Red Sea GPS Jamming Final Review - Presentation Script

1. Title & Objective

Final Red Sea GPS Jamming Detection — Part A. The goal was to detect likely GPS jamming/spoofing in vessel-to-vessel meetings data with a transparent, rule-based logic and stakeholder-friendly visuals.

2. Dataset & Scope

The dataset includes meetings between vessels with start/end times, positions, and speeds. The focus was on identifying suspicious meetings vs. normal operations, not on attribution.

3. Method at a Glance

• Rule-based physical plausibility checks (e.g., 'impossible' speeds)
• Spatial clustering to find repeat hotspots
• Clean exports with human-readable reasons for auditability

4. Exploratory Insights

EDA revealed that most meetings have realistic speeds below 25–30 knots. A narrow band of extreme high-speed values indicates potential spoofed fixes.

5. Spatial Hotspot Logic

Rounded coordinates to 0.02° (~2 km grid), counting meetings per cell. High counts signal repeat hotspots — consistent with interference artefacts.

6. Output & Hand-off

Generated the labeled CSV: RedSea_GPS_Jamming_Classified_analysis.csv
Includes 'is_jamming_meeting', 'jamming_reason', and contributing rule metrics.

7. Results & Recommendations

Findings show that flagged meetings cluster in specific grid cells and speed outliers.
Recommendations:
• Prioritize patrolling/monitoring near these hotspots.
• Use labels in downstream ML pipeline.
• Add AIS sensor health checks and external bulletin cross-checks.

8. Part B — Menifot Clean Tracks

This part ensures clean, reviewer-ready vessel tracks by removing noise/outliers. Reliable inputs ensure accurate detection in Part A.

9. Demo Flow

1. Open presentation deck (Objective → Methodology → Hotspots → Results).
2. Open HTML for EDA insights.
3. Show export CSV with flags and reasons.
4. Show Menifot Clean Tracks HTML as preprocessing step.

10. Anticipated Reviewer Questions

Q: Why rule-based instead of ML?
A: Rule-based = transparency and physics-based.

Q: Why 0.02° grid?
A: Balances precision vs. interpretability.

Q: False positives?
A: Restricted to implausible speeds or repeat hotspots.

Q: Deliverables?
A: Deck, HTML notebooks, labeled CSV.

11. One-Slide Summary

Problem: Detect GPS spoofing/jamming in Red Sea meetings.
Approach: Physics-aware rules + 2-km hotspot clustering.
Proof: EDA shows unrealistic speed band & repeat hotspots.
Output: Labeled CSV for audit & action.
Next: Monitoring, ML integration, standardize cleaning pipeline.