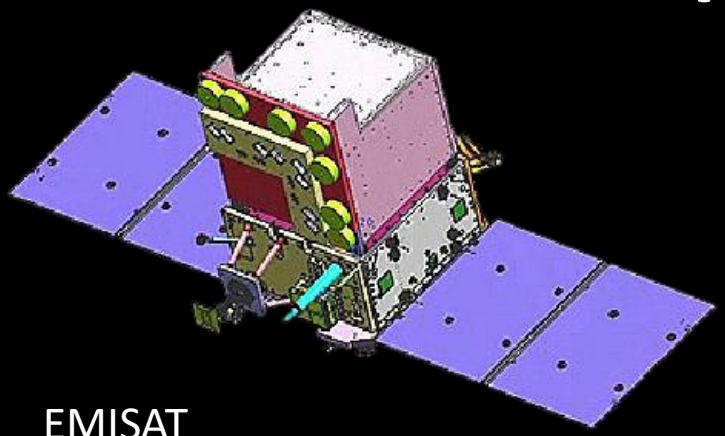

KEPLER
AEROSPACE
ELINT From Space
By
Kepler Aerospace

Agenda

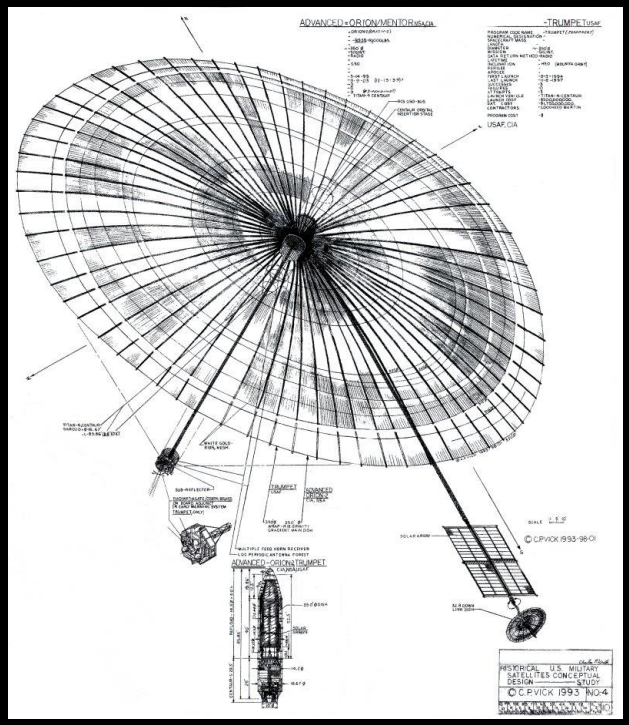
- SBEW- Scenario
- SmallSats in Defense
- Citadel SBS

