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Inside AIS Spoofing

Patterns, risks, and real-time detection

Kevin Kinnee - Senior National Security Officer

Dimitris Ampatzidis - Senior Risk & Compliance Analyst

Vasiliki Efstathiou - Senior Data Science Manager

GNSS Jamming vs GNSS Spoofing vs AIS spoofing

Let's make clear the terminology first..

GNSS Jamming vs GNSS Spoofing vs AIS spoofing

GNSS Spoofing

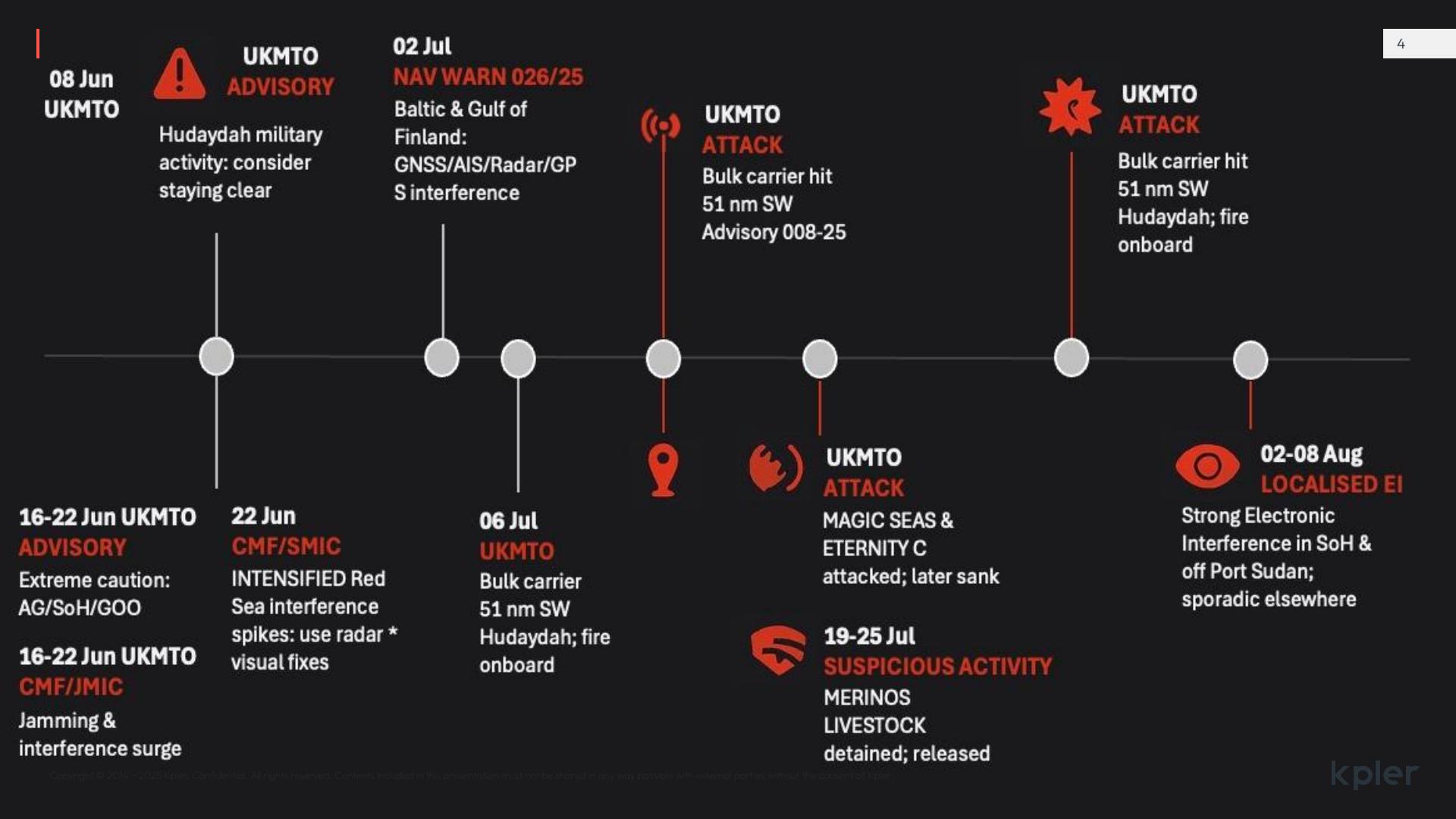
- Broadcasts **fake GNSS signals in common frequencies**
- Counterfeit signals are just slightly **stronger than real ones**
- **Receiver calculates the wrong position, speed or time**

