

MARITIME ROBOTICS

UNMANNED SURFACE VEHICLES FOR MARITIME DATA ACQUISITION

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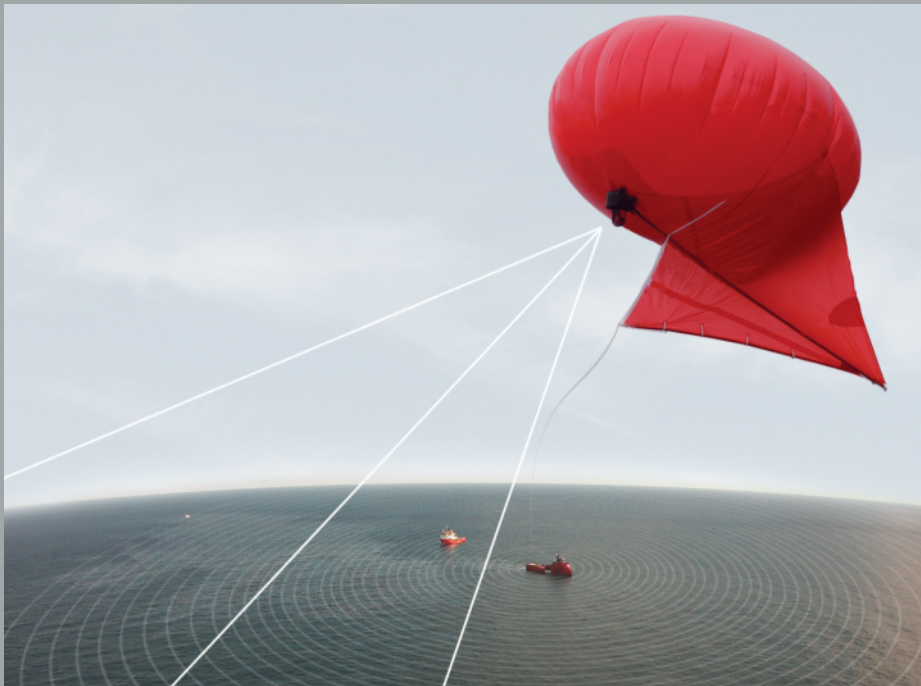


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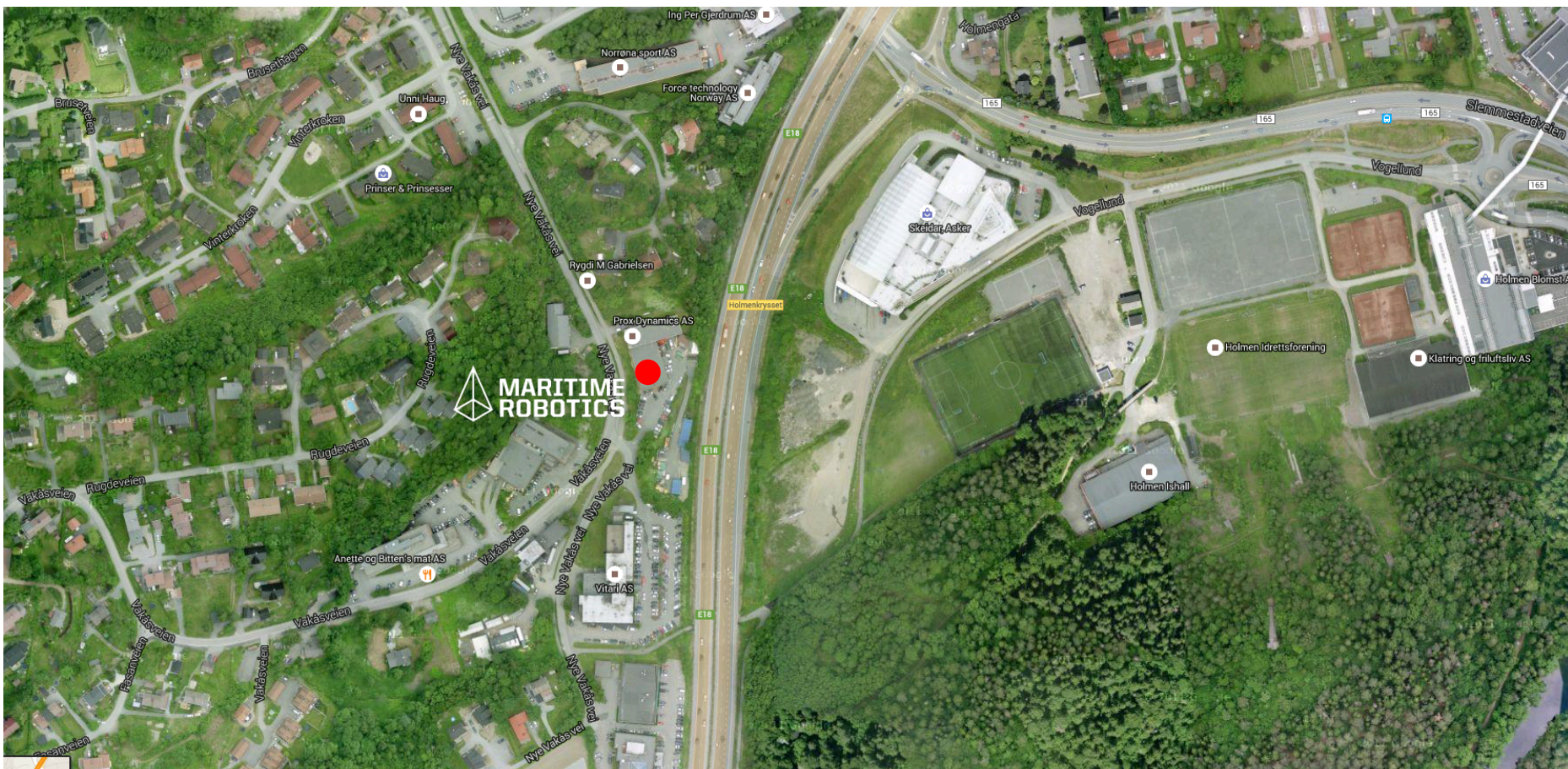
UNMANNED SYSTEMS FOR MARITIME DATA ACQUISITION





**MARITIME
ROBOTICS**

- Established in 2005
- Located in Trondheim, Asker and Eggemoen
- Step-by-step growth
- 14 employees



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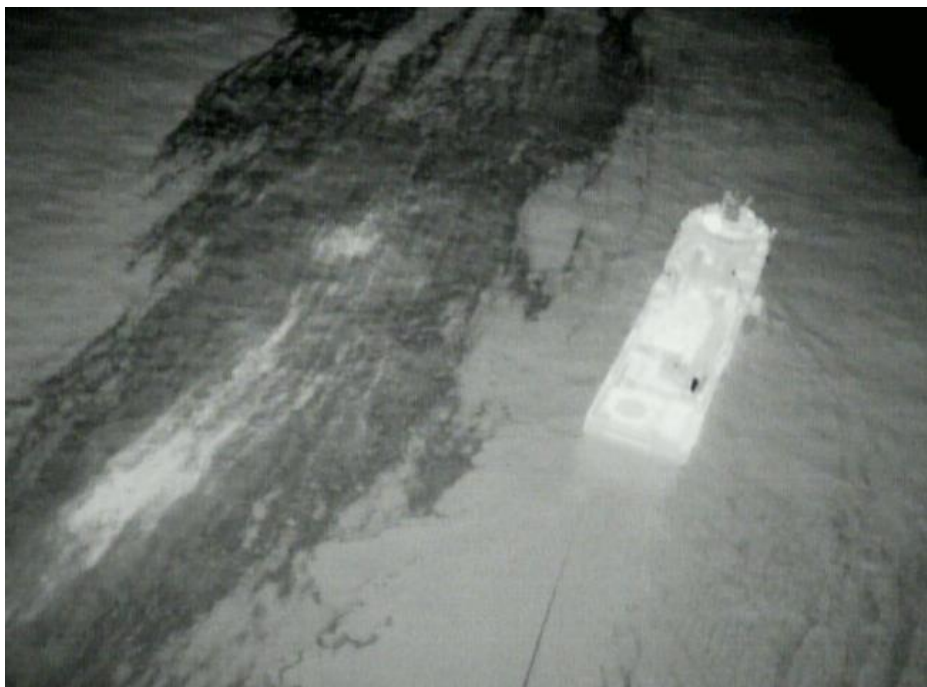
MOORED BALLOON SYSTEMS