SBEW- Space Based Electronic Warfare



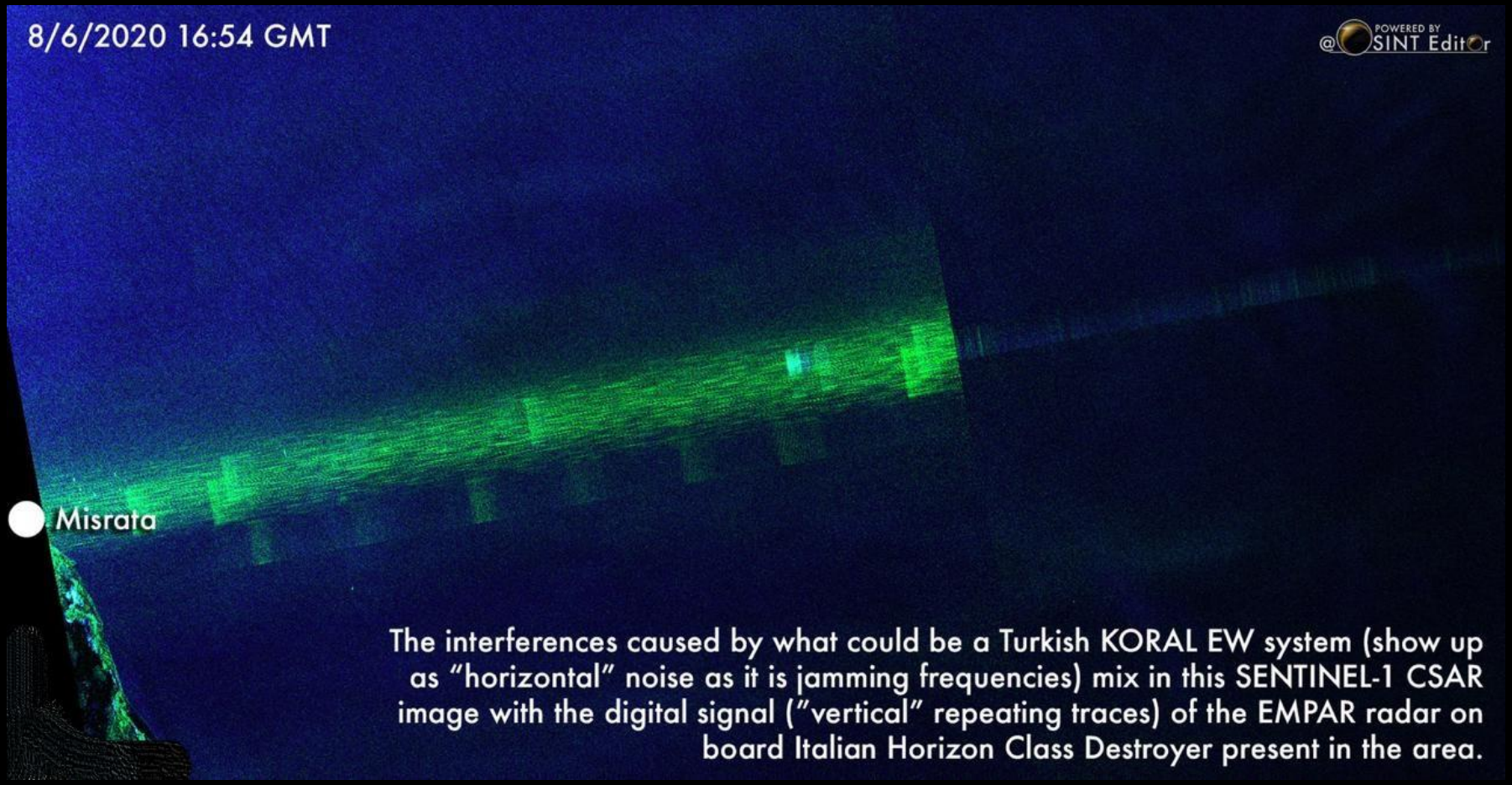
EMISAT

SENTINEL-2A



ORION ELINT

SBEW- Space Based Electronic Warfare



