



Shell OCEAN DISCOVERY XPRIZE®

GEBCO Symposium: Map the Gaps
Canberra, Australia, Nov 14th, 2018

TEAM ON SITE:



GEBCO-NF
Alumni

Straight from 4000 m depths of Mediterranean. GEBCO-NF Alumni in the Finals of Shell Ocean Discovery XPRIZE.

presented on behalf of the **GNFA Team** by
Dr Karolina Zwolak
Polish Naval Academy





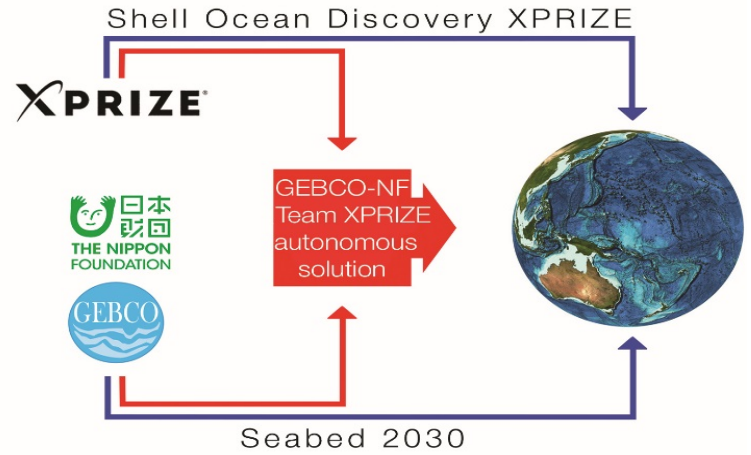
Shell OCEAN DISCOVERY XPRIZE[®]

A \$7 million global competition challenging teams to advance deep-sea technologies for autonomous, fast and high-resolution ocean exploration.

Create solutions that advance the autonomy, scale, speed, depths and resolution of ocean exploration
<http://oceandiscovery.xprize.org>



Meeting global challenges





The key elements of the Round 1 / 2 challenge

1. Create an autonomous solution to collect data
2. All components used for data gathering must fit within a standard 40 ft shipping container
3. Produce a high-resolution bathymetric map of an area - **100 km²** / **250 km²**
(5 m horizontal and 0.5 m vertical resolution)
4. Produce images of a specified object
5. Identify and image **five** / **ten** archeological, biological or geological features

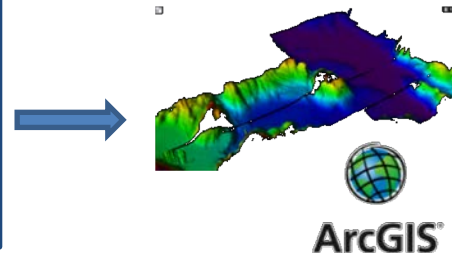
Preliminary phase: written description of the proposed solution

Round 1

Min. **100 km²** in **16 hours**
48 h of data processing
Max. Depth - **2000 m**

Round 2

Min. **250 km²** in **24 hours.**
48 h of data processing
Max. Depth - **4000 m**