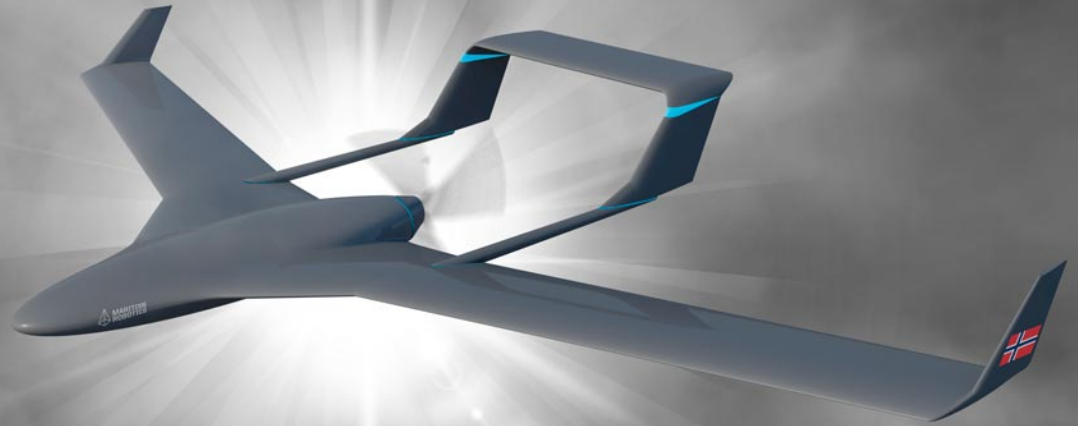
OCEANEYE®

MOORED BALLON SYSTEM





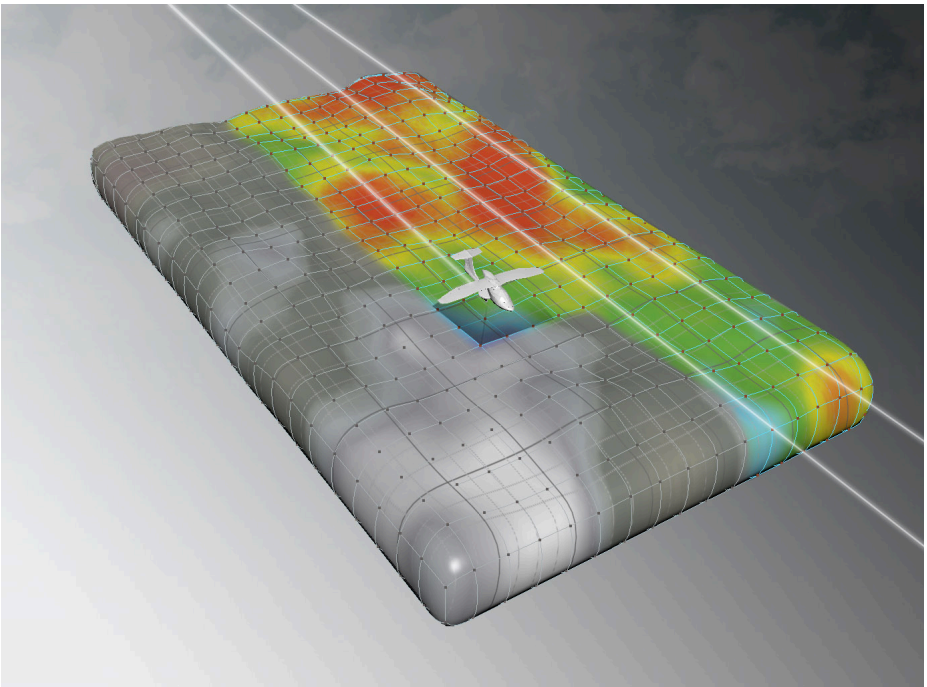
UNMANNED AIRCRAFT SYSTEMS



PENGUIN MR

UNMANNED AIRCRAFT SYSTEM





UNMANNED SURFACE VEHICLES



MARINER **UNMANNED SURFACE VEHICLE**



Vanvikan/Leksvik

Trondheim





Det vi så var en autonom
kollisjonsdeteksjon fra to autonome skip,

Ubemannede fartøyer brukes i dag til å utføre oppgaver i uoversiktlige og farlige områder, eller til kartlegging av geografiske områder. Større førerløse fartøyer som kan frakte folk eller gods, er nå på full vei inn. Video: Ingvil Snøfugl/SINTEF-selskapet MARINTEK

Åpner testområde for ubemannede fartøy

Trondheimsfjorden blir verdens første teknologiske tumleplass for førerløse fartøy som ferdes under, på og over vannoverflata.

