

# **Maritime Experiment Briefing to AOC MINI-CONFERENCE**

**11 MAY 2015**

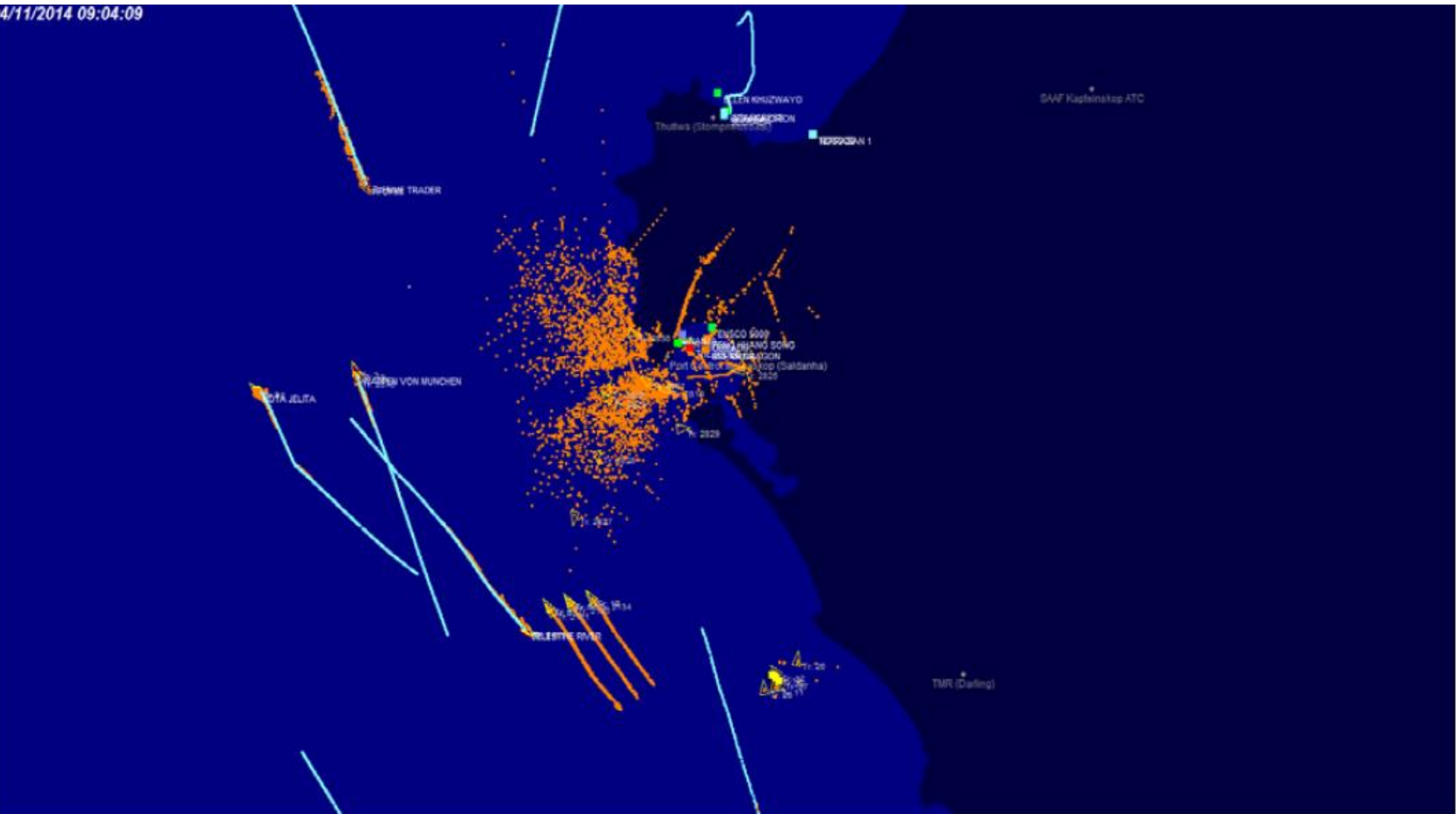
**L. DOWNES, et al**  
**Institute for Maritime Technology**

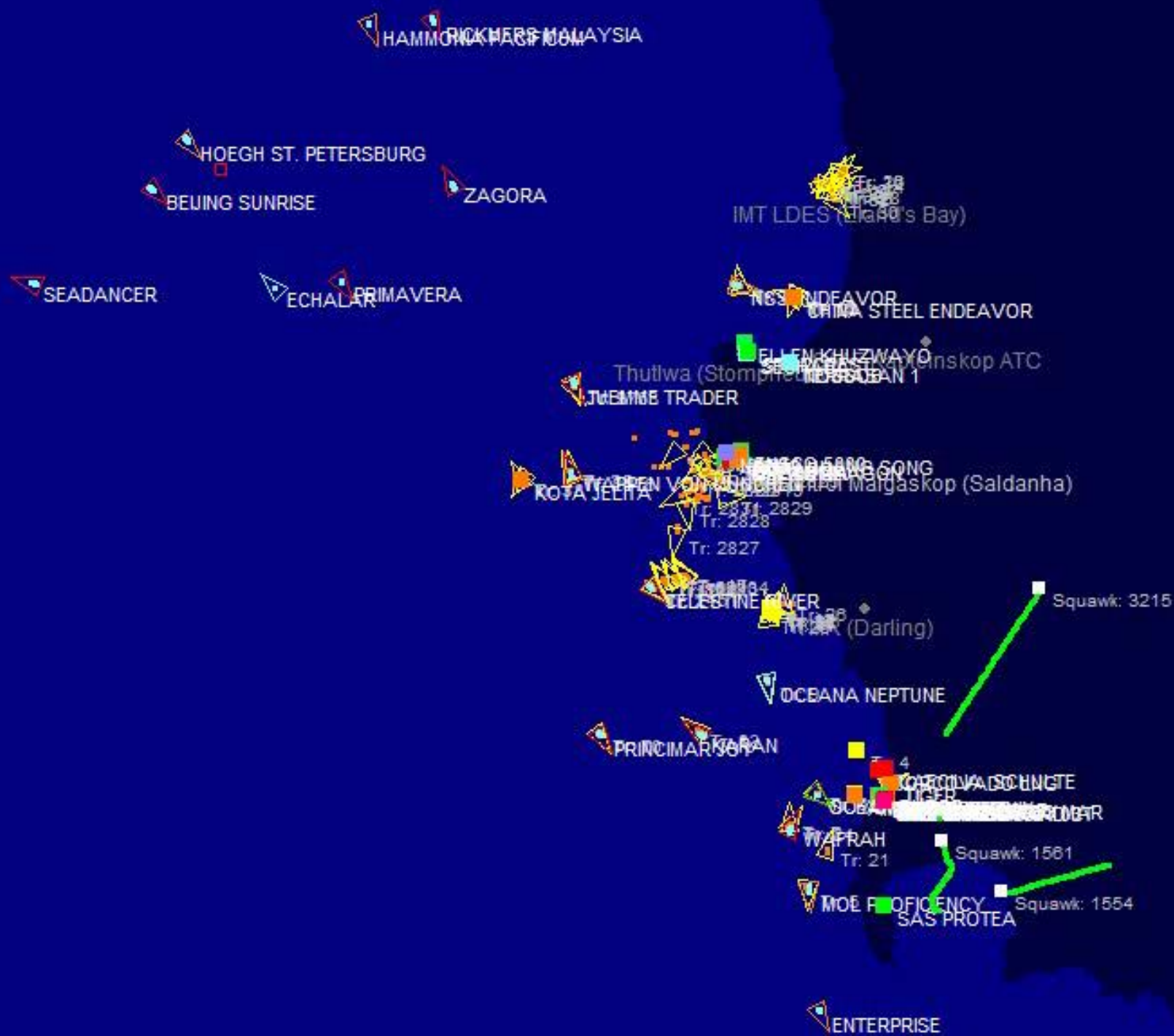
- **This briefing is an informal overview of the Maritime Experiment held in Saldanha from 2 to 6 November 2014**
- **The focus of this presentation will be on the creation of a Recognised Maritime Picture for use by the Operational Commander to conduct Command and Control.**
- **Additionally, the prime focus will be centred on the use of Above Water Sensors, Sensor Integration and Data Management**