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32 Teams from 25 countries

Prelimination phase

21 Teams from 13 countries

Round 1
Min. 100 km² in 16 hours
48 h of data processing
Max. Depth - 2000 m

Round 1
Technology Readiness Test

9 Teams in Final Round

now 6

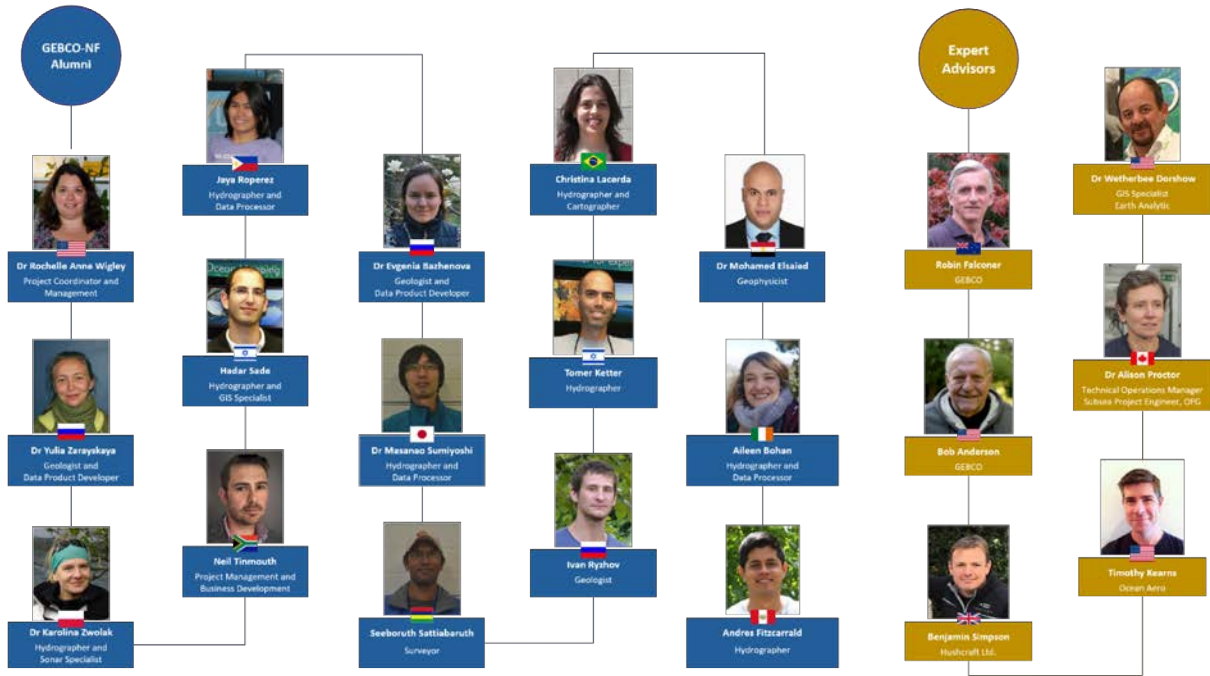
Round 2
Min. 250 km² in 24 hours.
48 h of data processing
Max. Depth - 4000 m



<http://www.telemundo.com/noticias/2017/09/20/el-huracan-maria-deja-todo-puerto-rico-sin-electricidad>



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> 50 team members from 15 countries





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New autonomous surface vessel capable of deployment & retrieval of AUV

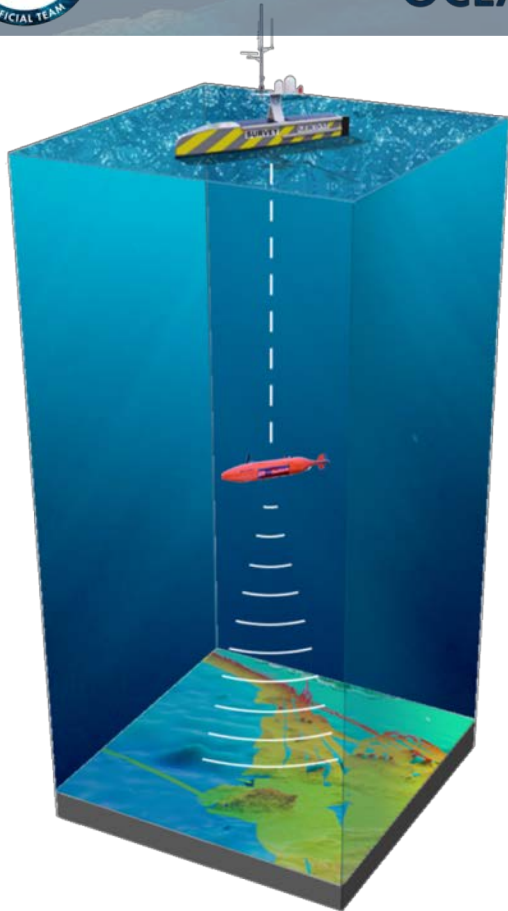
- Hushcraft Limited SEA-KIT USV *Maxlimer* with KM HiPAP
- Remote and Autonomous operations facilitated by Kongsberg Maritime K-MATE.