GNSS Jamming

- Floods the GNSS band with **very strong noise**
- **Real signals are blocked** → total loss of service
- Harder to execute than spoofing, but **easy to detect** because of the high power level

AIS Spoofing

- **The vessel itself** (not an external attacker)
- Transmits **false AIS identity, position or course** to hide real activity
- Affects only the spoofing vessel → **no area-wide interference**
- **Track may look believable** or obviously wrong, depending on attacker skill



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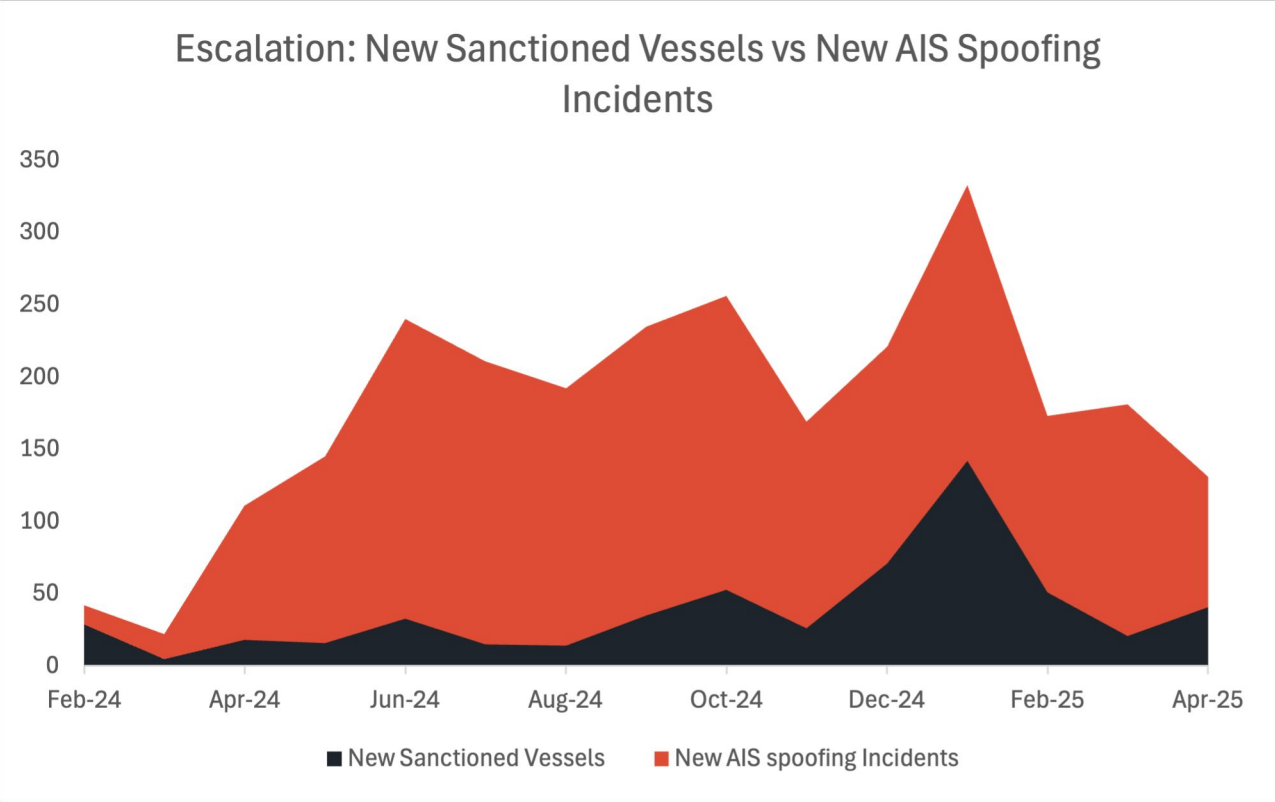
Why now?