**ALTHOUGH PRESENTATION FOCUSES ON ABOVE WATER SENSORS, THE EXPERIMENT WAS A TEAM EFFORT FROM IMT. IMT COLLEAGUES THAT PARTICIPATED:**

- **NSAW – VISTANET INTEGRATION (LJ van Wyk)**
- **RADAR SITE INTEGRATION (PL Botha)**
- **OPTICS AND IR (Dr W Gunter and G Vrahimis)**
- **UNDER WATER SECURITY (J Schmidt)**
- **UNDER WATER SENSORS (P le Grange + team)**
- **COMMUNICATIONS (L. Clayton + C Dreyer)**
- **ENVIRONMENTAL (Dr C Wainman and Colleagues)**

4/11/2014 09:04:09







# RS 940 DOPPLER – INTEGRATION VIA HIGH SPEED DATALINK





# IMT MICROWAVE OPTICS LINK OBSTRUCTING RS 940 HIGH SPEED DATA-LINK



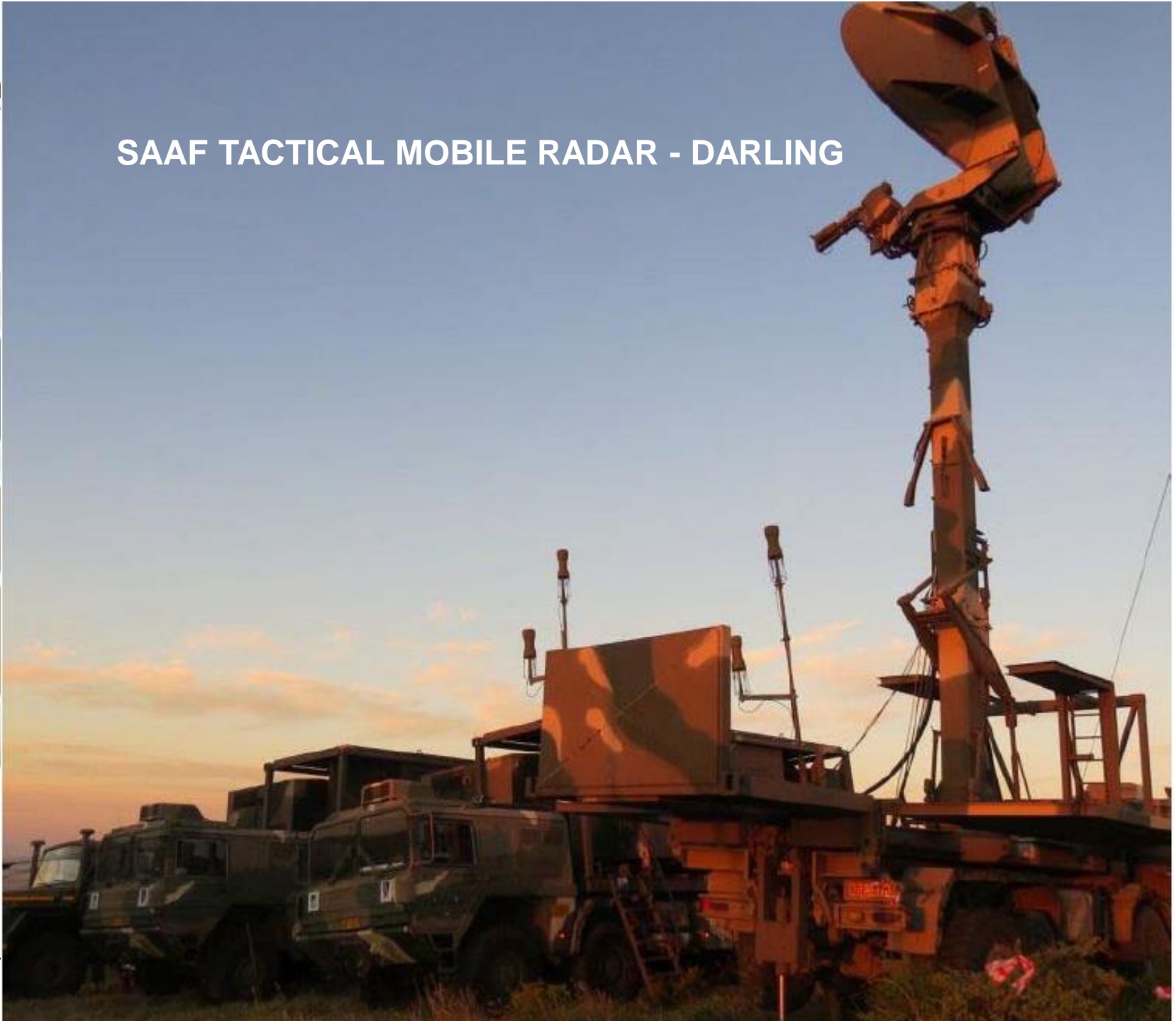