Commercially available Kongsberg Maritime HUGIN AUV

- Round 1: Ocean Floor Geophysics *Chercheur* AUV: 3,000 m
- Round 2: Kongsberg Maritime: 4,500 m

Fusion of seafloor bathymetry and imagery

- Fusion of EM2040 MBES, HISAS1032 real aperture bathymetry, HISAS synthetic aperture side-scan imagery, and spot-focused synthetic aperture HISAS imagery and bathymetry.

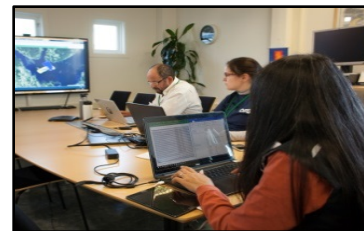
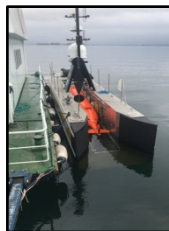




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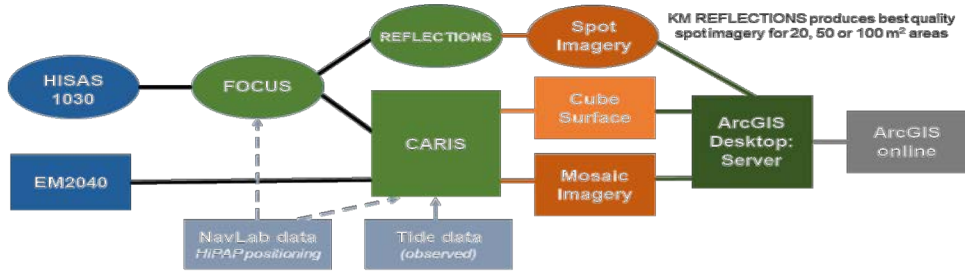


Round 1 of Shell OCEAN DISCOVERY XPRIZE[®]

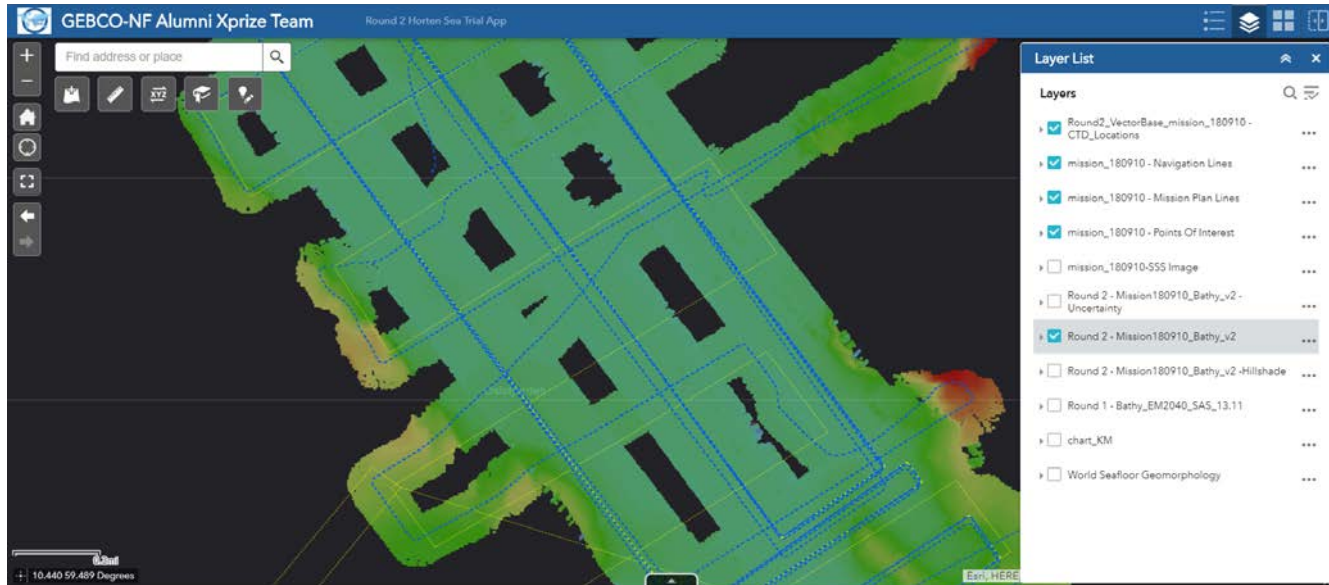
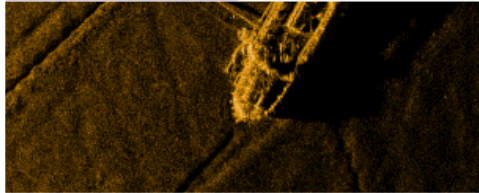
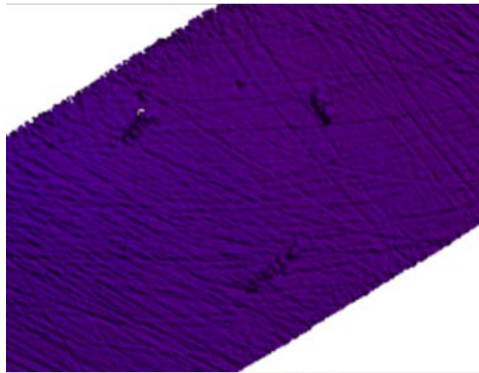