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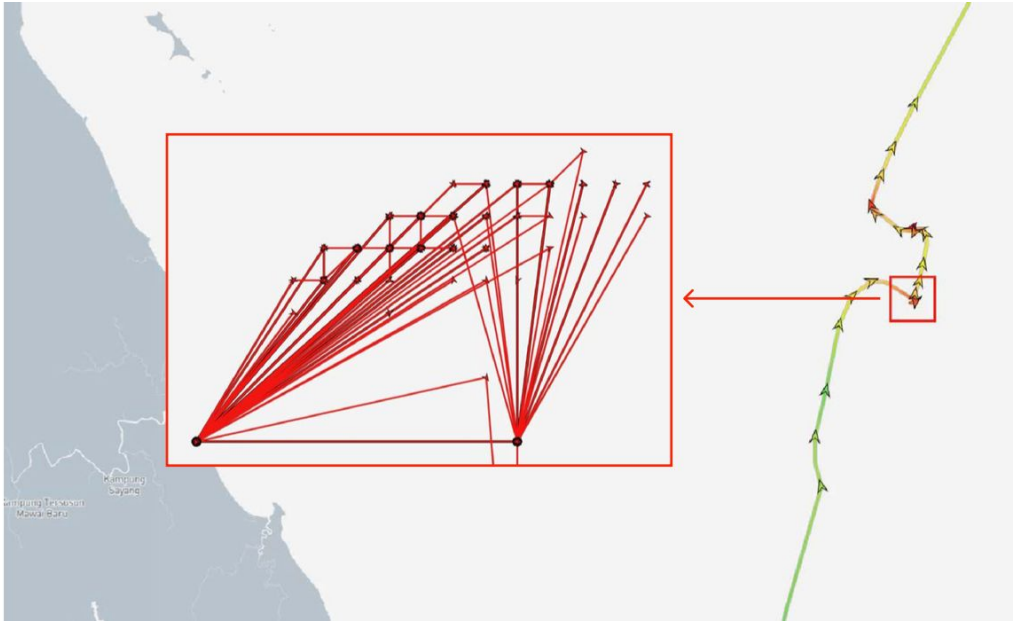
Anatomy of spoofing - GNSS spoofing