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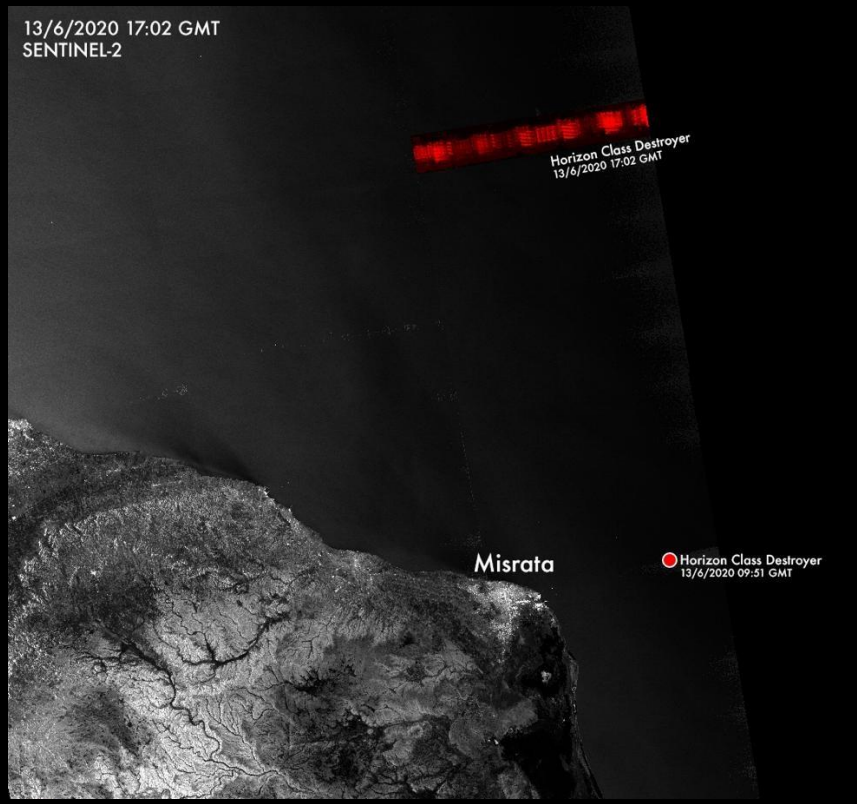
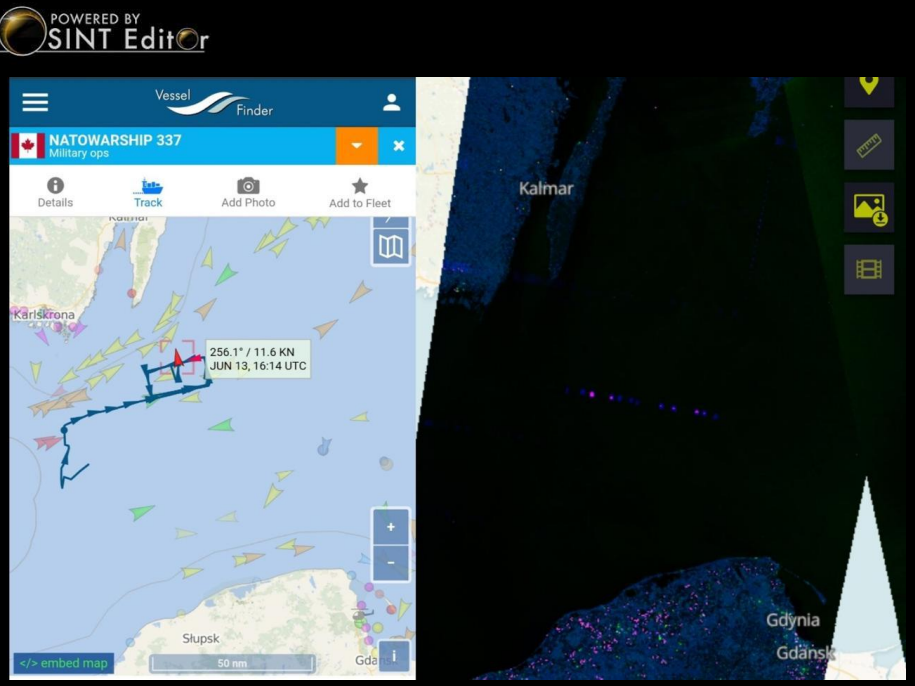
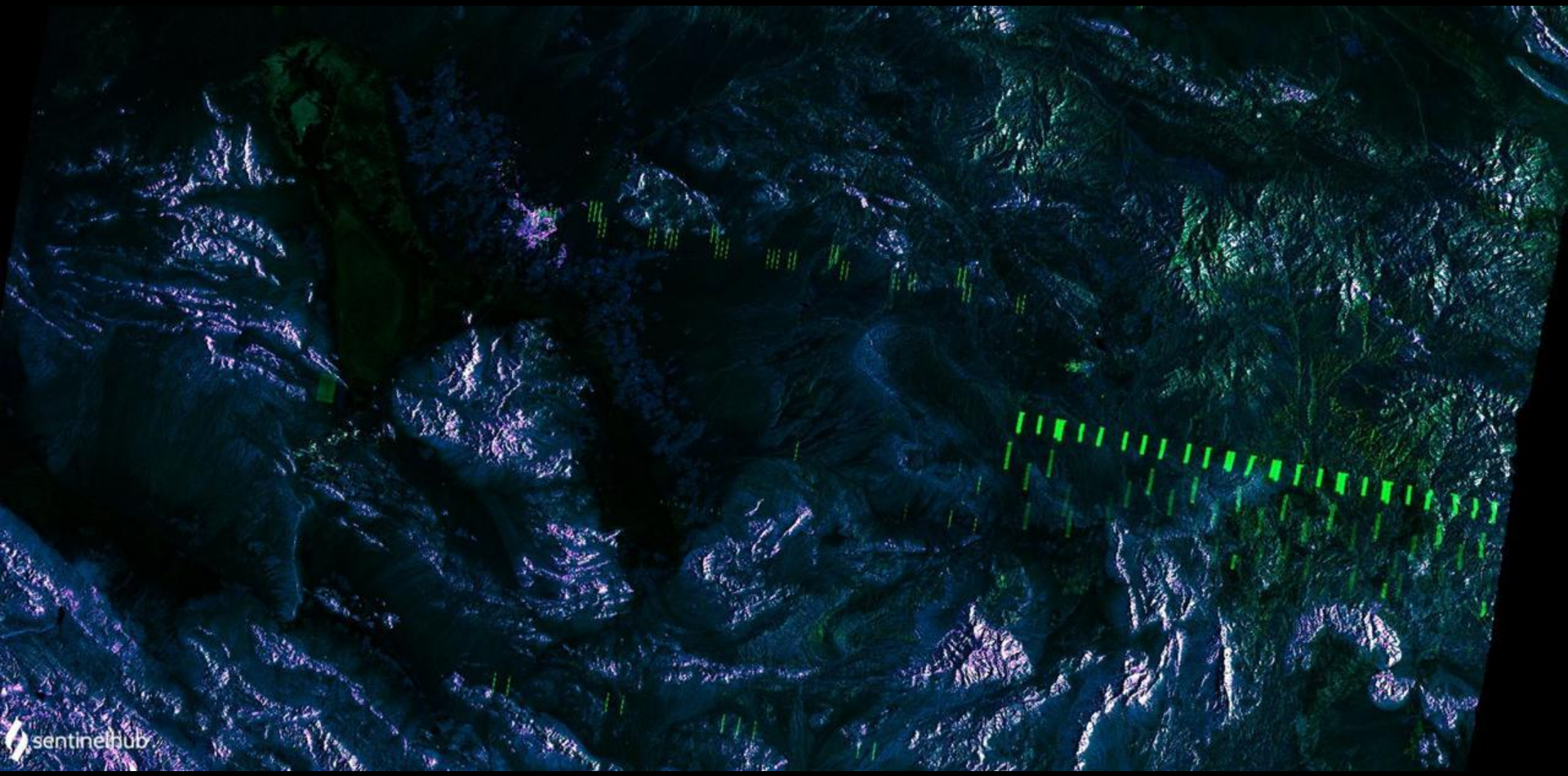