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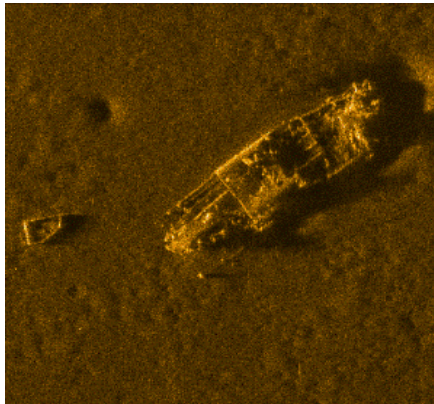
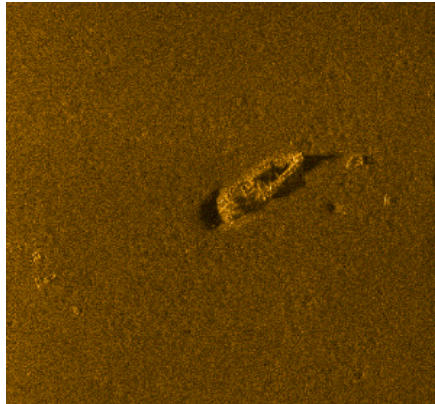
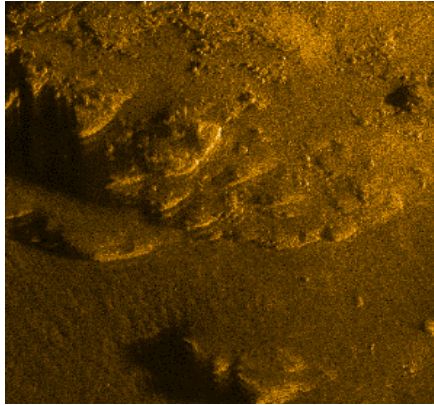
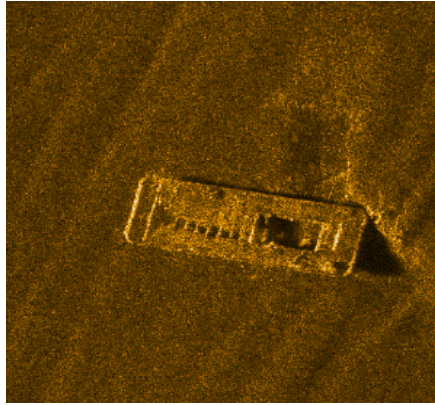


Automated work flow
– data to information

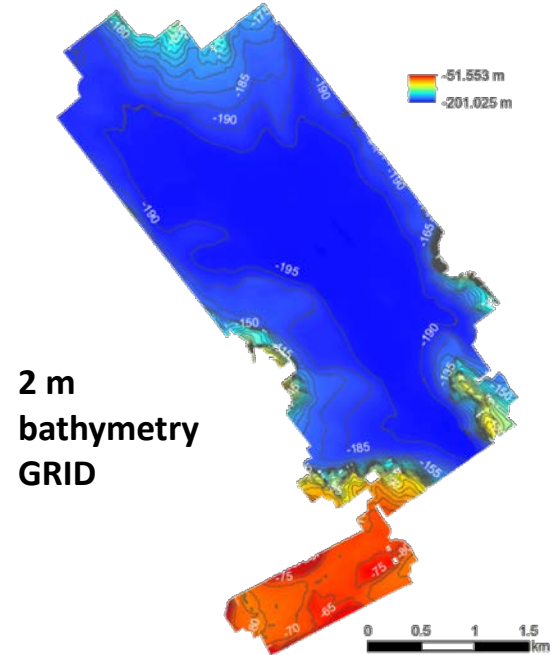




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2 cm resolution
HiSAS images