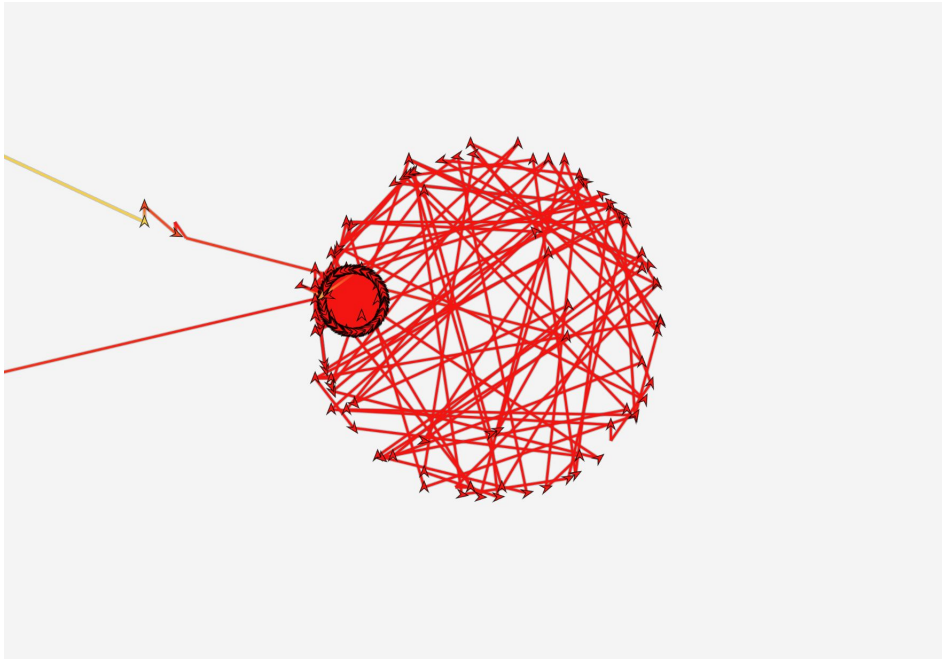
Anatomy of AIS spoofing

Trajectory shapes - dense symmetric stationary grids



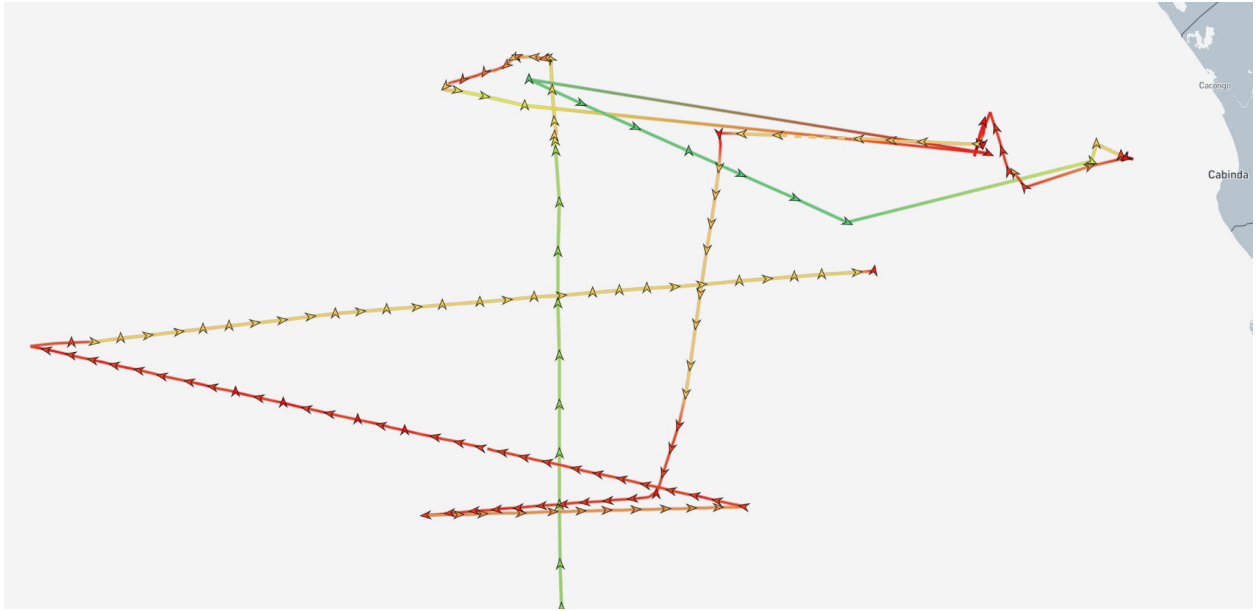
Anatomy of AIS spoofing

Trajectory shapes - dense symmetric circles



Anatomy of AIS spoofing

Trajectory shapes - erratic loitering



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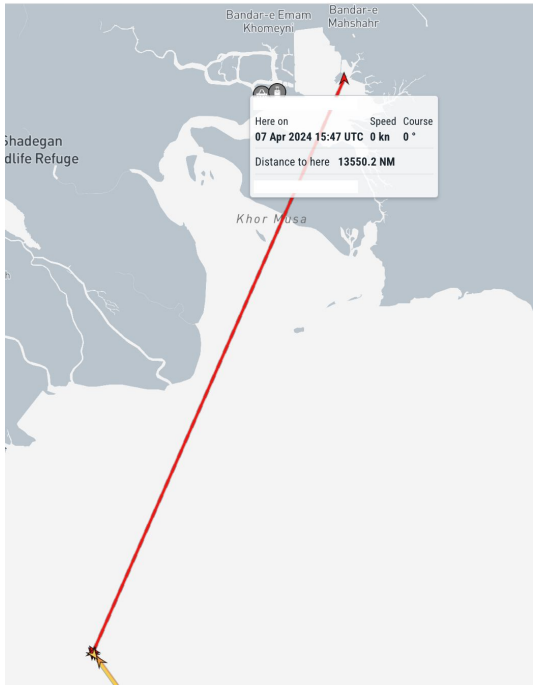
Anatomy of AIS spoofing

Trajectory shapes - leaks of true locations



Anatomy of AIS spoofing

Replays of traversed paths

