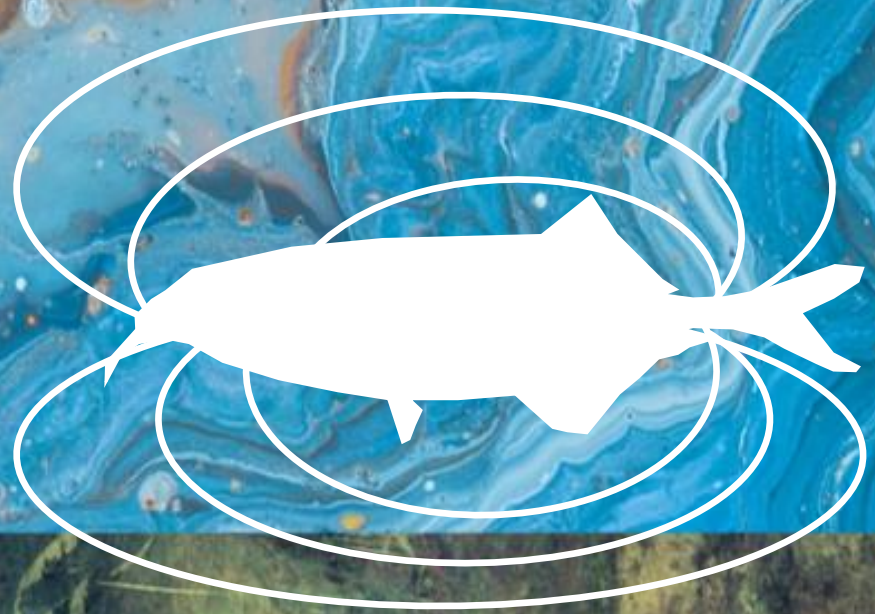
CEDAR®

Controlled Electric Detection And Ranging

28/06/2024



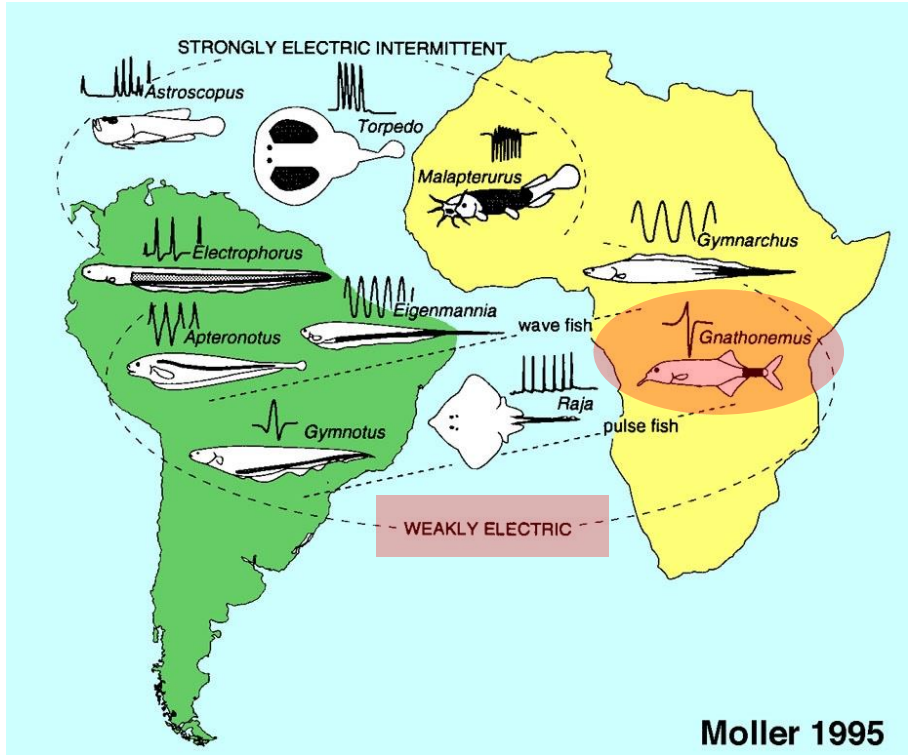
New Electromagnetic Technology for the Detection of Underwater Objects: Principle and Results of Tests Carried Out at CMRE