Interferences in CSAR sat data show the Italian Horizon class destroyer that has been patrolling the sea just east of Misrata



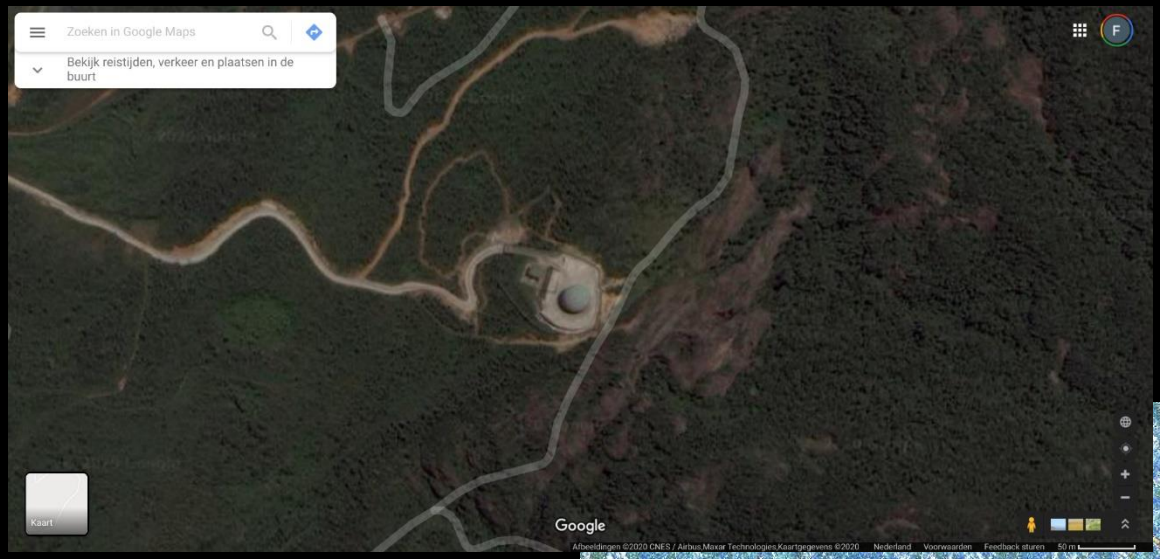
5GHz interference tracking, Canadian Halifax class frigate HMCS Fredericton shining her AN/SPS-505 radar during BALTOPS.