Anatomy of AIS spoofing

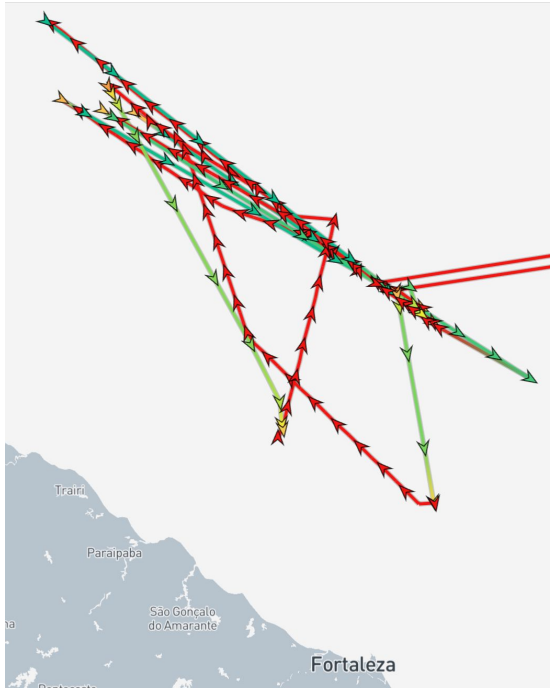
Detection methods:

- Kinematic analysis algorithms: detect non-viable vessel tracks **(AIS)**
- Ground station localisation algorithms: detect inconsistencies between AIS-reported tracks and expected range of terrestrial reception **(AIS + terrestrial station statistics)**
- Vessel identification in satellite imagery location inconsistent with AIS-reported location **(AIS + satellite imagery)**
- Human expertise

Anatomy of AIS spoofing

Detection methods:

- Kinematic analysis algorithms: non-viable trajectories



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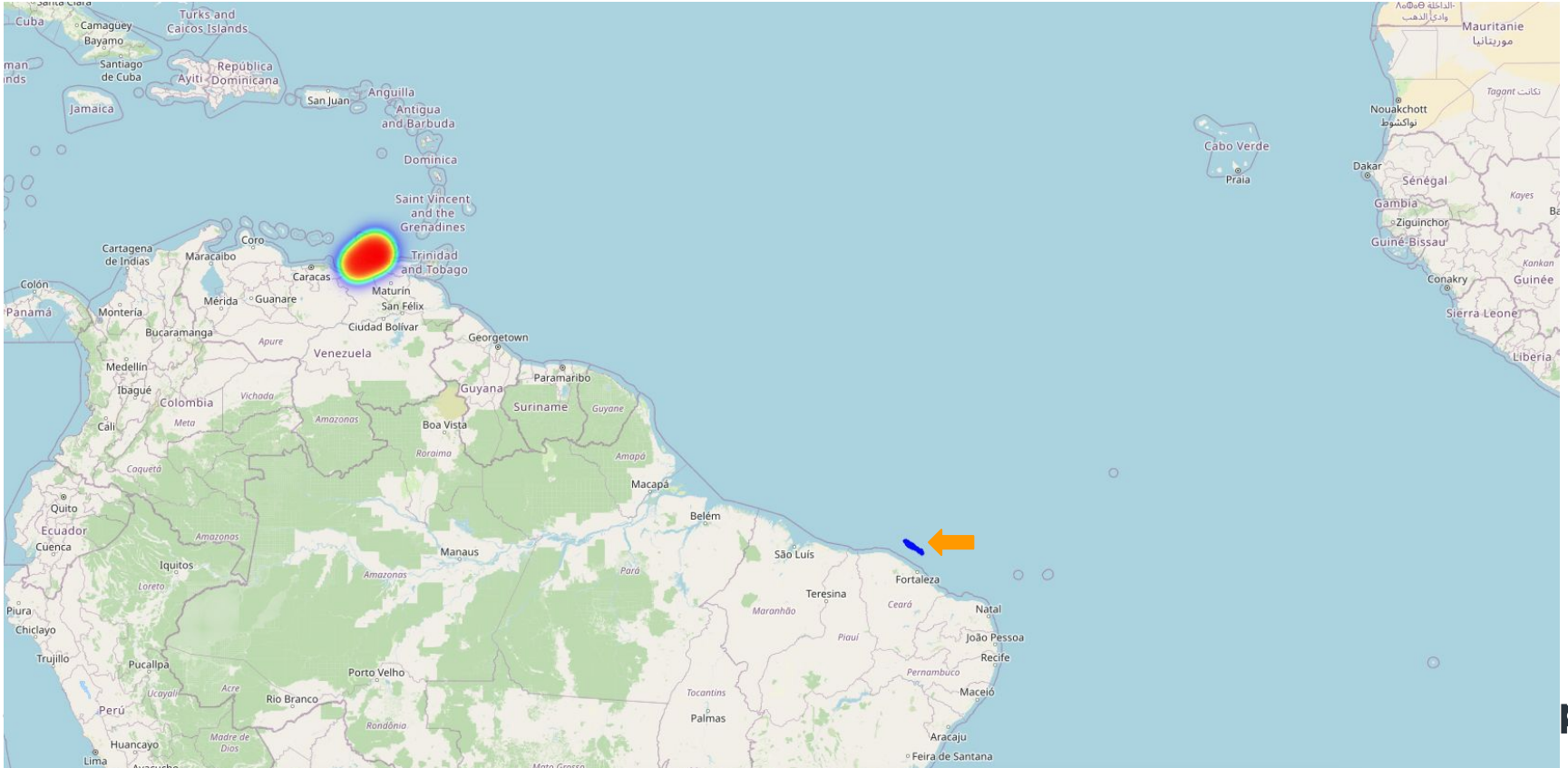
Anatomy of AIS spoofing

Detection methods:

- Ground station localisation algorithms: out of range of terrestrial reception



Anatomy of AIS spoofing

Detection methods:

- Vessel identification in satellite imagery location inconsistent with AIS-reported location
- Analyst-validated

R&C Roadmap

for Q3/25-Q1/26

- **Operational Risks: Full Fleet Coverage** – Expanding from tankers and dry cargo vessels over 5k tonnes to the entire IMO-registered fleet in MarineTraffic.
- **Smarter Spoofing Detection** – Fusing multiple detection methods to deliver greater accuracy, especially for long-duration events.
- **Deeper Event Context** – Providing detection source details and visual evidence for spoofing incidents when available.

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Thank you! Questions?

Kevin Kinnee - kkinnee@kpler.com

Dimitris Ampatzidis - dampatzidis@kpler.com

Vasiliki Efstathiou - vefstathiou@kpler.com