NATO OTAN

SCIENCE & TECHNOLOGY ORGANIZATION
CENTRE FOR MARITIME RESEARCH & EXPERIMENTATION

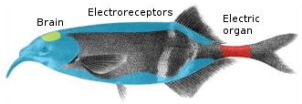
ELWAVE

From « Electric Sense » to CEDAR®

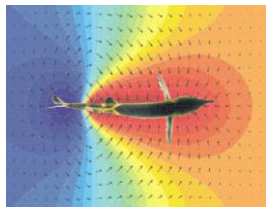


CEDAR® (Controlled Electric Detection And Ranging) is bio-inspired by active electrolocation perception mode (“Electric sense”)

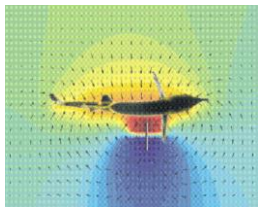
- Real-time 360° perception (4pi steradian)
- Location and characterization (size, shape, material, alive)
- Metallic and non-metallic objects
- Efficient for buried objects (cable, mine/UXO, pipeline) and in complex environments (turbid water, high flow, …)
- Integrable on any size of ROV, ROTV and AUV



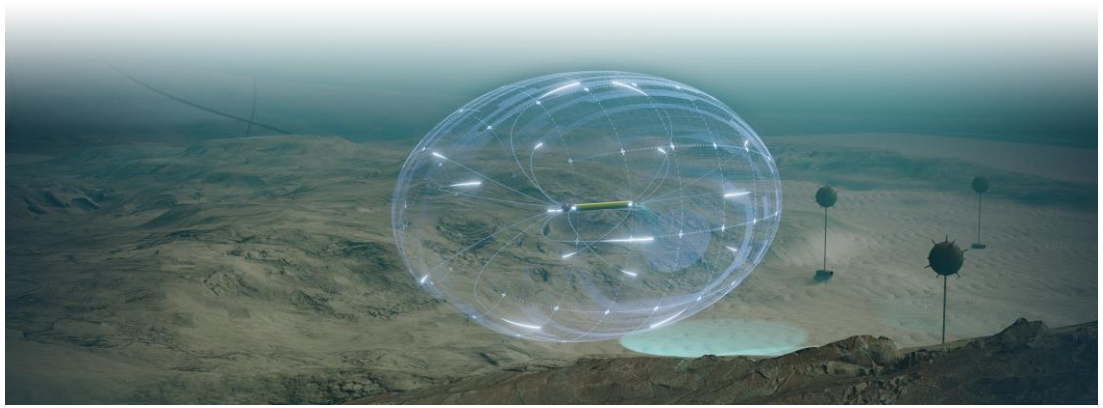
Electric fish Gnathonemus Petersii



Electric field generated by the fish without object



Electric field perturbated by an object close to the fish



OCTOPULSE overview

ELWAVE

POD

- 1.3Kg - 70W (peak) - Al
- Real-time algorithms
- Upgradable embedded firmware
- RS232 & Ethernet pigtails
- Internal data logging

MMI

- Configuration, Data display & QA/QC

ELECTRODES

- 0.35Kg – Al & Ti
- Electrical current transmission & reception
- Easily swappable
- Cable length 1,5m or 7m