SBEW- Space Based Electronic Warfare

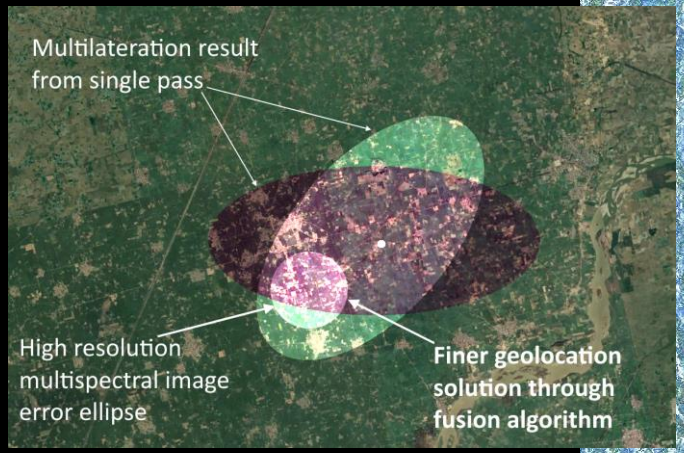


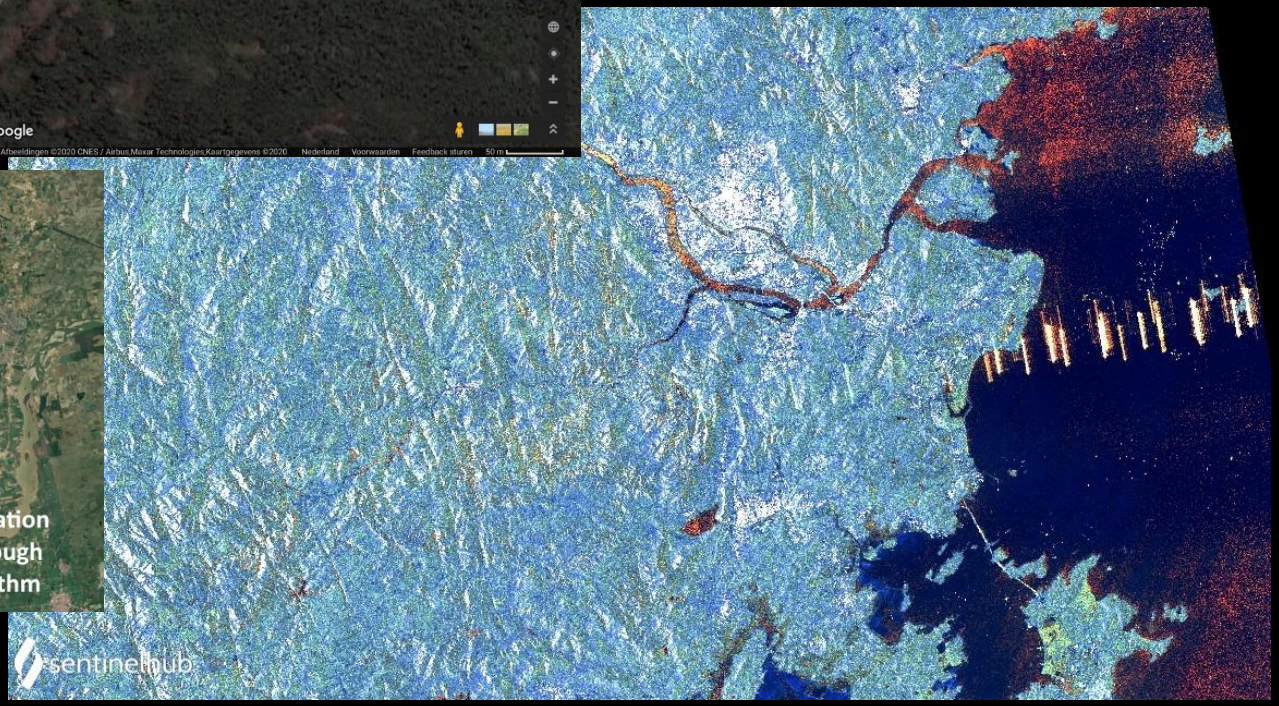
Interferences in CSAR sat data show 5 GHZ interference near the Iranian Missile complex at Sirjan on 23-06-2020

SBEW- Space Based Electronic Warfare



5GHz radar interference just south of Fuzhou, China, Indicating presence of Air Defence radar. Confirmed by Google imagery





