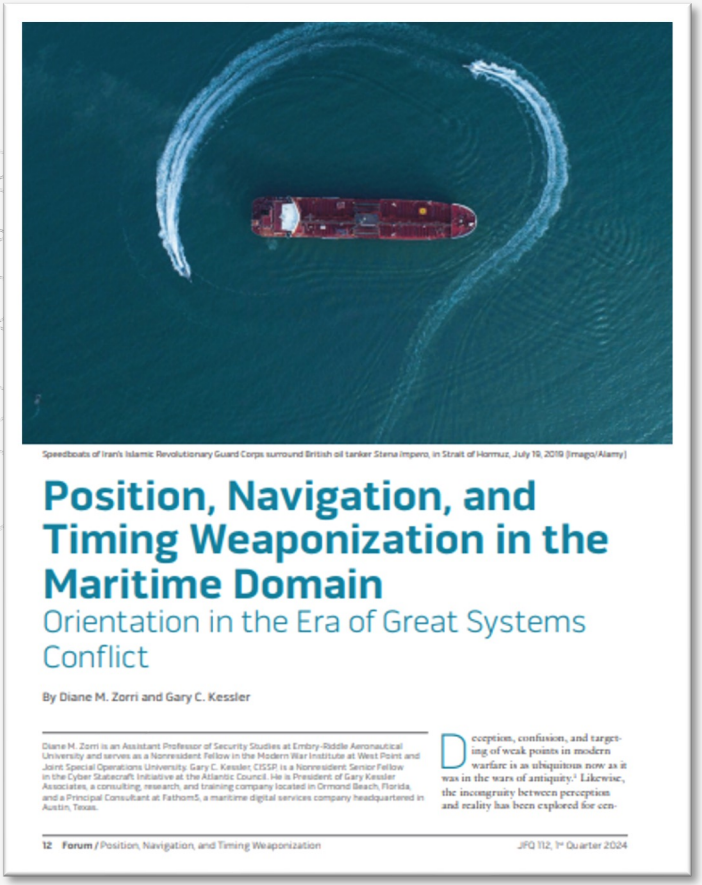
Agenda

- Global Navigation Satellite Systems (GNSS)
- Automatic Identification Systems (AIS)
- Why do countries spoof and jam?
- Examples
- Themes
- NATO Alignment

Slides are a static portrait.

Audience is passive and cannot interact.



Speedboats of Iran's Islamic Revolutionary Guard Corps surround British oil tanker *Stena Impero*, in Strait of Hormuz, July 19, 2019 (Imago/Alamy)

Position, Navigation, and Timing Weaponization in the Maritime Domain

Orientation in the Era of Great Systems Conflict

By Diane M. Zorri and Gary C. Kessler

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Deception, confusion, and targeting of weak points in modern warfare is as ubiquitous now as it was in the wars of antiquity.[1] Likewise, the incongruity between perception and reality has been explored for cen-

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Global Navigation Satellite Systems