# LDES SITE INTEGRATION



## SAAF TACTICAL MOBILE RADAR - DARLING









# ELECTRO-OPTICS PARTICIPATION



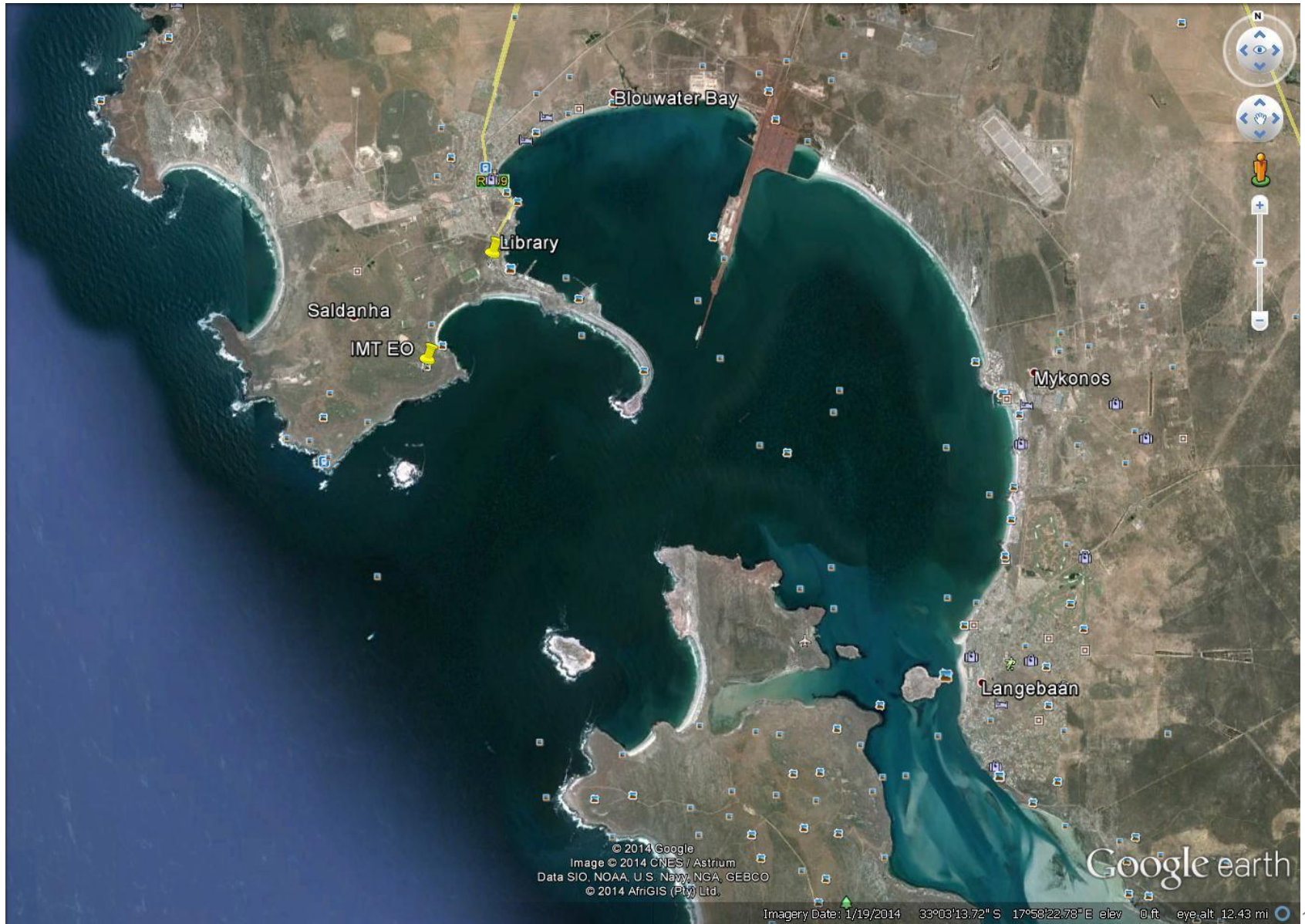
# ME OBJECTIVES

- To provide and/or enhance the close range ( $< 10$  km) maritime picture (MDA / situational awareness) using electro-optic sensors for target detection, tracking and **identification**.
- To test certain electro-optic sensor combinations in order to achieve the first objective.





# DEPLOYMENT POSITION





# DEPLOYED POSITION

MT





# DEPLOYED EO SENSORS

Vigiscan IR  
↓  
Canon- Celestron  
VIS  
↓  
Saturn IR  
↓  
Pelco PTZ  
↓  
FLIR PTU