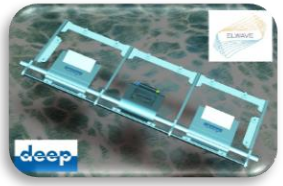
6000m ON REQUEST

ROV

WROV

AUV

ROTV



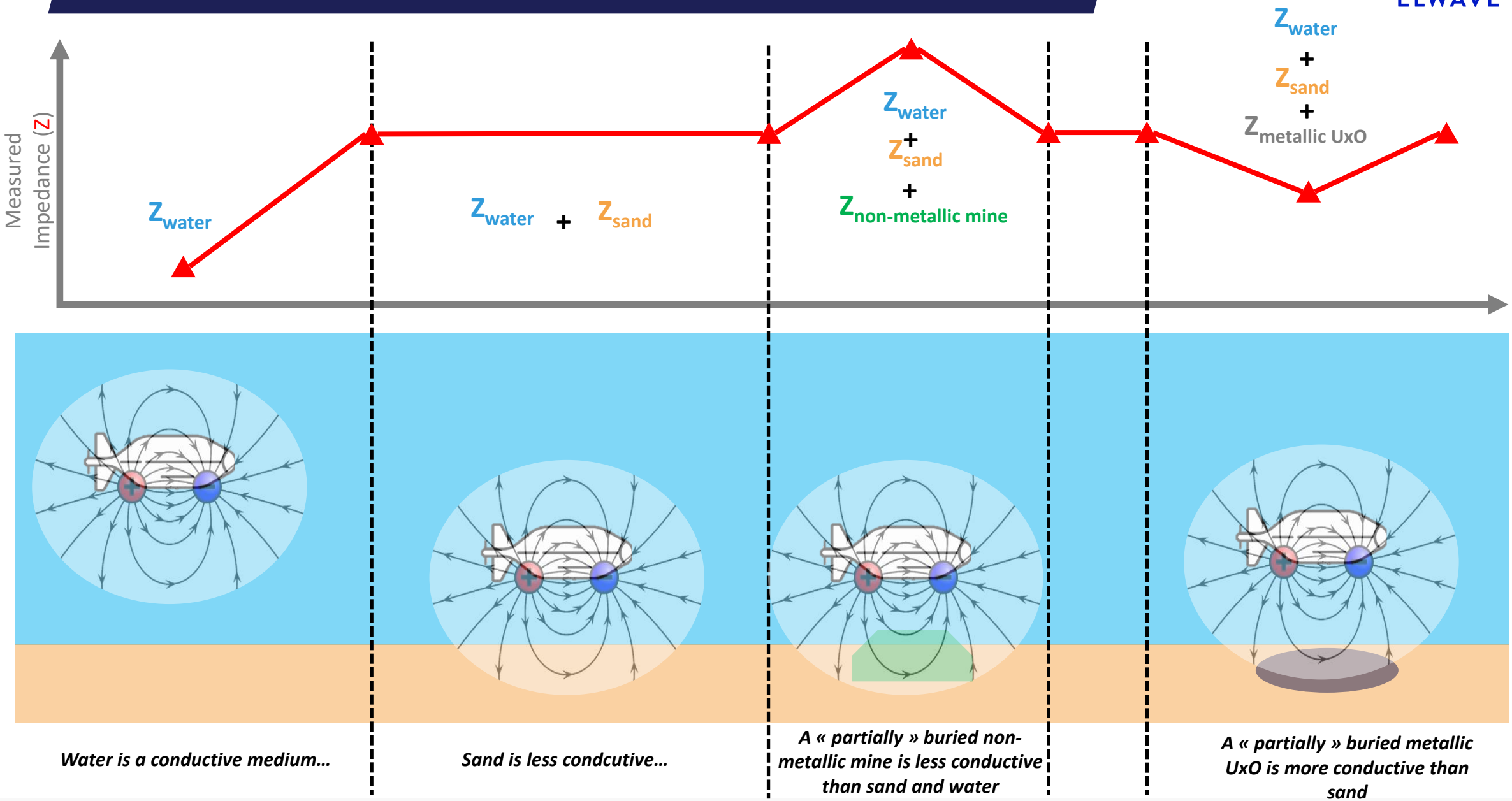
CRAWLER

TRENCHER

PERSISTENT

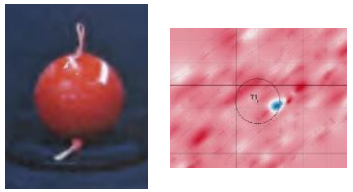
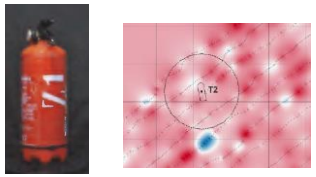
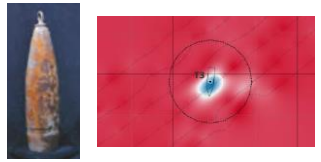
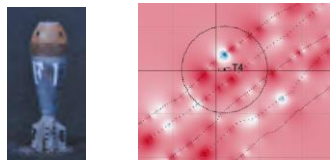
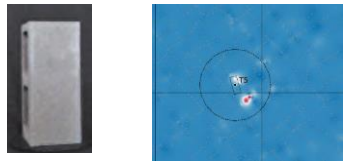
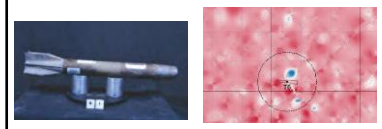
CEDAR®, it starts with **U** (*fixed*)=**Z**(*computed*)*I (*measured*)

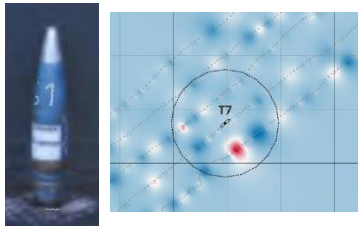