Av Grete Wolden

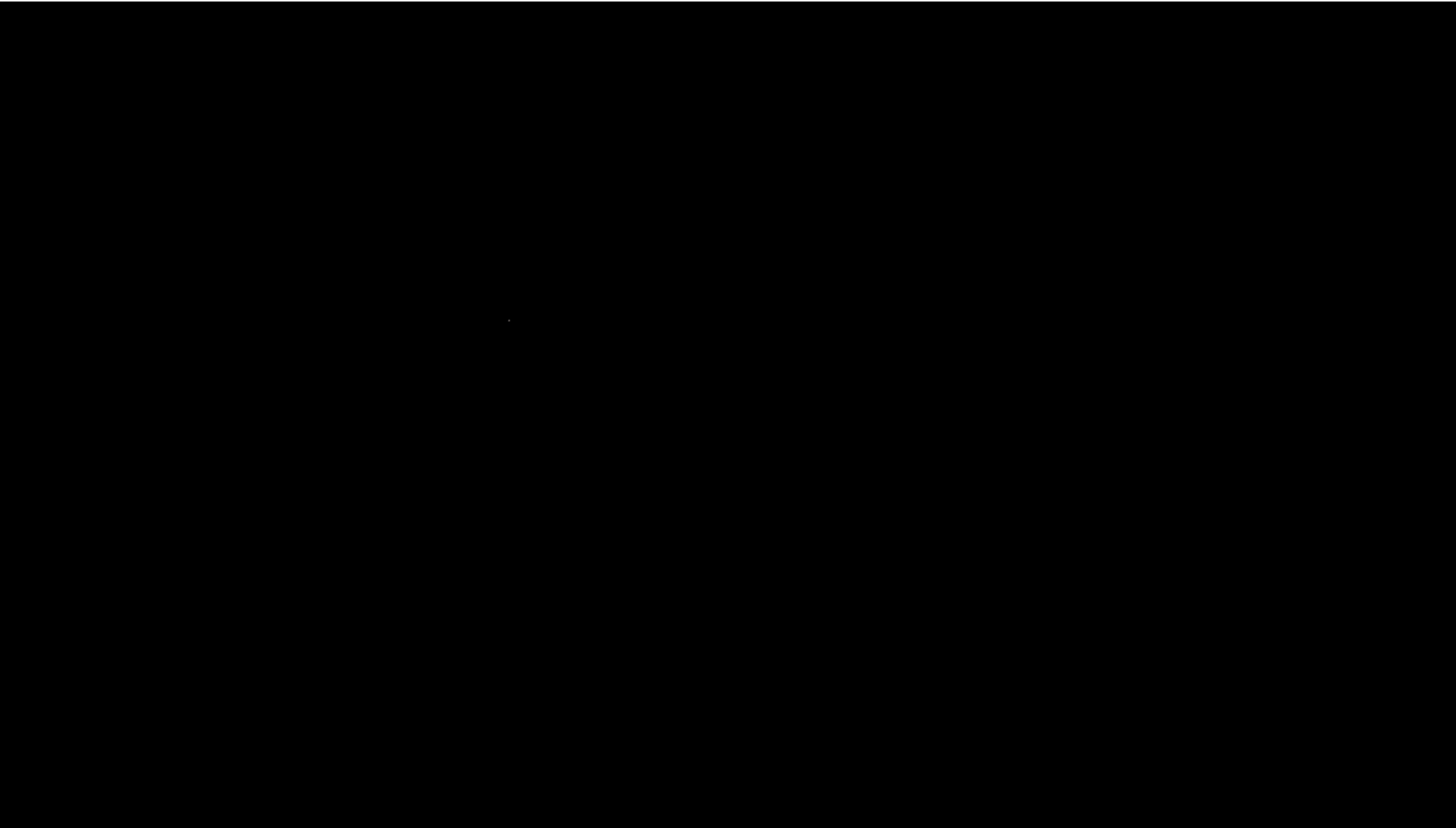
Publisert 30.09.16

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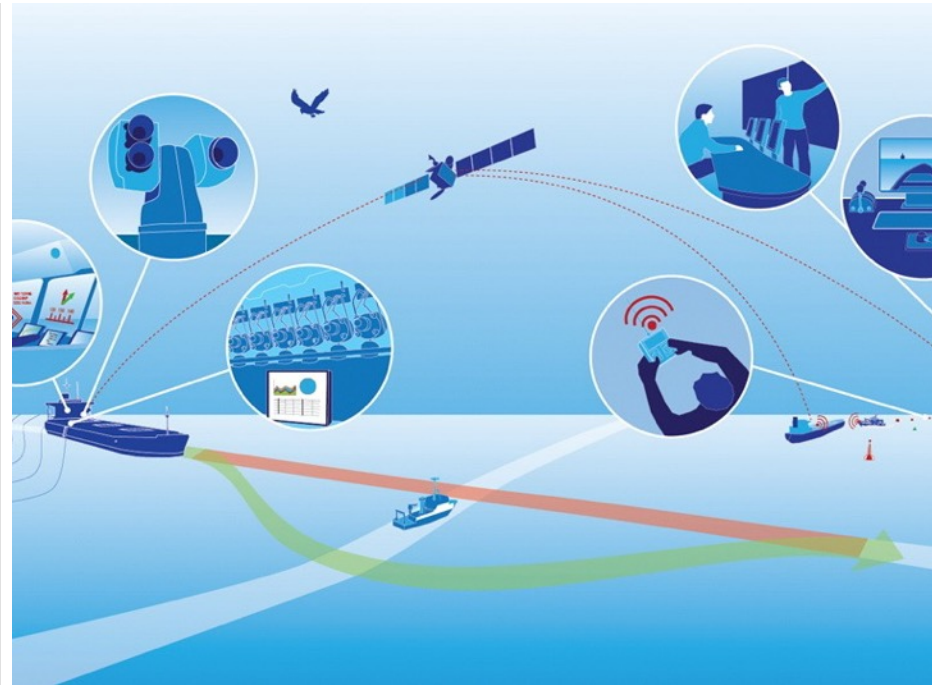






UNMANNED BOATS LEGISLATIONS

- The dilemma
 - Nothing allows
 - Nothing prohibits
- The engineers ask the legislators
 - What do we do?
- The legislators ask the engineers
 - What do you have?
- Numerous ongoing RnD projects
 - SMBs
 - Established system providers
 - Legislators





I ❤️
AUTONOMY



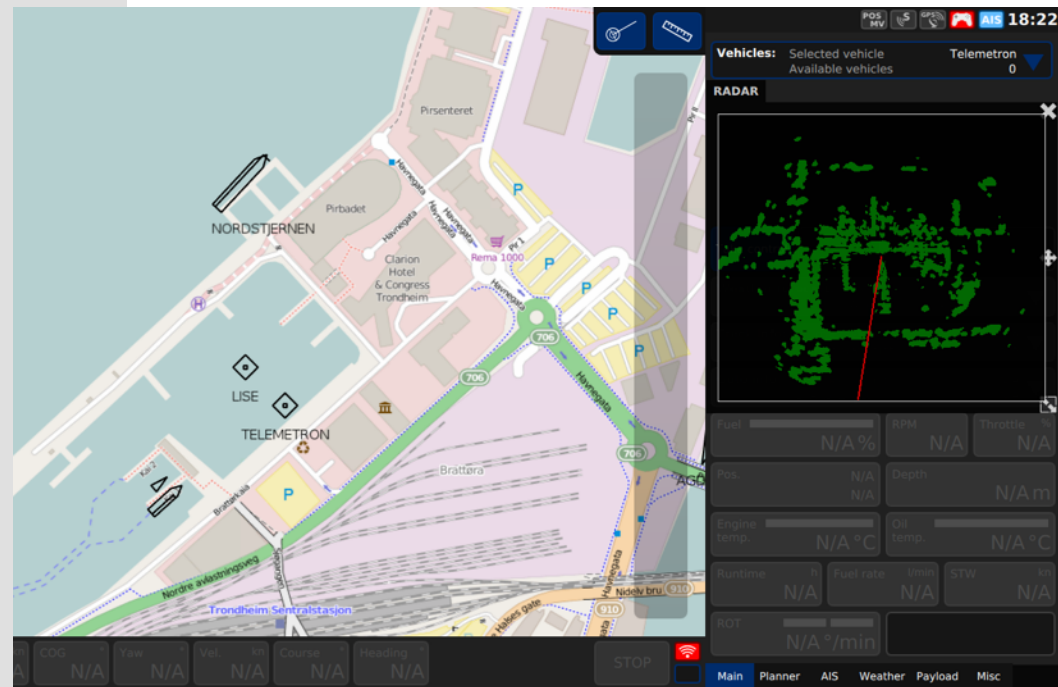
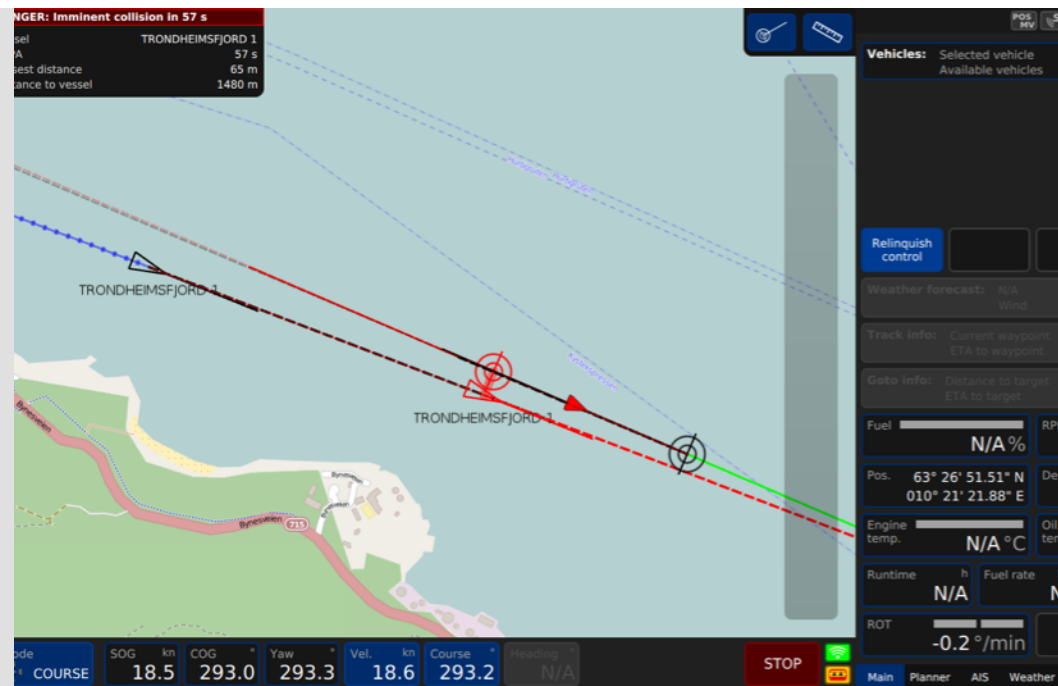
Full Definition of AUTONOMY