HARRIS RF  
Network Link  
↓

# DEPLOYED EO SENSORS

Long range sensors

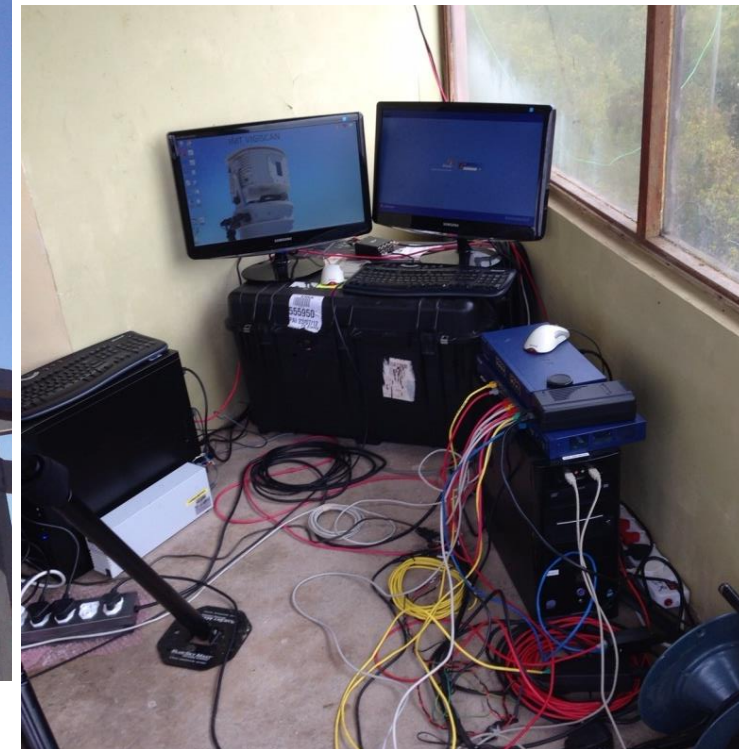
Saturn IR

Canon-Celstron VIS

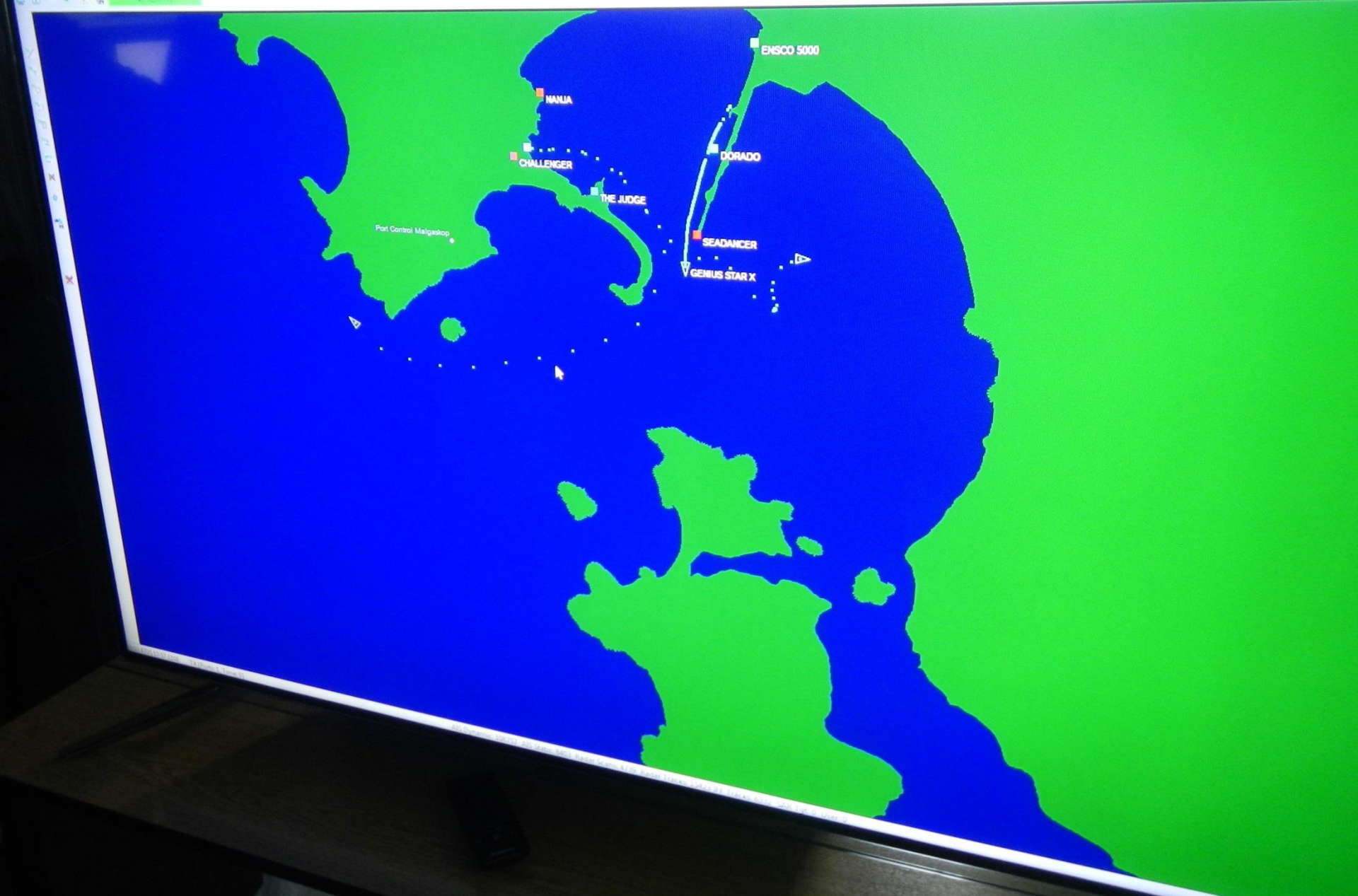
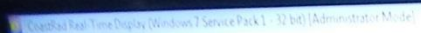
Panoramic sensor