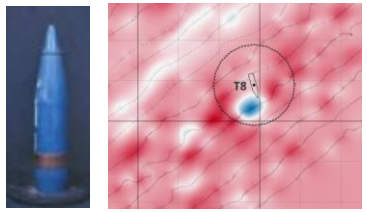
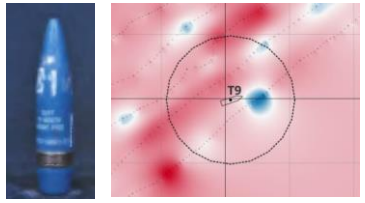
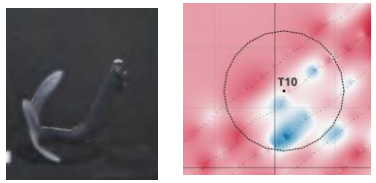
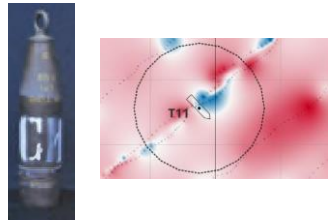
ELWAVE



ELWAVE's RESULTS @ CMRE

ELWAVE

T1	T2	T3	T4	T5	T6
hard plastic and steel balast	Fire extinguisher, steel-sheets and rubber 492mm * 161mm	155mm artillery projectile, steel 680mm*163mm	M53 mortar projectile, steel and aluminum 282mm*80mm	Cement block 492mm	Vulcano projectile, steel, 70mm*127mm
					