SBEW- Space Based Electronic Warfare – Current Threats

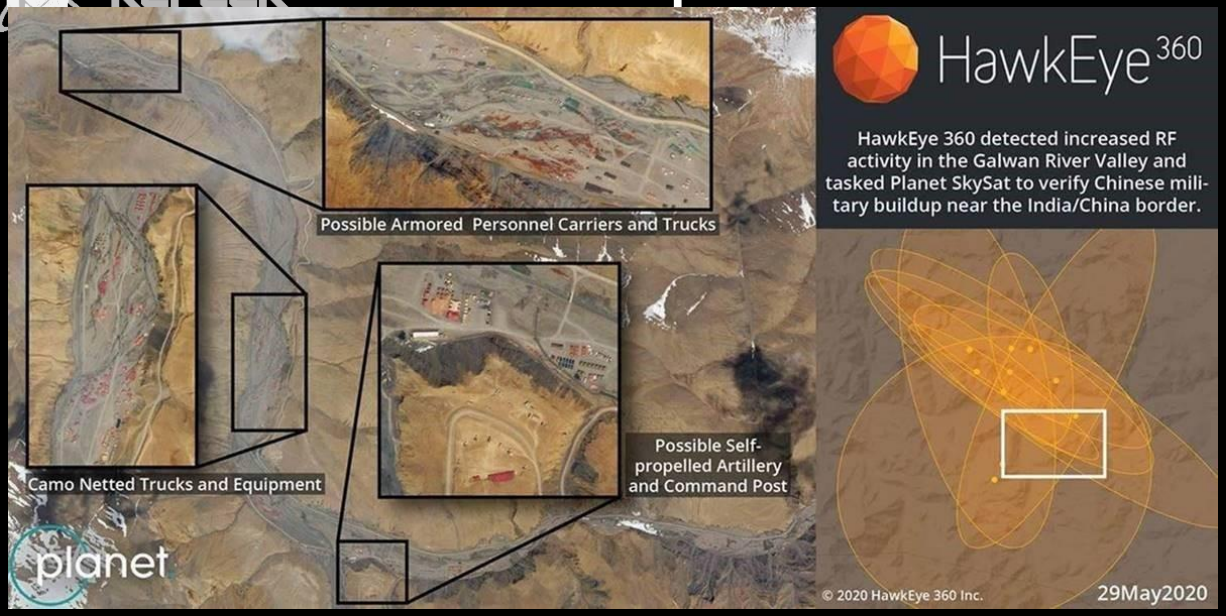
TPS-77 LR AIR DEFENSE RADAR
Frequency – 1.2 to 1.4 GHz
USA ORIGIN

JY-27A ANTI STEALTH RADAR
Freq- 135-155 MHz
CHINESE ORIGIN

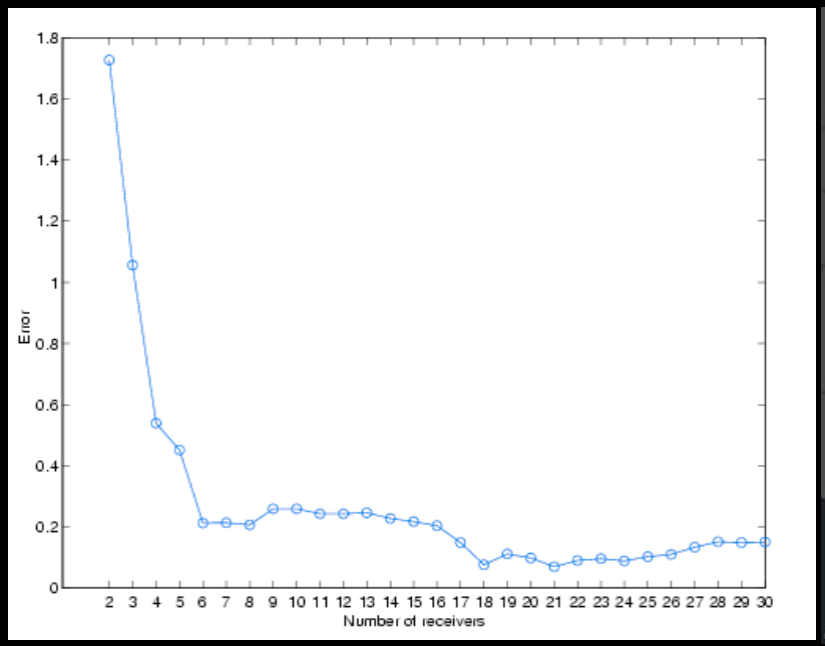
REZONANS-N\GHADIR LR ANTI STEALTH RADAR
Freq- 3-30 MHz
RUSSIAN\IRANIAN ORIGIN