plural **autonomies**

- 1 : the quality or state of being self-governing
- 2 : self-directing freedom and especially moral independence
- 3 : a self-governing state

COLLISION DETECTION AND AVOIDANCE AIDING

- Collision detection with alarm to operator (4 level approach)
 - AIS
 - Radar
 - EO/IR cameras
 - Lidar/proximity sensors
- Collision avoidance
 - RnD activity
 - Implemented and tested AIS based collision avoidance



AUTOSEA PROJECT



Sensor fusion and collision avoidance for autonomous surface vehicles (Autosea)

Our vision is for the Norwegian maritime industry and researchers in collaboration with international partners to attain world-leading competence and knowledge in the design and verification of methods and systems for sensor fusion and collision avoidance for autonomous surface vehicles (ASVs). The research partners will develop and evaluate such methods and systems in compliance with the maritime anti-collision regulations (COLREGS), utilizing fusion of data from radar, AIS, IR, LIDAR, camera, IMU, GPS, etc. In addition to enabling commercial ASVs, the results can be used to enhance decision support systems for humans on manned vessels. The project will also provide a solid foundation for independent third-party verification of autonomous marine technology.

Involved companies



Involved researchers

[Ass. prof. Edmund Førland Brekke](#),
project manager, AMOS & Dept. of
Engineering Cybernetics

[Morten Breivik](#), AMOS & Dept. of
Engineering Cybernetics

[Prof. Tor Arne Johansen](#), AMOS
& Dept. of Engineering Cybernetics

[Prof. Thor Inge Fossen](#), AMOS
& Dept. of Engineering Cybernetics

[Prof. Kristin Ytterstad
Pettersen](#), AMOS & Dept. of
Engineering Cybernetics

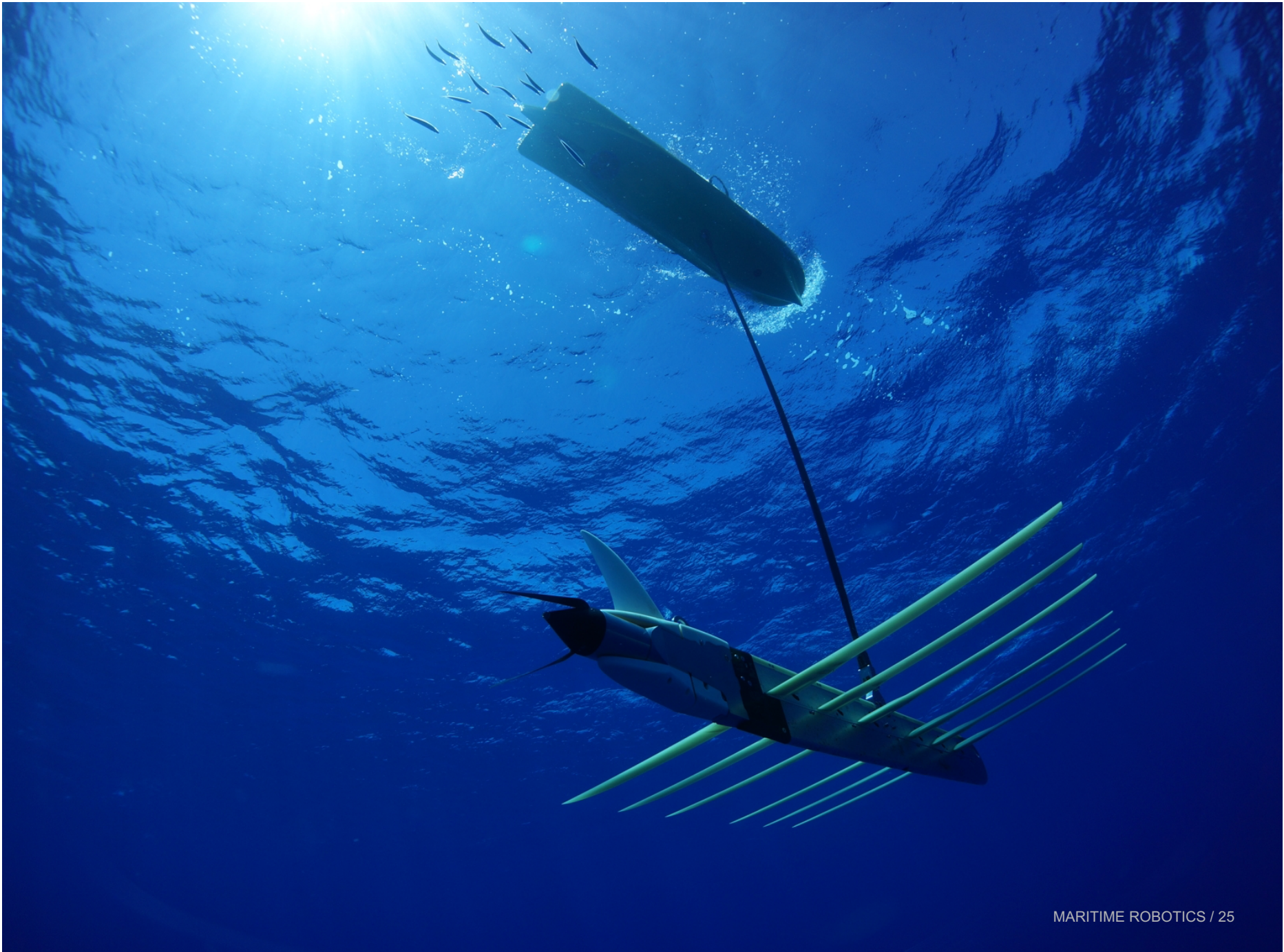


- Centre for Autonomous Marine Operations and Systems -

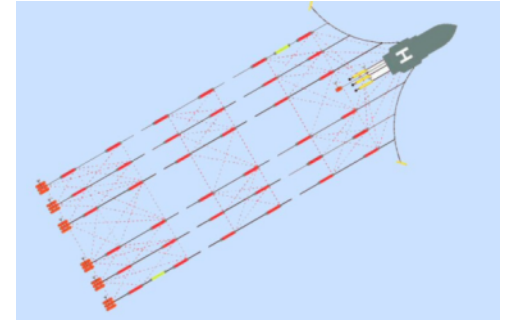
USV FAMILY AT A GLANCE

OPEN WATERS





WHERE IS THE MARKET?