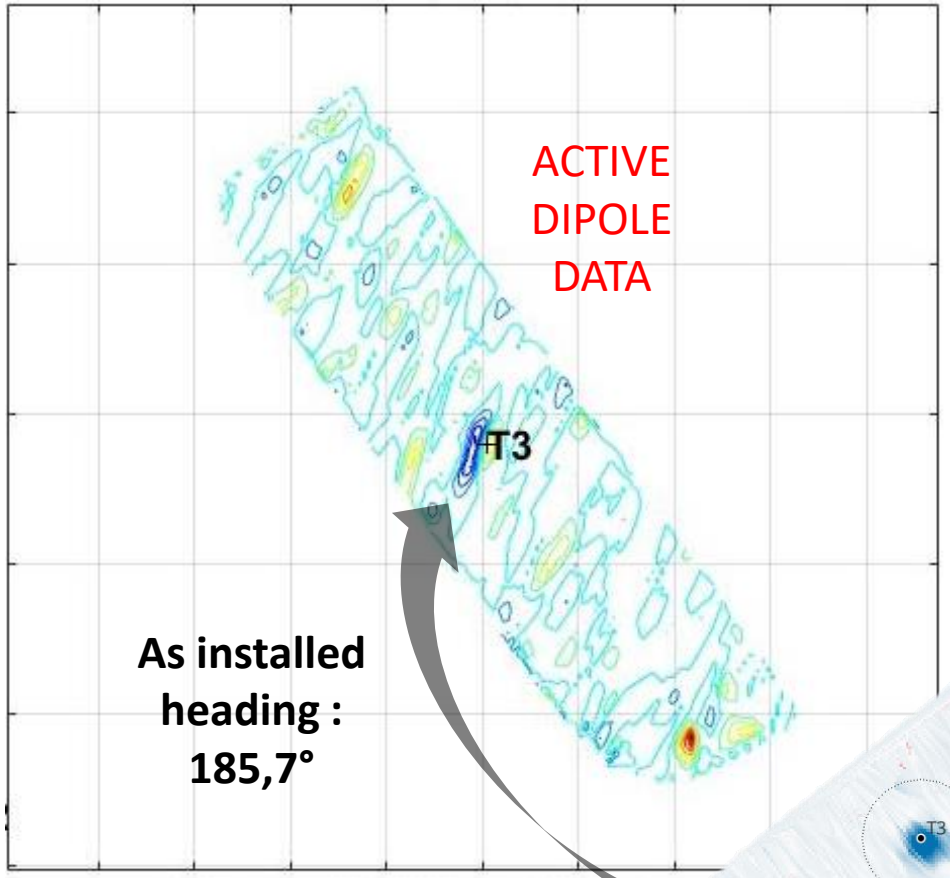
T7	T8	T9	T10	T11	T12
40mm anti-aircraft projectile, steel & aluminium 212mm*41mm	127mm navy artillery projectile, steel 640mm*126mm	76mm naval artillery projectile, steel 354mm*80mm	Anchor, steel, zinc treated 11Kg	105mm artillery projectile, steel 473mm * 106mm	hard plastic and steel balast
					 Not Surveyed Same than T11