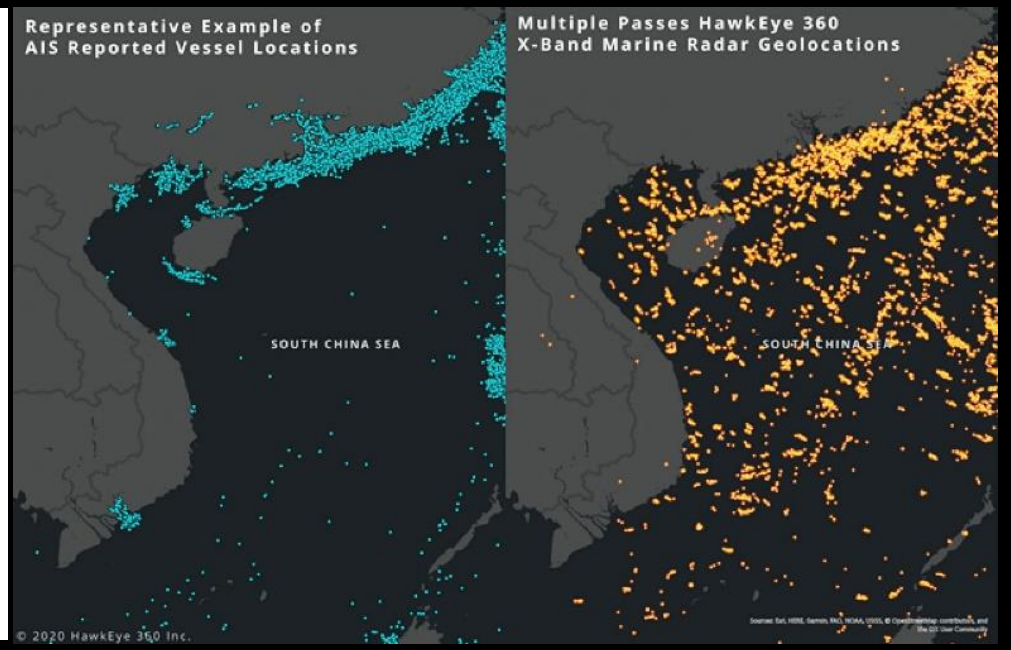
CITADEL SBS in HF/S band can easily pinpoint and identify such radars for SEAD/DEAD Operations

SBEW- Space Based Electronic Warfare



What you see vs what it is
AIS silent shipping caught on VHF SIGINT
Source: Hawkeye360



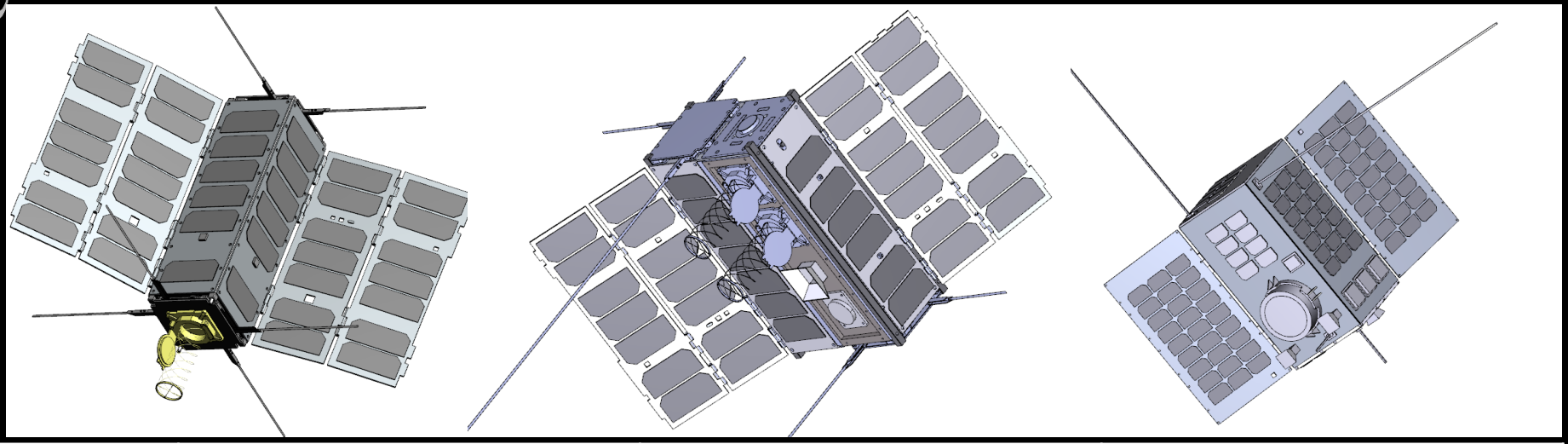


Geolocation error for Electronic Emissions with multiple receiver setup .
Source: Mustafa Gokhan , Naval postgraduate School, USN

CITADEL SBS (Space Based Surveillance System)