GPS
United States

- 1978: first launch
- 1994: global use
- 30+ satellites
- 6 orbital planes

GLONASS
Russian Federation

- 1993: first launch
- 24 operational satellites
- 3 orbital planes

BeiDou
China

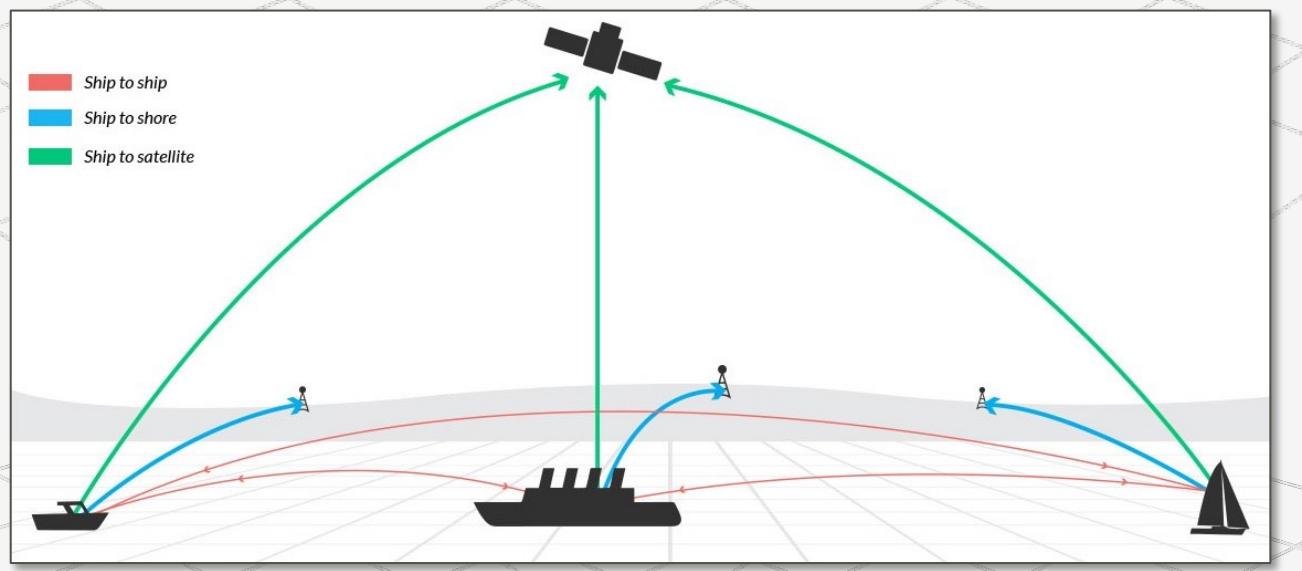
- 2000: first launch
- 44+ satellites
- 6 orbital planes

Galileo
European Union

- 2011: first launch
- 24 + 6 (spare) satellites
- 3 orbital planes

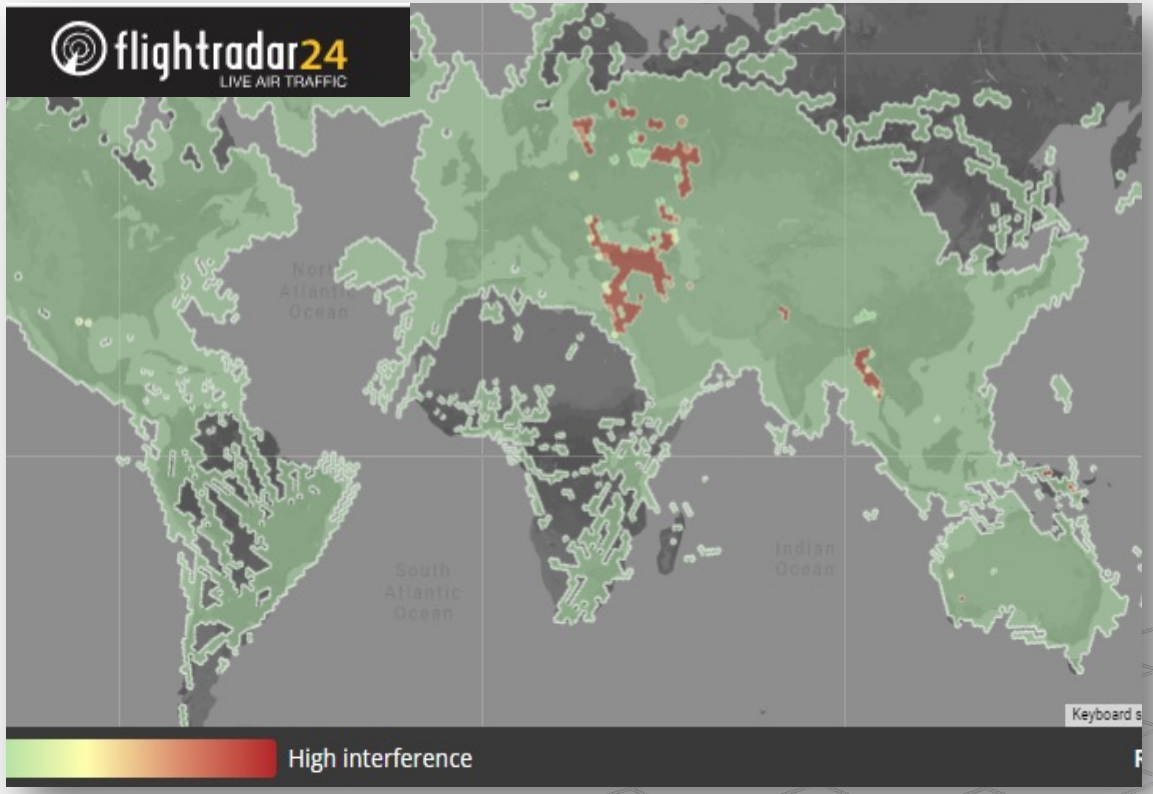
Automatic Identification System (AIS)