Vigiscan IR

Control/data capture PCs at  
Malgaskop



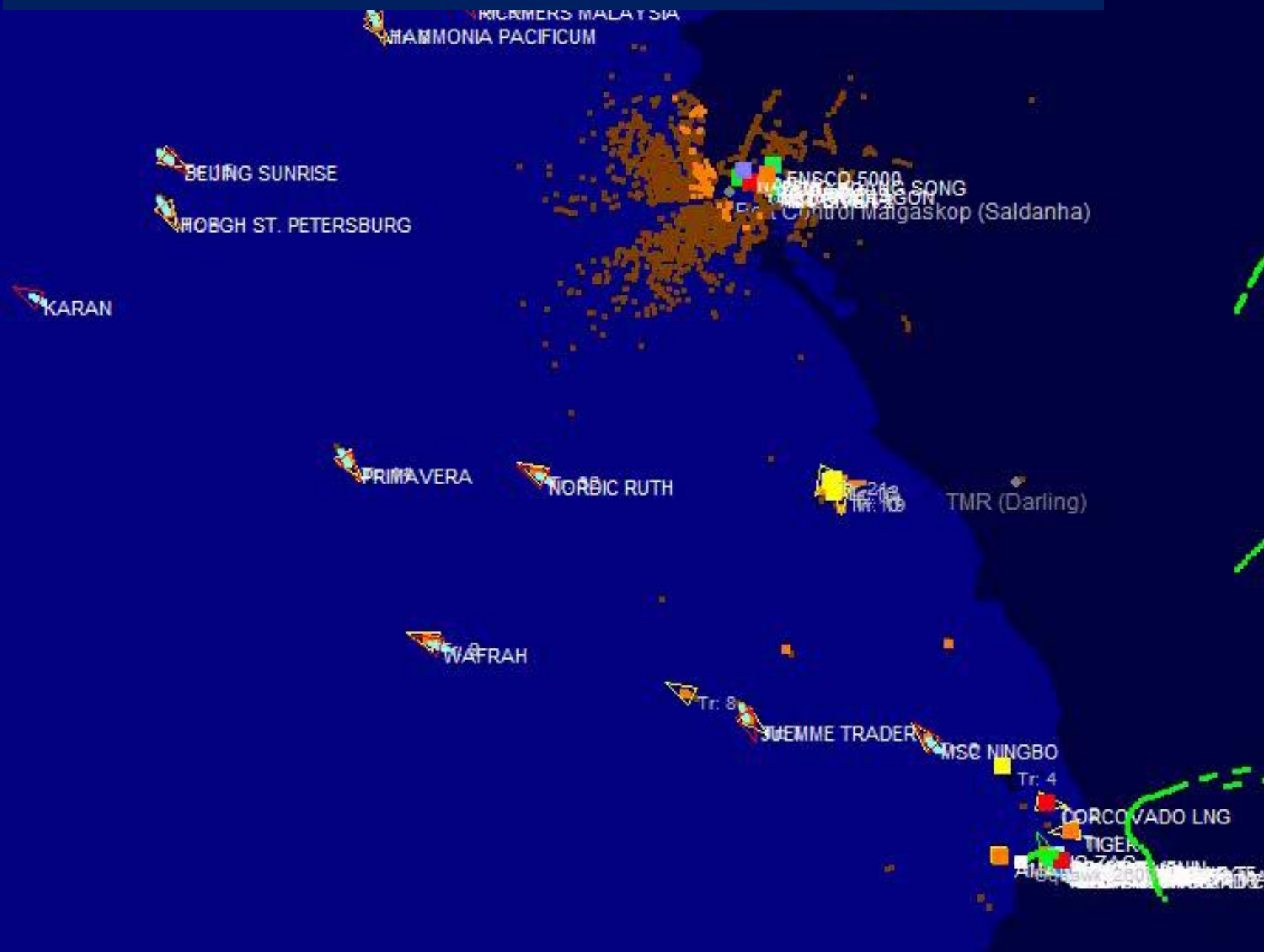








# EXAMPLES OF LESSONS LEARNT EFFECTIVE USE OF SCARCE PATROL ASSETS



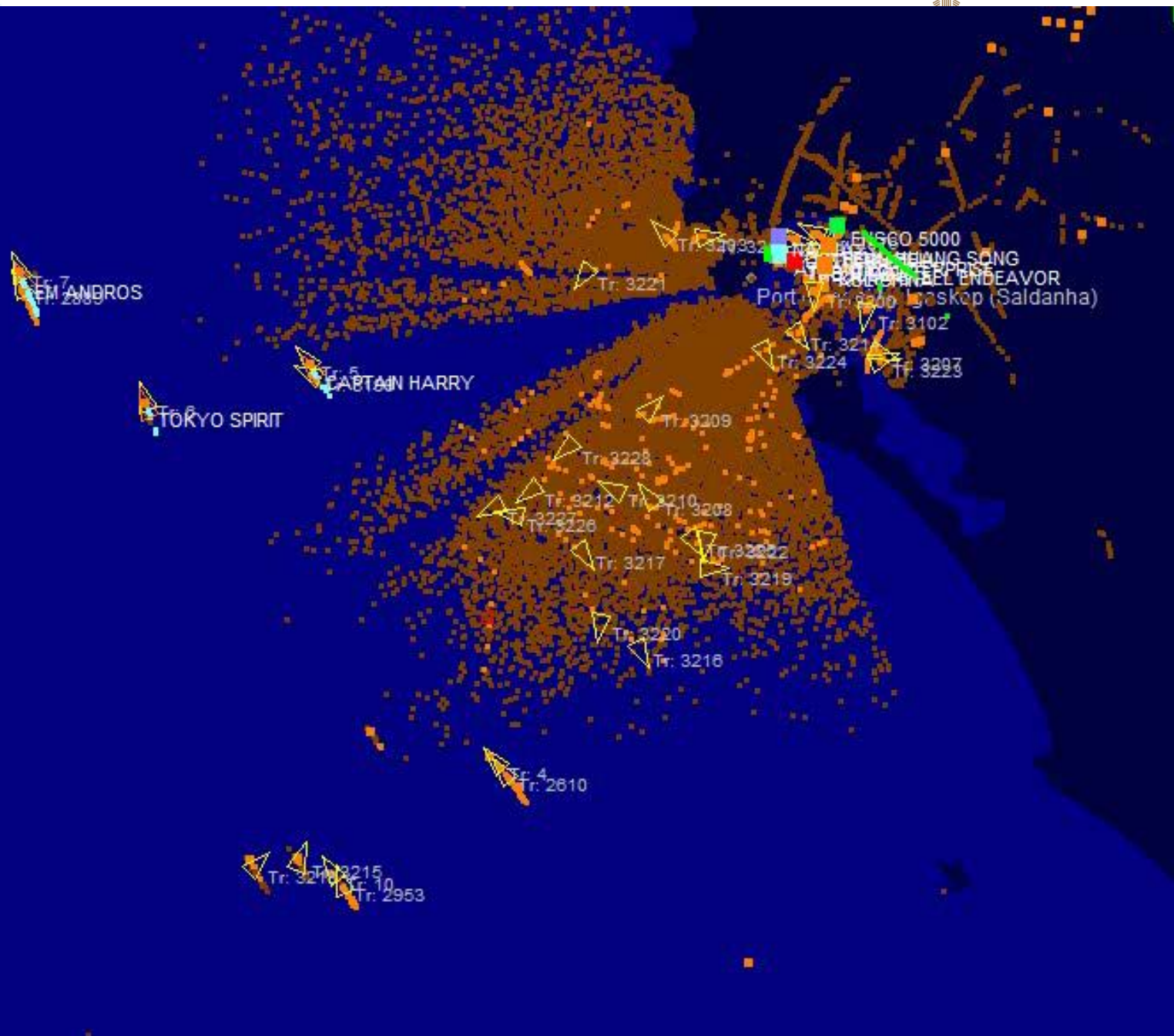








# MONITORING OF STEALTHY TARGETS



- **COASTAL SURVEILLANCE RADARS OF THE 1970's AND 1980's:**

- NON-COHERENT AND FIXED FREQUENCY
- MAGNETRON-BASED
- HIGH PEAK POWER AND DEFINED PULSES

- **IN THE RSA WE USED AVAILABLE ATC RADARS:**

- LOW PRF < 1000Hz
- LONG PULSE – 1 TO 2  $\mu$ s
- SLOW ARP – 4-8 rpm
- WIDE BEAMWIDTHS >2°



## ● **COASTAL SURVEILLANCE RADARS OF THE 2000's:**

- COHERENT AND MULTI FREQUENCY
- SOLID STATE/MPM BASED TRANSMITTERS
- LOW AVERAGE POWER AND PULSE COMPRESSION