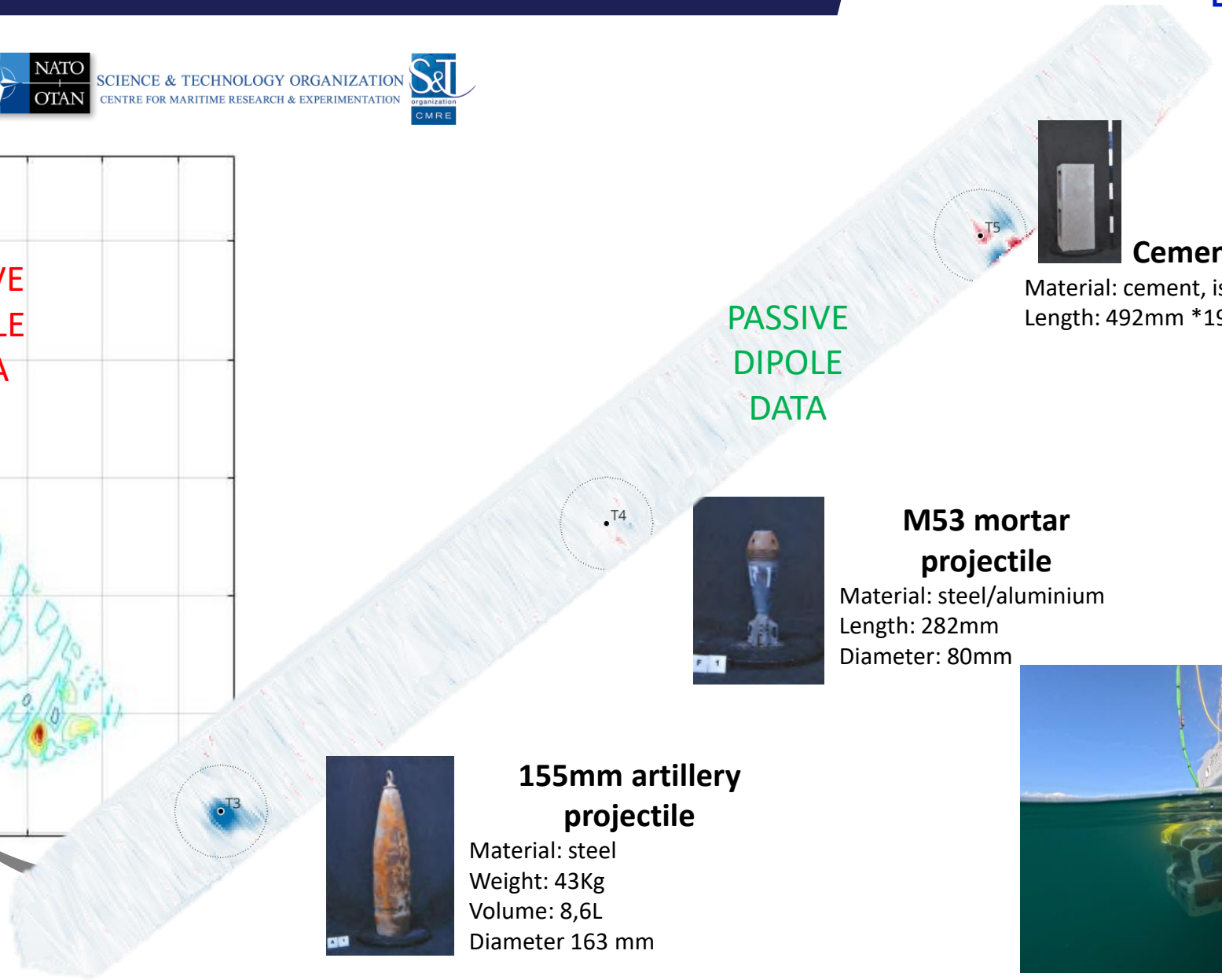
ELWAVE's RESULTS @ CMRE

ELWAVE

IDA INSTITUTE FOR DEFENSE ANALYSES

NATO OTAN SCIENCE & TECHNOLOGY ORGANIZATION
CENTRE FOR MARITIME RESEARCH & EXPERIMENTATION
S&T organization CMRE





Cement block

Material: cement, isolating