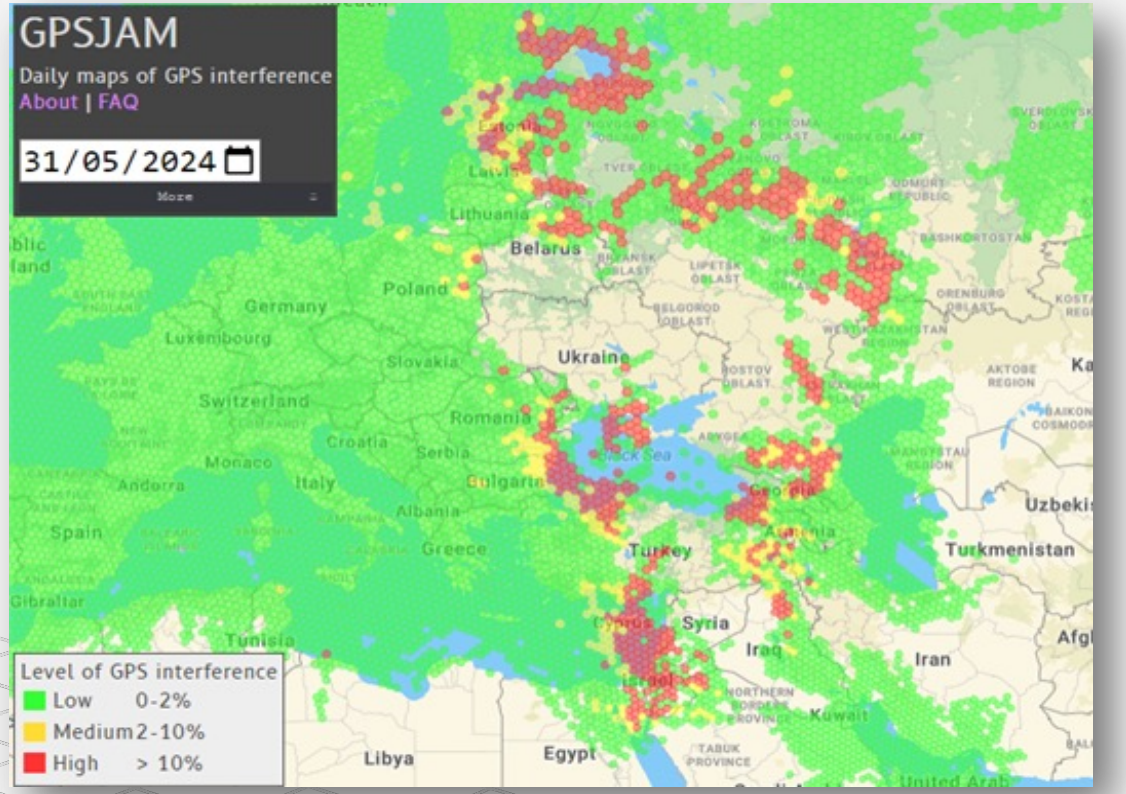
- Digital positional awareness system operating in the Very High Frequency (VHF) maritime band
- Helps identify ships, assist in target tracking, assist in search and rescue operation, simplify information exchange and provide additional information to assist situational awareness (International Maritime Organization (IMO), A 29/Res.1106)



Source: NATO Shipping Centre

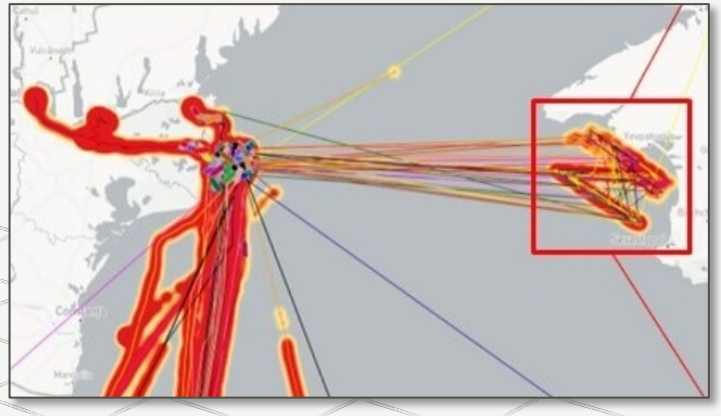
GPS Interference





Why?