- DOPPLER PROCESSING

## ● **MODERN COTS VTS RADARS:**

- LOW PRF < 1000Hz
- EFFECTIVE RANGE RESOLUTION < 30m
- SLOW ARP – 4-8 rpm
- NARROW BEAMWIDTHS >0.7 DEGREES

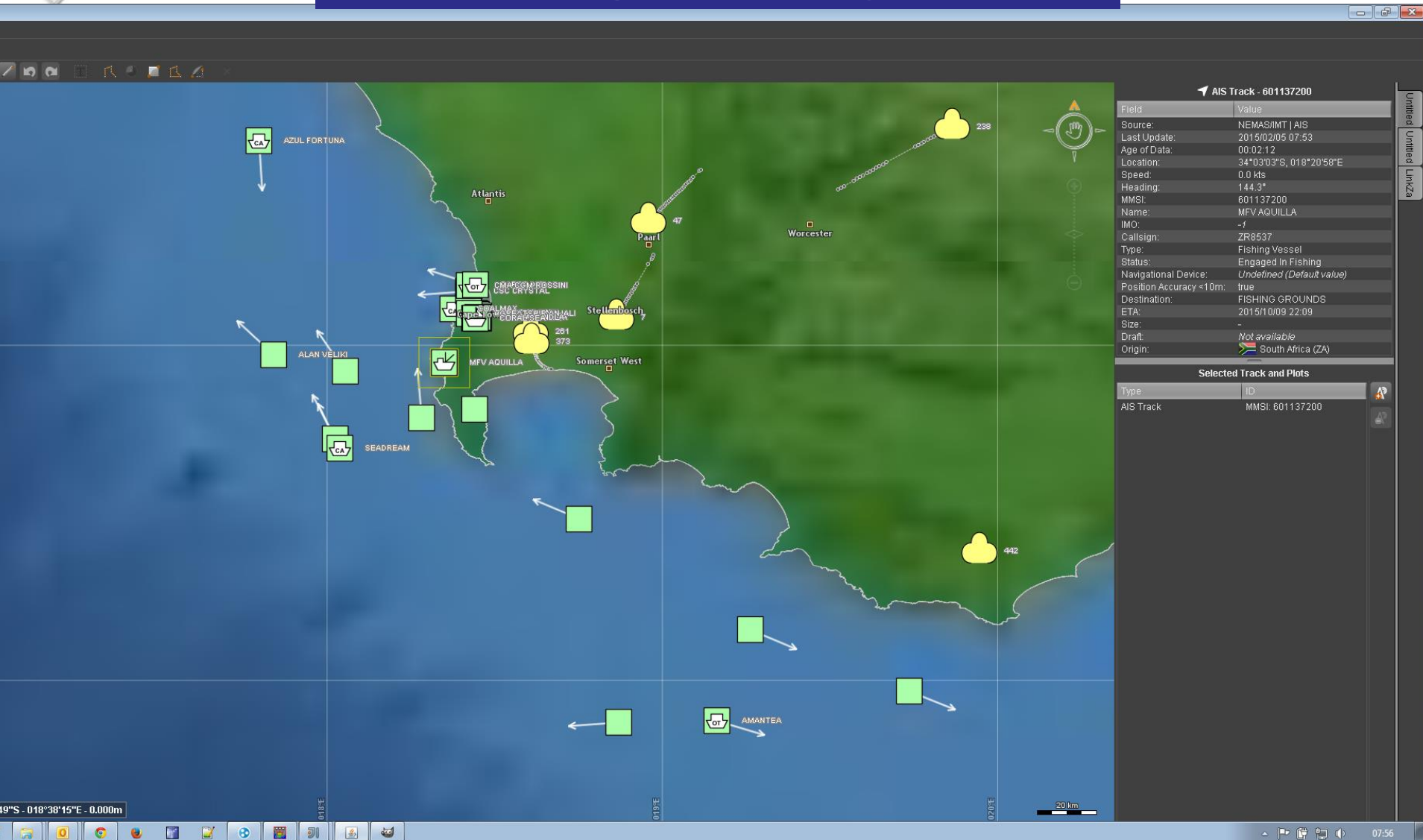
# **SOME MAJOR CHALLENGES FOR RADAR RELATED ISSUES**

- **HIGH RESOLUTIONS REQUIRES ADVANCED PROCESSING (150m SHIP TARGET PROVIDES A NUMBER OF TRACKS)**
- **GREAT NUMBER OF POTENTIAL TRACKS (MOVING WAVE CRESTS, BIRDS, SKI-BOATS, ETC)**
- **CONFLICTING REQUIREMENTS:**
  - LONG RANGE DETECTION INCREASES EFFECTS OF CLUTTER
  - ROUGH SEAS CREATE INTERMITTENT TRACKS
  - HIGH ANGULAR RESOLUTION REQUIRES SLOWER SCAN RATES
  - USING PRECISION DOPPLER REQUIRES LONG DWELL TIME
  - HIGH UPDATE RATES REQUIRED FOR AIRBORNE TARGETS