Length: 492mm *195mm*195mm

M53 mortar projectile

Material: steel/aluminium
Length: 282mm
Diameter: 80mm

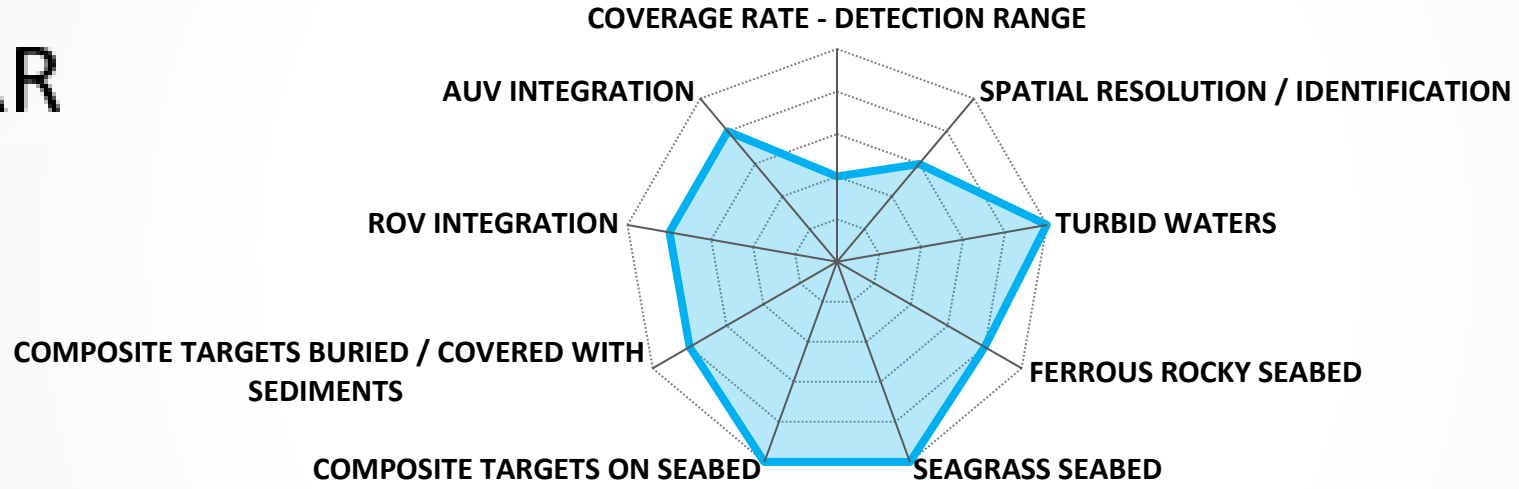
155mm artillery projectile

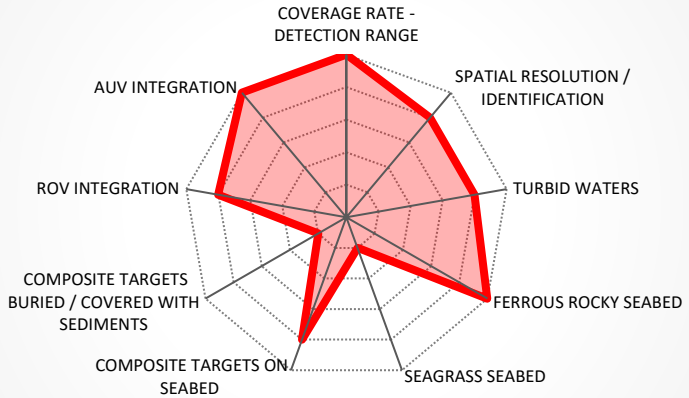
Material: steel
Weight: 43Kg
Volume: 8,6L
Diameter 163 mm