Norwegian Sea

Safjörður

Ákureyri

Iceland

Reykjavík

Vík

Faro Islands

Norway

LIQUID
ROBOTICS

SV3-154 - MARITIM

Data View

[Select Data]

Mode: Follow Sequential Course
Ave Speed(kts): 1.76
Last Speed(kts): 1.87
Target Waypoint: 1
Meters to Target: 124401.4
Ave Water Speed(kts): 0

Light:

P/L1: P/L2: Sub:

P/L3:

SV3 Commands

Follow Sequential Course

Hold Station At Waypoint

Follow Custom Course

Follow Fixed Heading

Set Parameter


Comment

More Commands ...

End
Mission

FR24 Shakedown

Show System Menus

Health:  Last refresh: Tue-Oct-4-2016 10:38:40 (UTC) Universal Time Coordinated, Casablanca, Monrovia

Now

Duration

3

hour(s)

Kart

Satellit

JAN MAYEN

Norwegian Sea

Island
Iceland

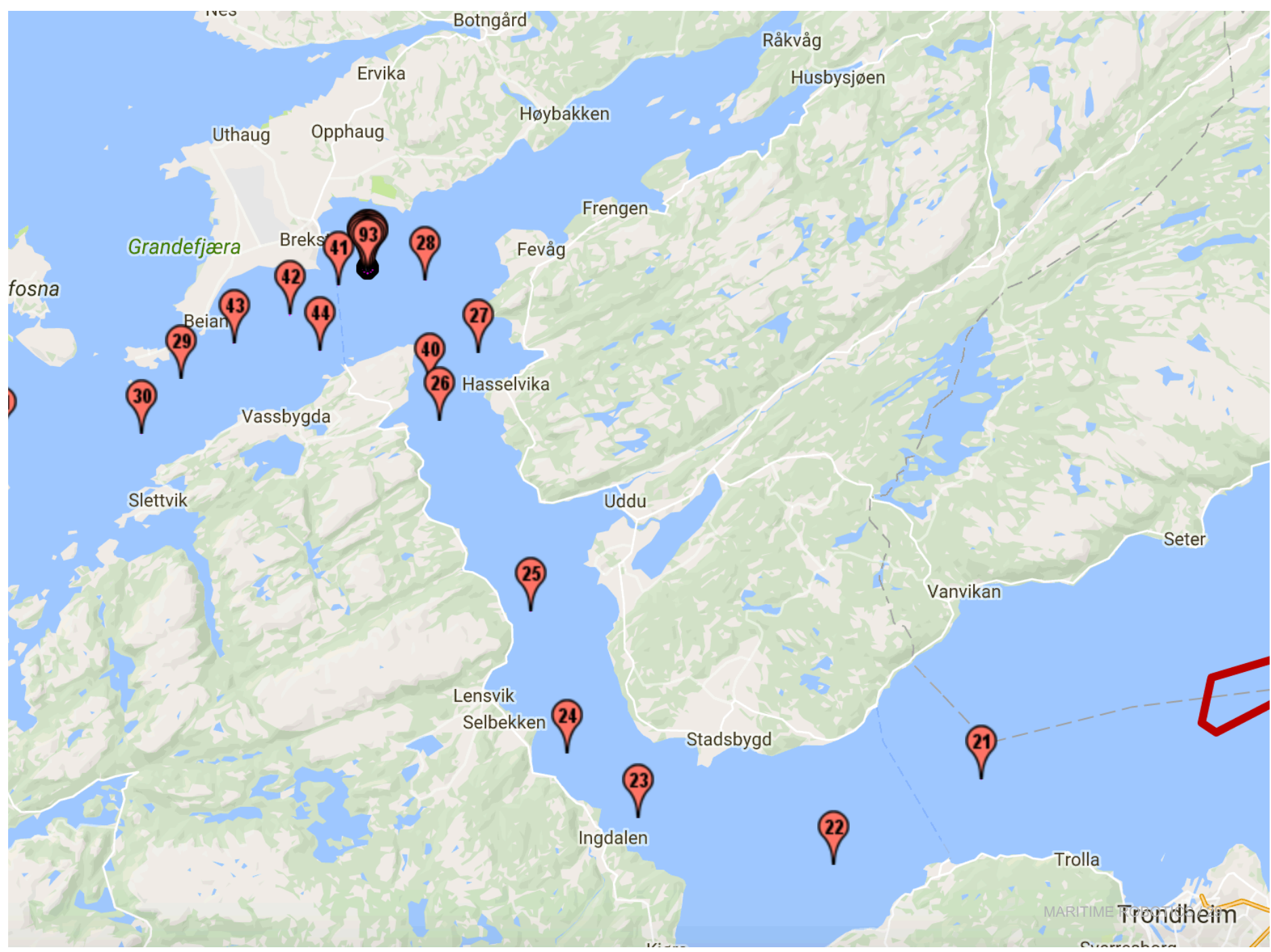
Akureyri

Vik

Føroyar
Faroe
Islands

Sverige
Sweden

Norge

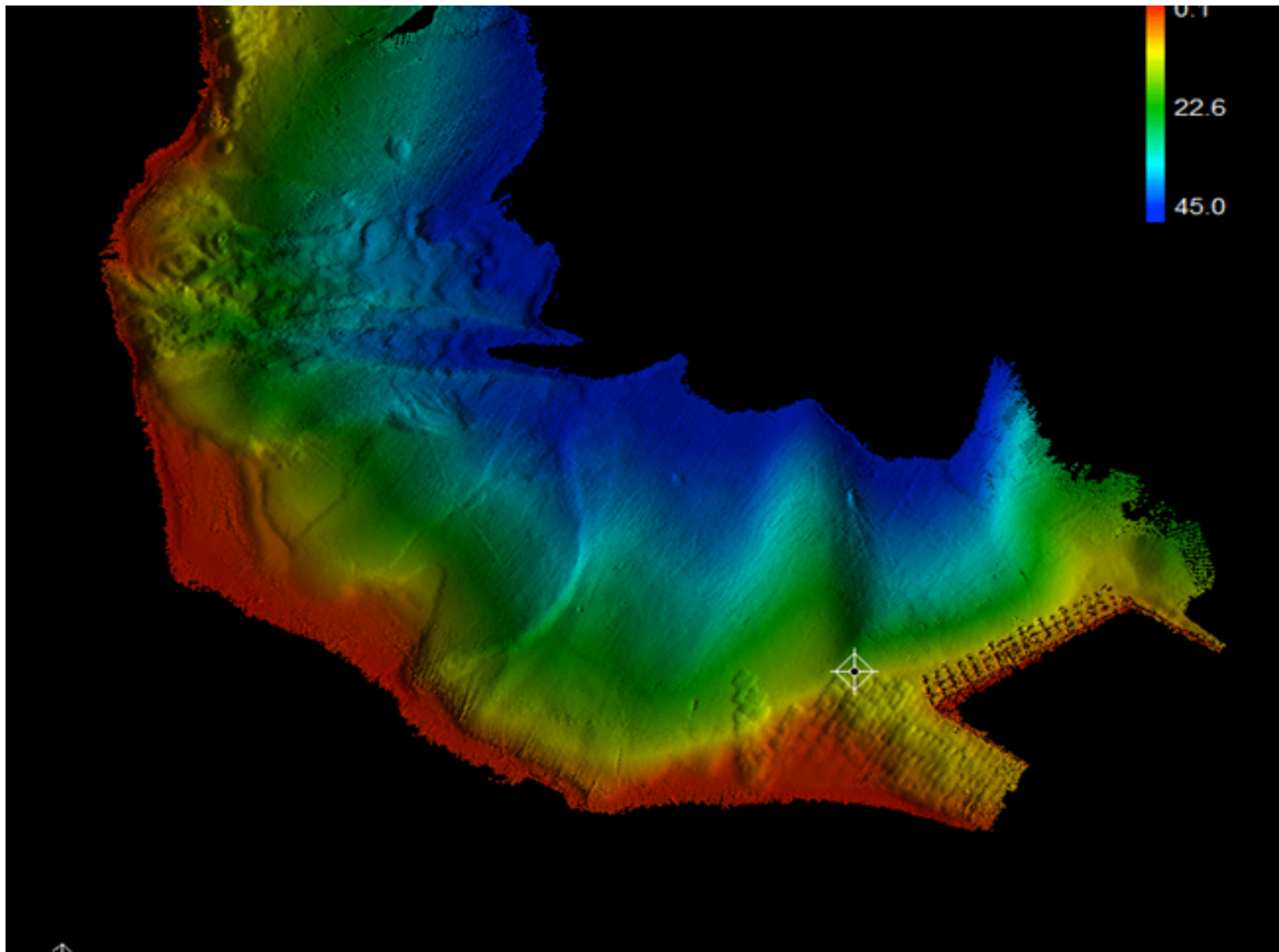


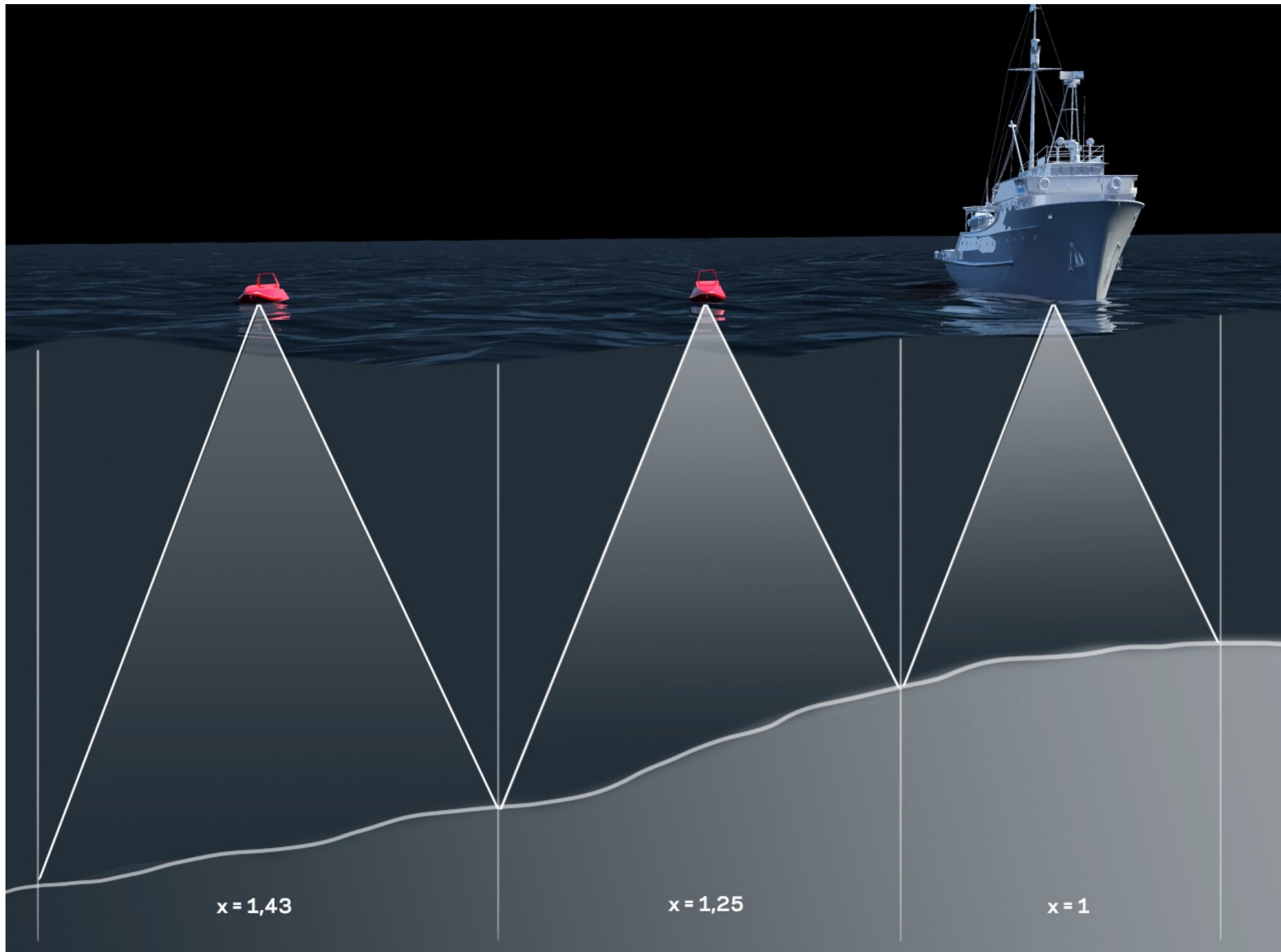


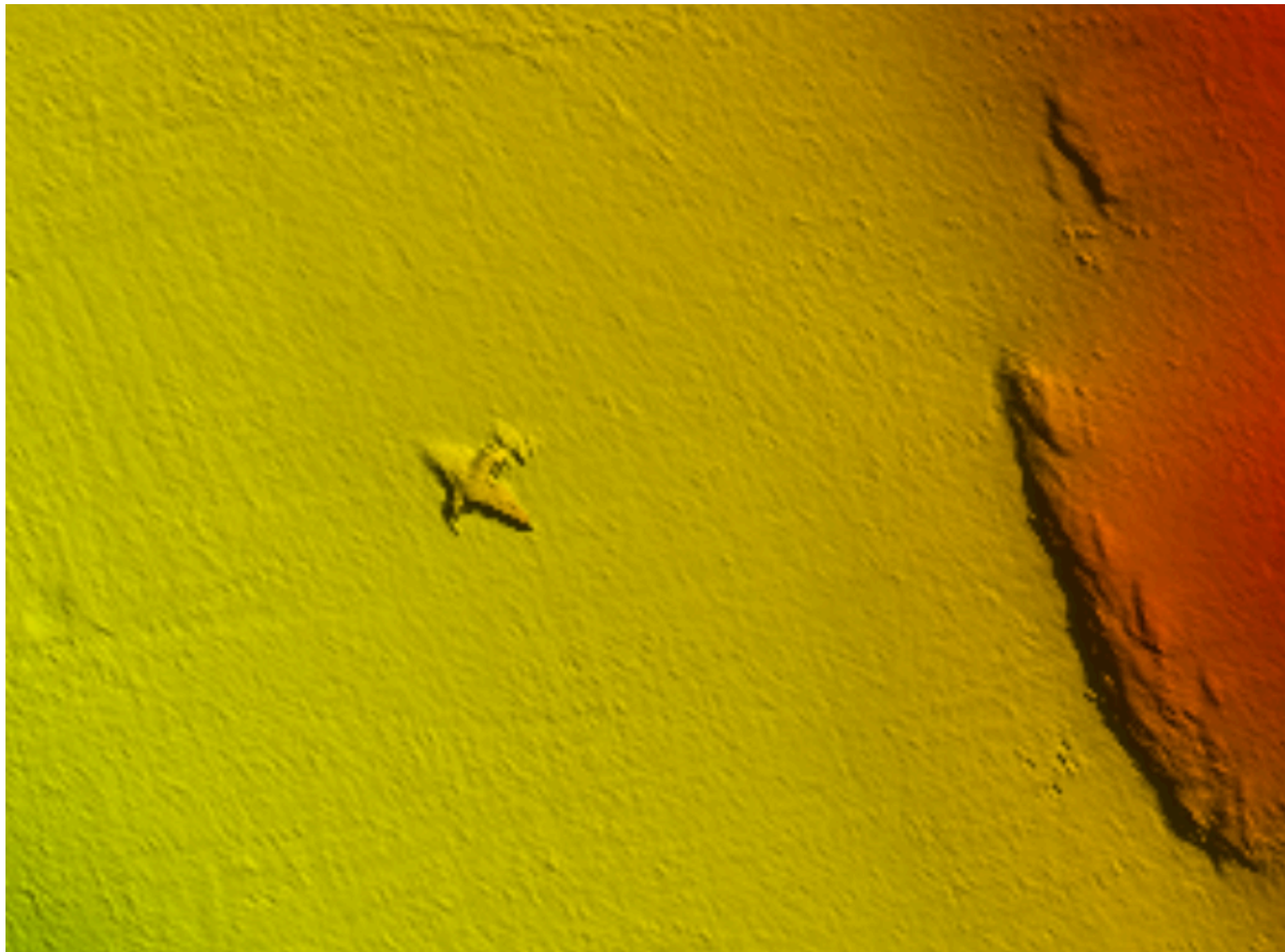


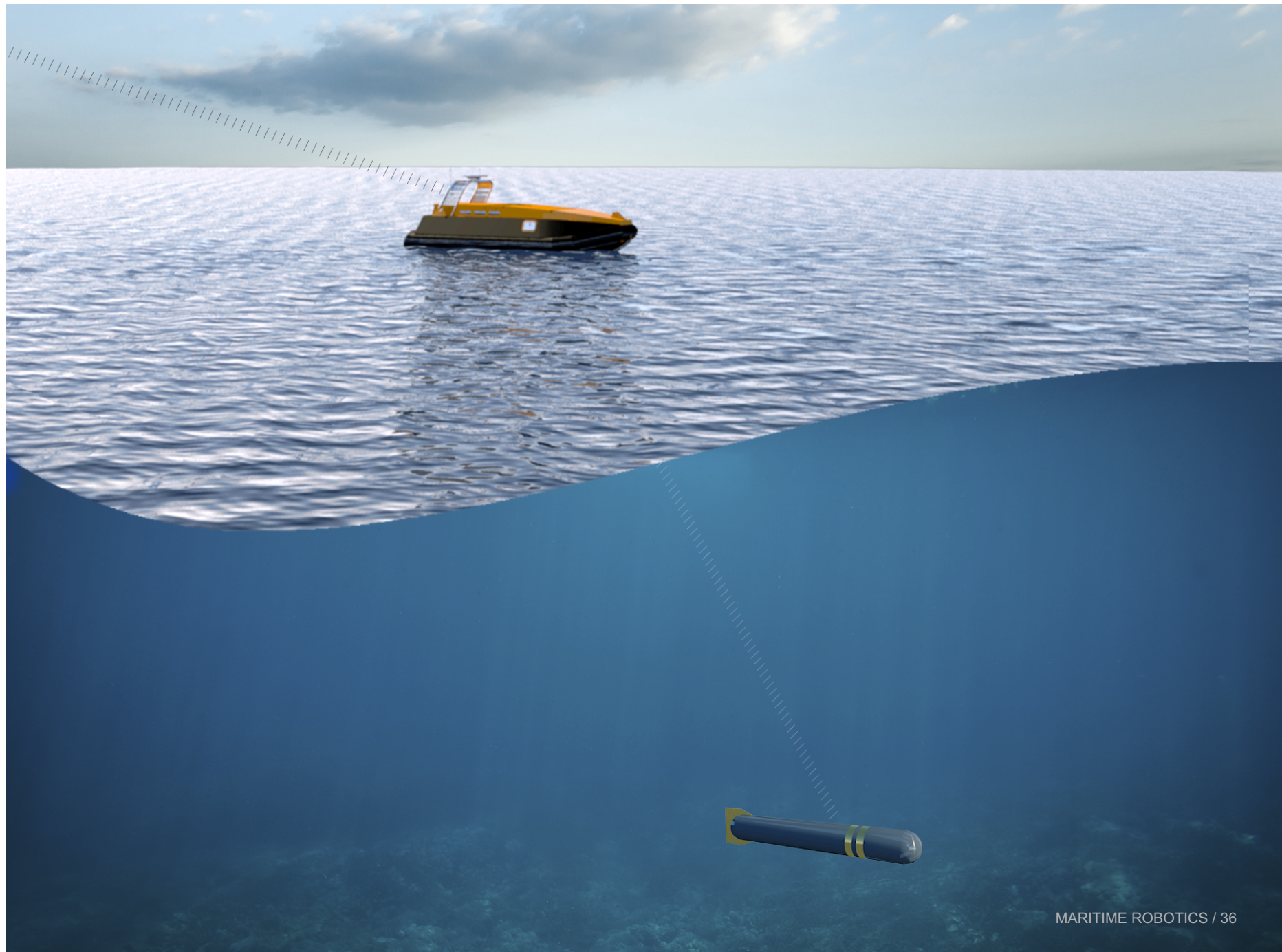