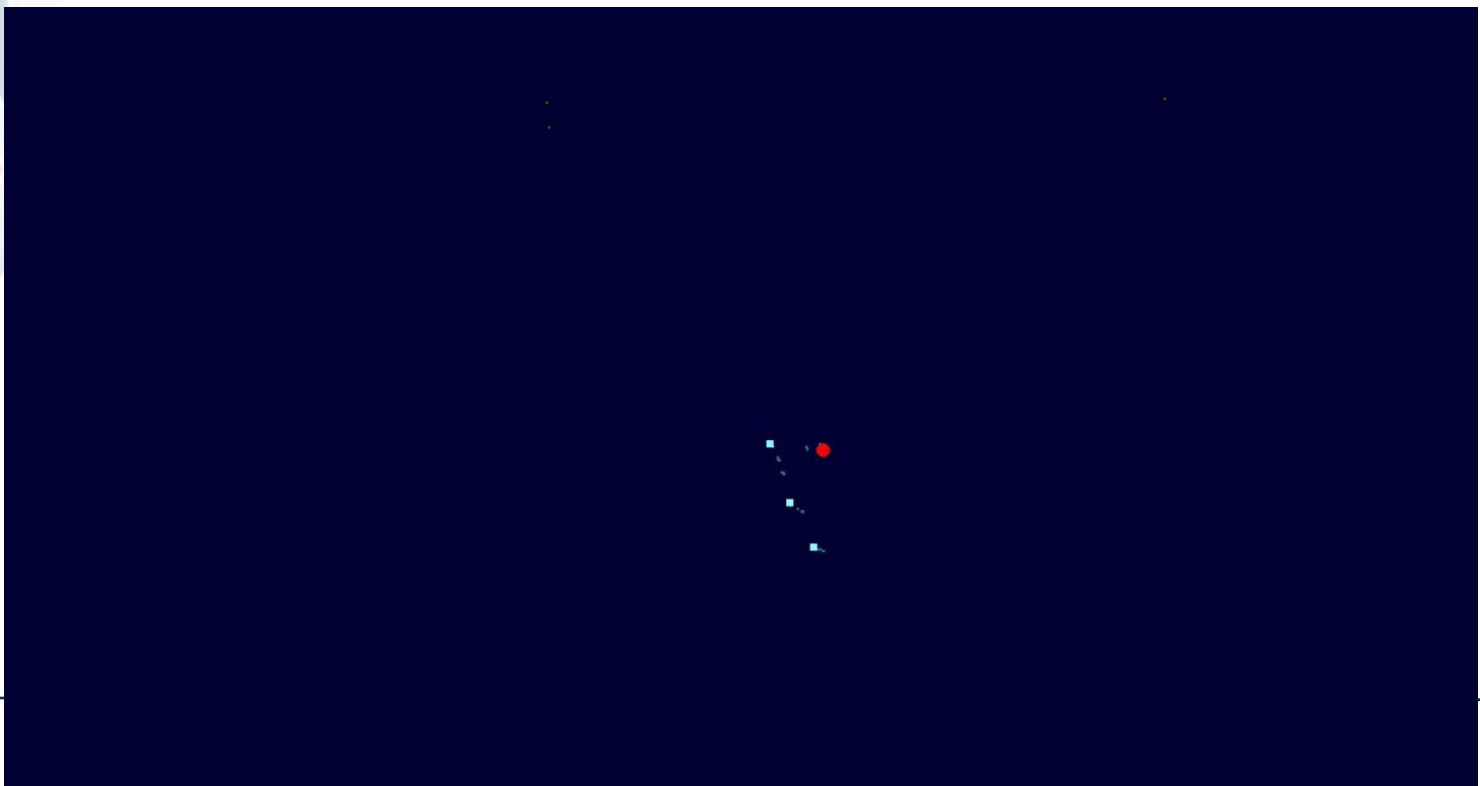
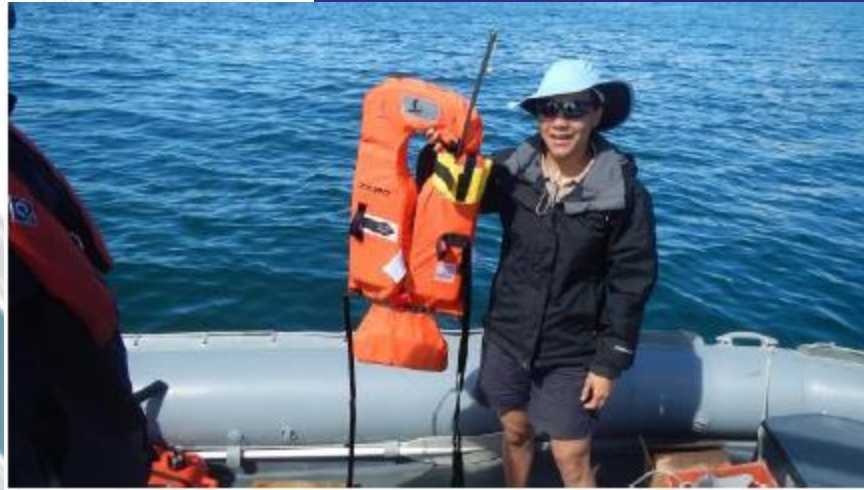
# RMP COMPILATION AND TRACK MANAGEMENT





**ARMSCOR**  
Armaments Corporation of South Africa SOC Ltd

# ALTERNATE TECNOLOGIES







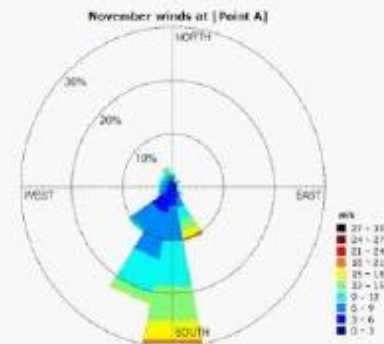
# MARITIME RAPID ENVIRONMENTAL ASSESSMENT