CEDAR TECHNOLOGY BENEFITS TO MCM

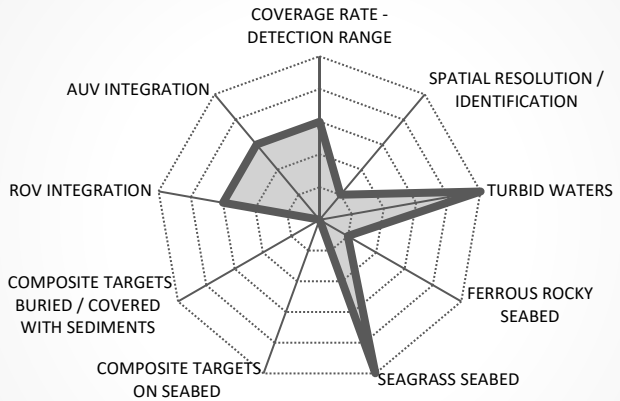
ELWAVE

CEDAR

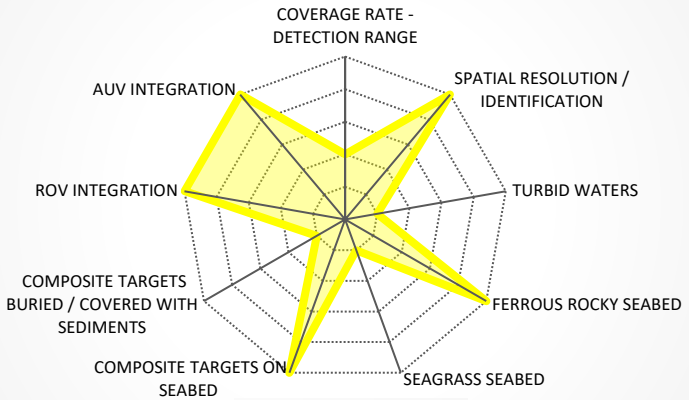




SONAR



MAGNETOMETER

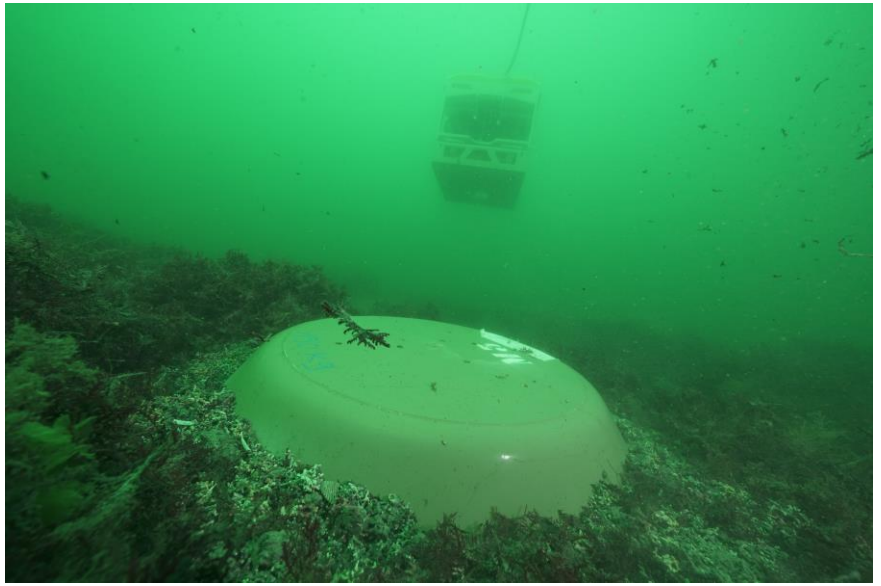


CAMERA

Mine identification ROV – « electric camera »

- After large area SONAR survey, an ROV is sent for visual identification prior neutralisation.

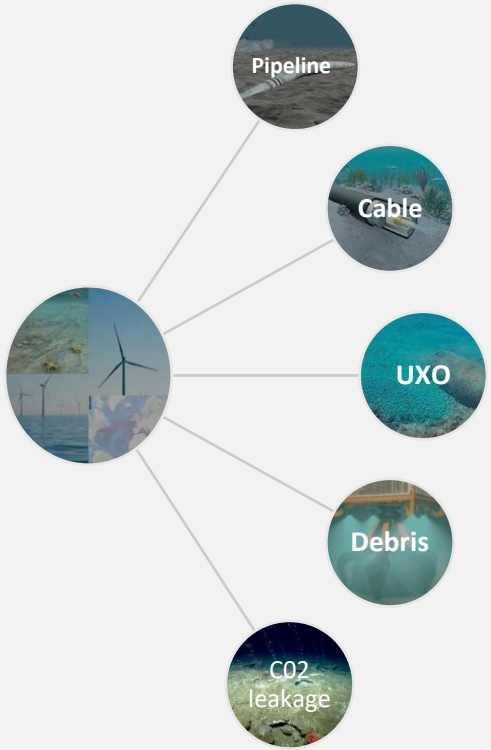
- Tetrapulse offers the capactity to assess size, shape and electric nature of the target even in turbid waters in the area of interest e.g. **navigation channel, cable route…**



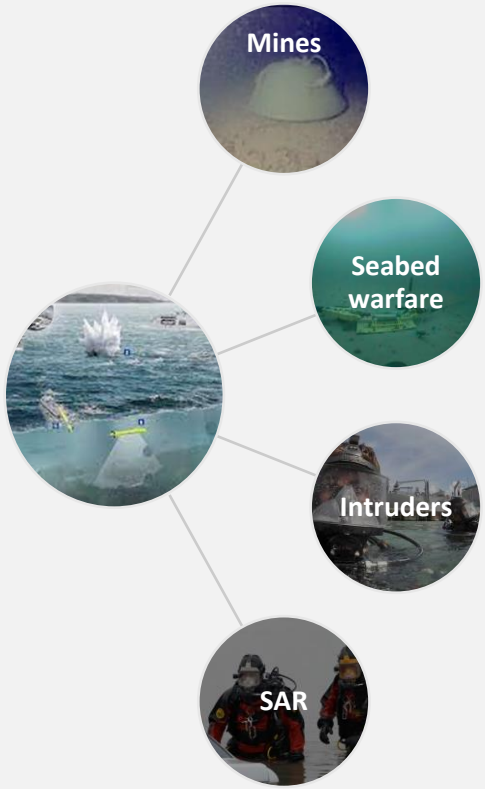
CEDAR® DUAL HYDROSPATIAL APPLICATIONS

ELWAVE

ENERGY & COMMUNICATION



DEFENSE & SECURITY



SCIENCE

SMART ROBOTIC