1. **Avoid Sanctions**
2. **Maintain Maritime Insurance**
3. **Illegal Unregulated Undocumented (IUU) Fishing**
4. **Irregular Activity & Conflict**



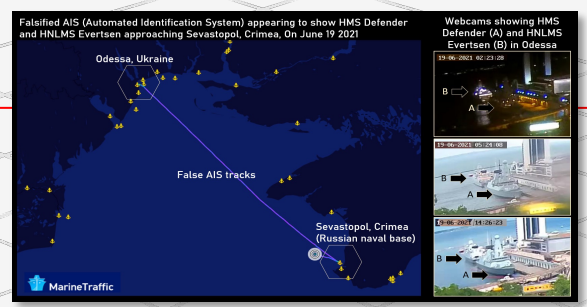
Examples of Irregular Activity

2019 Stena Impero

- July 2019, Strait of Hormuz
- UK Stena Impero suddenly turned north and entered Iranian territorial waters, where it was promptly seized by patrol boats of the Iranian Navy
- Likely in retaliation for the British seizure of an Iranian vessel earlier in the year due to suspected violations of European Union sanctions

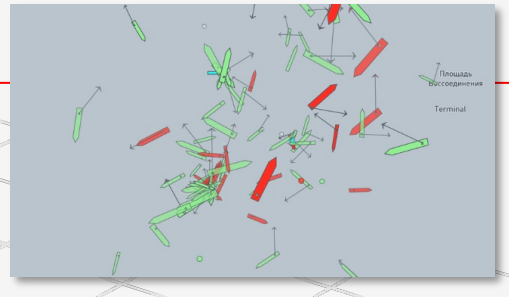
2021 Black Sea Incident

- UK HMS Defender and the Netherlands' HNLMS Evertsen docked in Odessa, Ukraine
- AIS tracking data falsely indicated that both ships sailed directly to Sevastopol, Crimea; within two nautical miles of the Russian Black Sea Fleet's command port
- Videos and webcam feeds confirmed that neither vessel had left Odessa



2024 Mass AIS Spoofing

- June 2024 dozens of merchant ships began transmitting AIS positions that put them at airports in the occupied Crimean peninsula and the Russian Federation
- As of June 4, 2024, nearly 50 vessels broadcast their location as the International Airport of Simferopol, Crimea, and approximately 30 vessels at Gelendzhik Airport near Novorossiysk



Themes

- **GREAT POWER COMPETITION:** The major powers are vying for legitimacy and dominance at the edges of their spheres of influence. As China and Russia contest U.S. and NATO primacy, they have increased their nefarious maritime activity including irregular spoofing and jamming.

- **OFFENSIVE:** GNSS interference is proliferating and both China and Russia are leading the in the development and deployment of technologies capable of disrupting modern systems. GNSS interference has been increasing over the last decade, and globally, GNSS interference occurred every day of 2024.

- **DEFENSIVE:** Both China and Russia are demonstrating a significant strategic advantage over NATO with an arsenal of robust secondary PNT systems. While GNSS interference is proliferating, China and Russia have maintained and modernized terrestrial navigation systems, which provide them with enhanced resilience and redundancy in their positioning, navigation, and timing capabilities.

NATO Alignment

TACTICAL

- Integrate information security–aware officers and shipboard detection systems into maritime personnel and management frameworks of all NATO maritime enterprises.
- Navigation and bridge staff must be capable of identifying when the data presented by automated systems is questionable and have independent methods for validating these systems.
- Celestial navigation techniques and the principles of inertial and hyperbolic systems should be included in training programs

OPERATIONAL

- NATO maritime naval exercises incorporate scenarios where the GNSS and AIS have been disrupted by enemy forces. This would challenge maritime practitioners to respond without relying on current technology.
- These exercises should also include opportunities to test the innovative capabilities of maritime cyber defenders and their ability to proactively counteract enemy actions.

STRATEGIC

- Parallel use of both GPS and Galileo to harden systems and act as a spoofing indicator
- Integrate signals from all four of the major GNSS to PNT systems
- Integrate data from the American National Aeronautics and Space Administration's Jet Propulsion Laboratory's Global Differential GPS (GDGPS) which offers corrections and real-time accuracy
- Secure AIS with international standards bodies
- Use big data and AI methods to exploit previous AIS and GDGPS data to better detect and quickly mitigate extant AIS anomalies

Thank you

Teşekkür ederim

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