DAILY PRODUCT: SALDANHA BAY - 03 NOVEMBER 2014 as at 08:00 B



## Meteorology - Offshore (West of Saldanha Bay)

	Yesterday (02 Nov '14)				Today (03 Nov '14)				Tomorrow (04 Nov '14)				Wednesday (05 Nov '14)			
Time	01:00	07:00	13:00	19:00	02:00	08:00	14:00	20:00	02:00	08:00	14:00	20:00	02:00	08:00	14:00	20:00
Wind Direction (°M)	159	138	180	170	322	351	325	336	321	333	185	188	168	159	168	163
Wind Speed (m/s)	6--8	3--4	2--3	6--9	5--7	3--4	4--6	3--4	4--6	5--7	3--4	4--6	4--5	5--7	8--11	9--12
Wave Direction (°M)	219	215	216	218	215	216	215	216	218	217	216	217	221	222	222	225
Wave Height (m)	2.4	2.1	1.8	1.9	1.8	1.6	1.5	1.7	1.9	2.1	2.2	2.2	2.1	2.2	2.4	2.6
Wave Period (s)	12.6	12.2	11.8	11.6	11.2	10.8	17.1	16	15.2	14.5	14.1	13.5	13.4	13.5	13.3	13.2
Seastate																
Cloud Cover (%)	58	18	0	0	83	100	91	52	18	99	37	1	0	0	0	0
Precipitation (mm/h)	0	0	0	0	1.9	14.8	4.7	0.7	0	0.2	0.1	0	0	0	0	0
Precipitation Type					RAIN	RAIN	RAIN	RAIN		RAIN	RAIN					
Relative Humidity (%)	87	82	80	87	93	94	88	90	88	91	90	91	90	92	87	88
Air Pressure (hPa)	1010	1012	1011	1009	1013	1013	1012	1014	1014	1018	1020	1022	1023	1024	1022	1020
Air Temperature (°C)	17	17	18	18	17	16	16	16	16	16	17	17	17	17	17	17

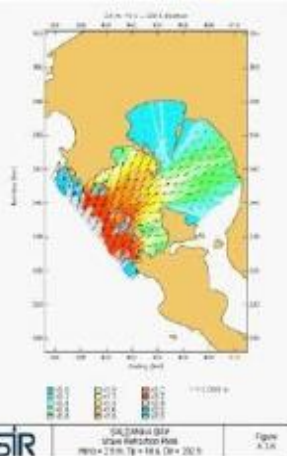


## Weather Statistics for the Month of November in Saldanha Bay

Parameter	Avg	Min	Max
Air Temperature (°C)	17.01	2.00	37.60
Air Pressure (dBar)	1015.60		1080.90
Relative Humidity (%)	73.31	13.00	
Wind Speed (m/s)	4.52	0.00	31.60
Rainfall (mm)	0.02	0.00	10.40

## Oceanography

### Wave Conditions





**Figure 4 : The entire communications EW system integrated at the Malgaskop high site )**



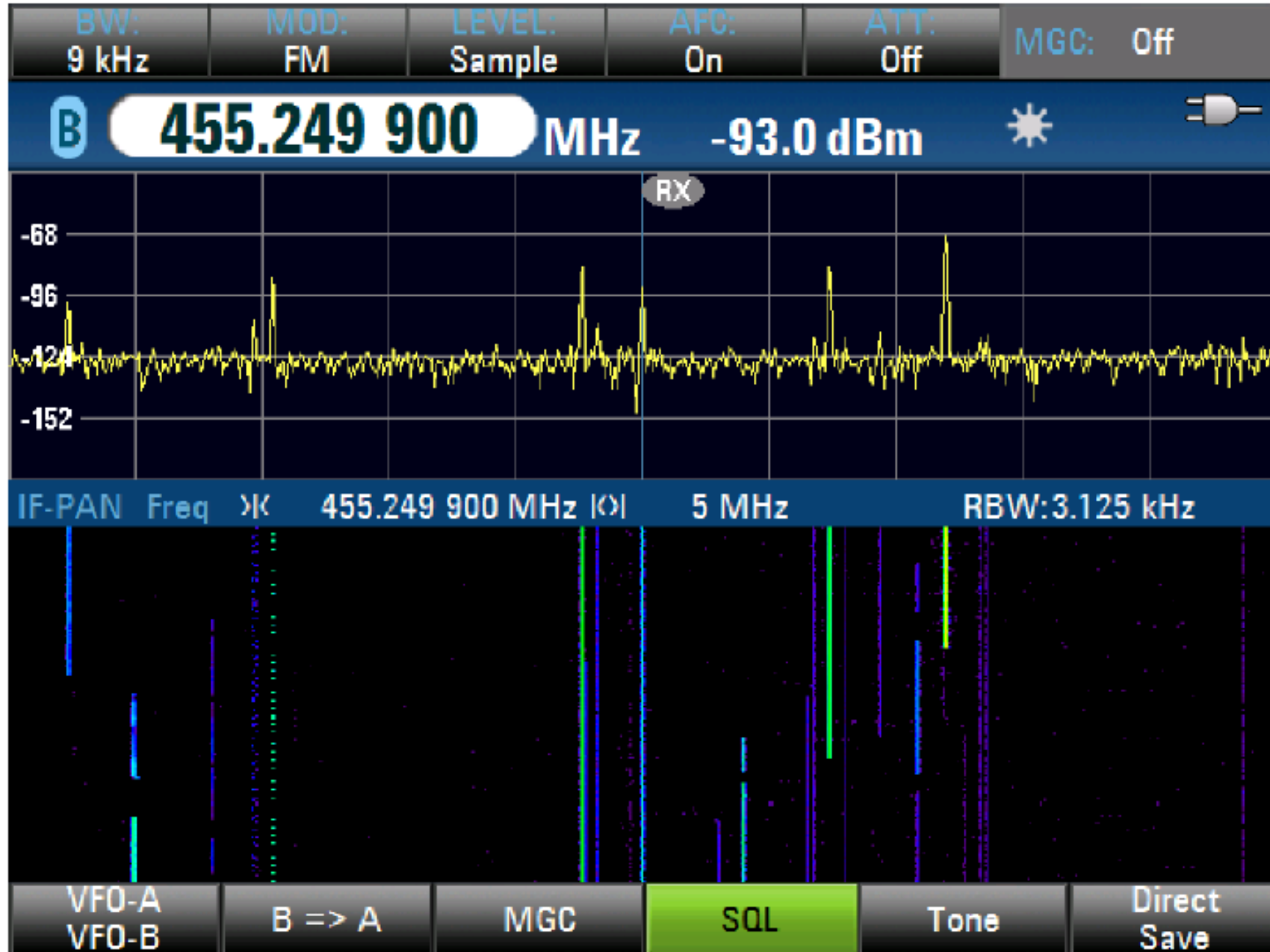


Figure 5 : Active area of the RF spectrum while looking for digital emissions for analysis

**CAPTAIN NICK SNYMAN**