USVS AIDING MANNED OPERATIONS











USV SUPPORTING AUV

High-bandwidth data capacity



Data & Position
aiding

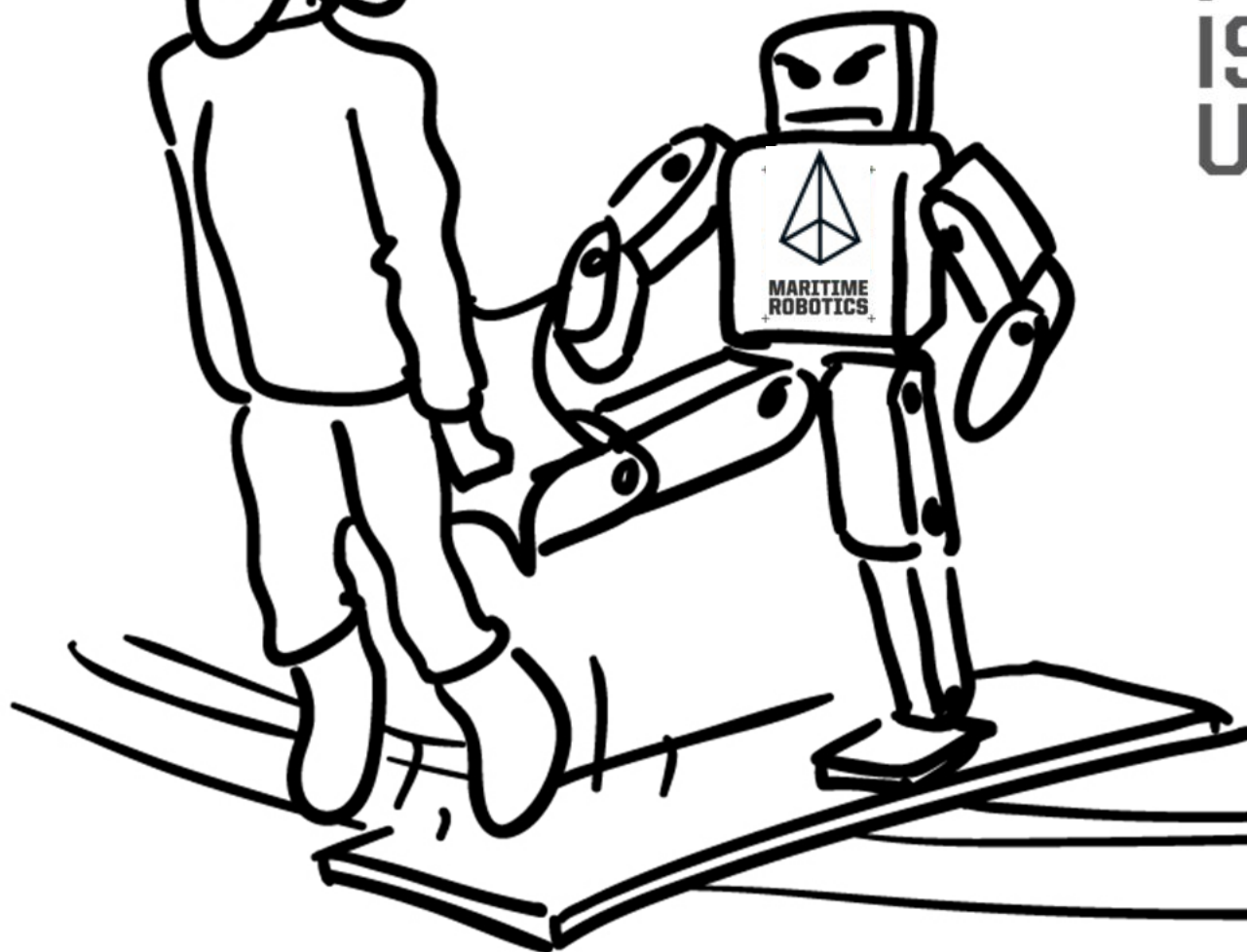




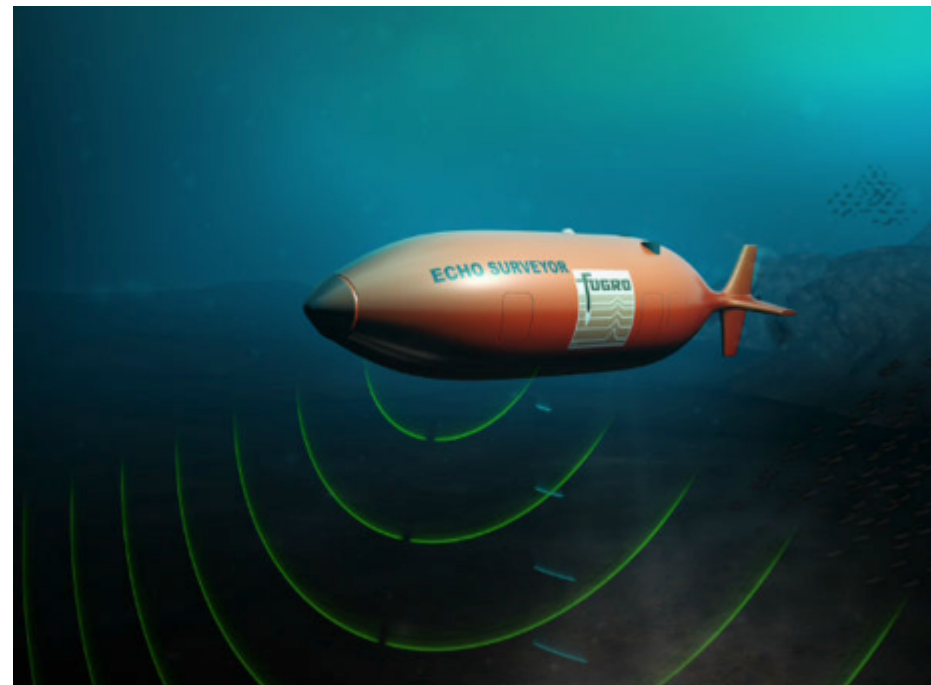
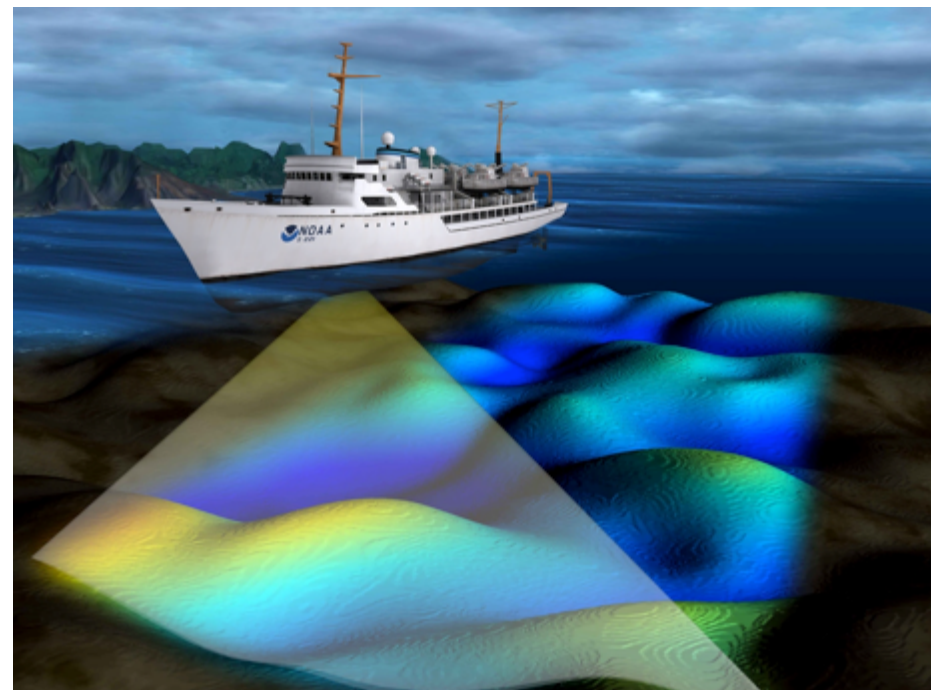
USVS AIDING MANNED OPERATIONS



THE
FUTURE
IS
UNMANNED



GAP FILLERS



THANK YOU FOR YOUR ATTENTION