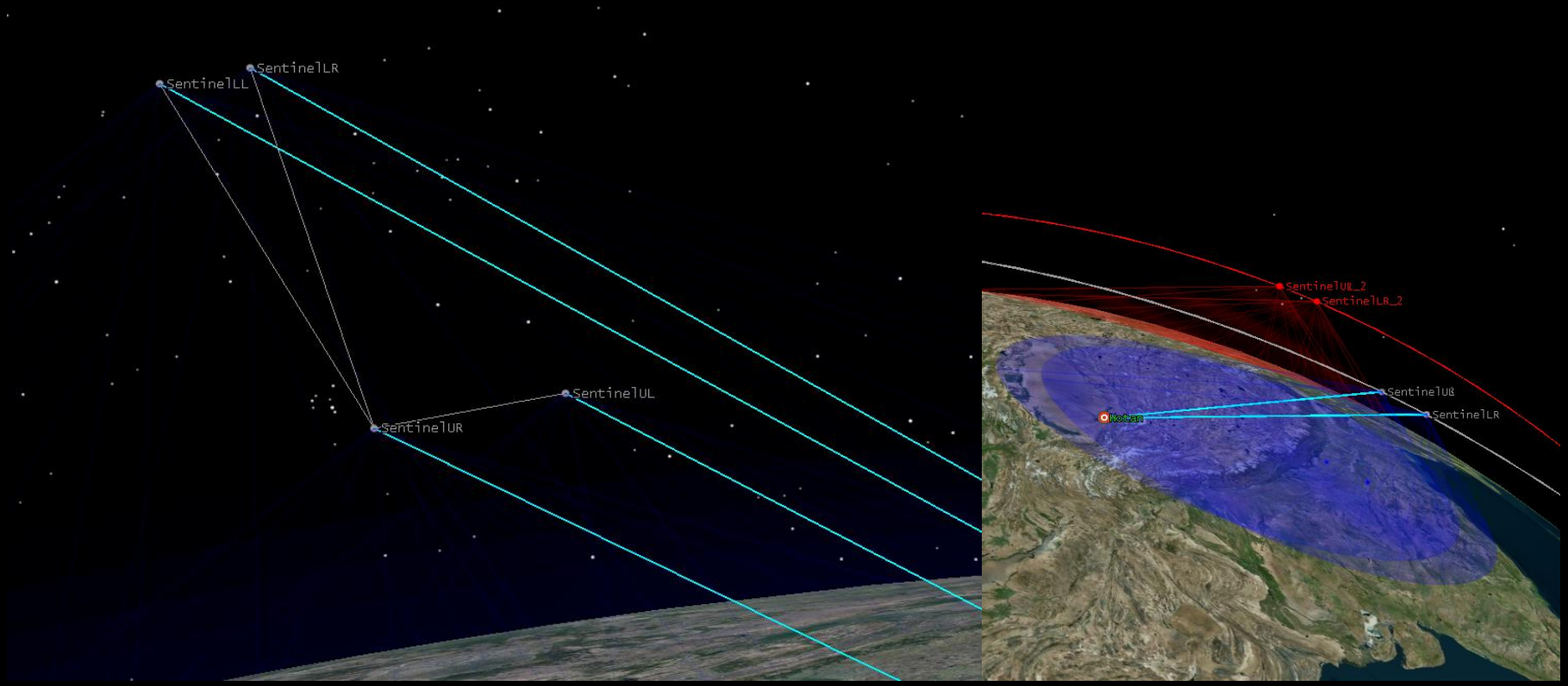
- Multi-satellite constellations for triangulation and revisit times
- Daily revisit minimum
- 3-4 satellites per constellation (EO-EW Cluster)
- Geolocation < 500m with TDOA/FDOA , < 30m for AIS , <150m for fusion data
- Onboard Edge Compute for data processing
- RF baseline formation due to cluster formation flying
- Dedicated modular buses for adaptable payloads
- Payload optimized as per mission and size
- Can serve as AIS/ADS-B receivers in emergency
- Ready to launch , containerized satellite storage
- Modular Bus for additional Missions
- “Tipping and Cueing” — using a sensor that can cover a large geographic area with lower fidelity for an initial collection, and then following up with a higher-resolution sensor to check on any suspicious activity. what our EO-EW Cluster is all about

CITADEL SBS Options



Size	3U	6U	16U
Mass	<5 kg	<18 kg	<35 kg
Frequency	V/UHF, L & S	V/UHF,L,S,C,X	V/UHF to 14 GHz
IF Cover	<50 MHz	<200 MHz	<800 MHz
AIS	Yes	Yes	Yes
ADS-B	No	Yes	Yes
Geo-Loc Acc	<1km with 3 Sat Cluster	<500m with 3 Sat Cluster	<200m with 3 Sat Cluster
EO GSD	<4m @ 505km	<3.5m @ 505km	<1.4m @ 505km
Data Link	S Band	S/X Band	S/X band

CITADEL SBS (Space Based Surveillance System



EW satellites with inter-sat communications for RF baseline formation flying over target area. Massive coverage on ground with Slanted sensors for oblique radar detection. EO Satellites in cluster allow for immediate image acq

Thank You