2 m
bathymetry
GRID

Based on the results of Technology Readiness Test and the quality of submitted data the Team has been qualified to the Final Round!



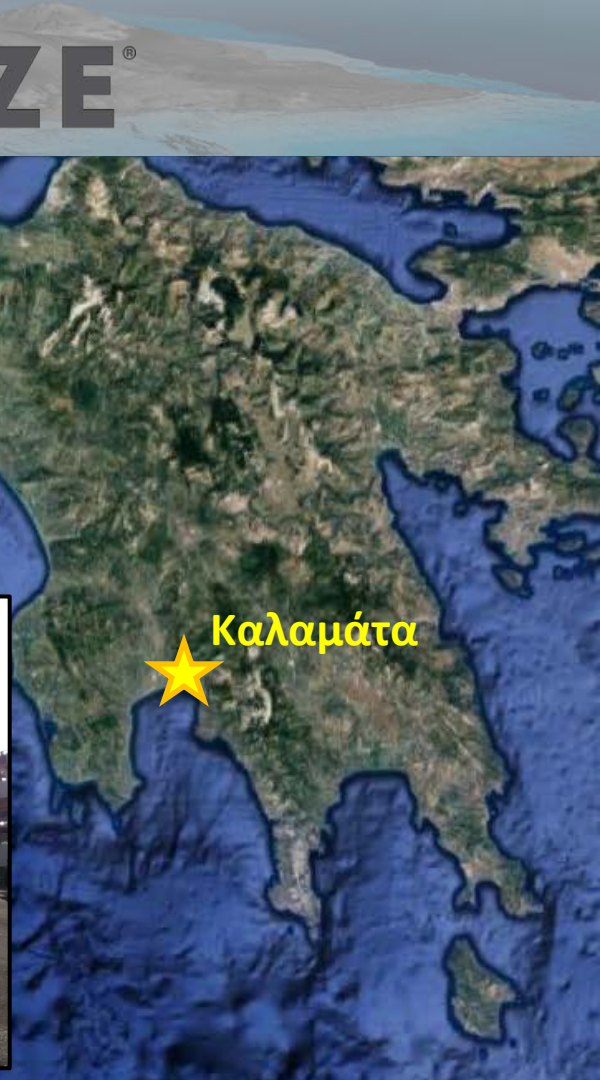
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Deep Ocean off Southern Greece to be Field Test Site for Finalists in the \$7M Shell Ocean Discovery XPRIZE

Oct 09 2018
XPRIZE



Καλαμάτα





Shell
OCEAN DISCOVERY

XPRIZE®

Launching and wet tests



USV Maxlimer - Starboard (Fluent)



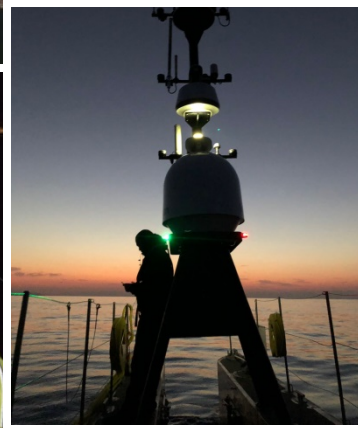
USV Maxlimer - Forward (Fluent)



USV Maxlimer - Aft Lower (Fluent)

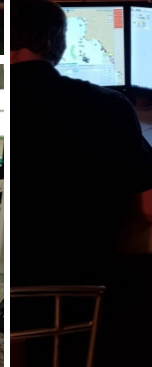
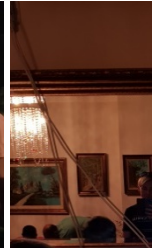
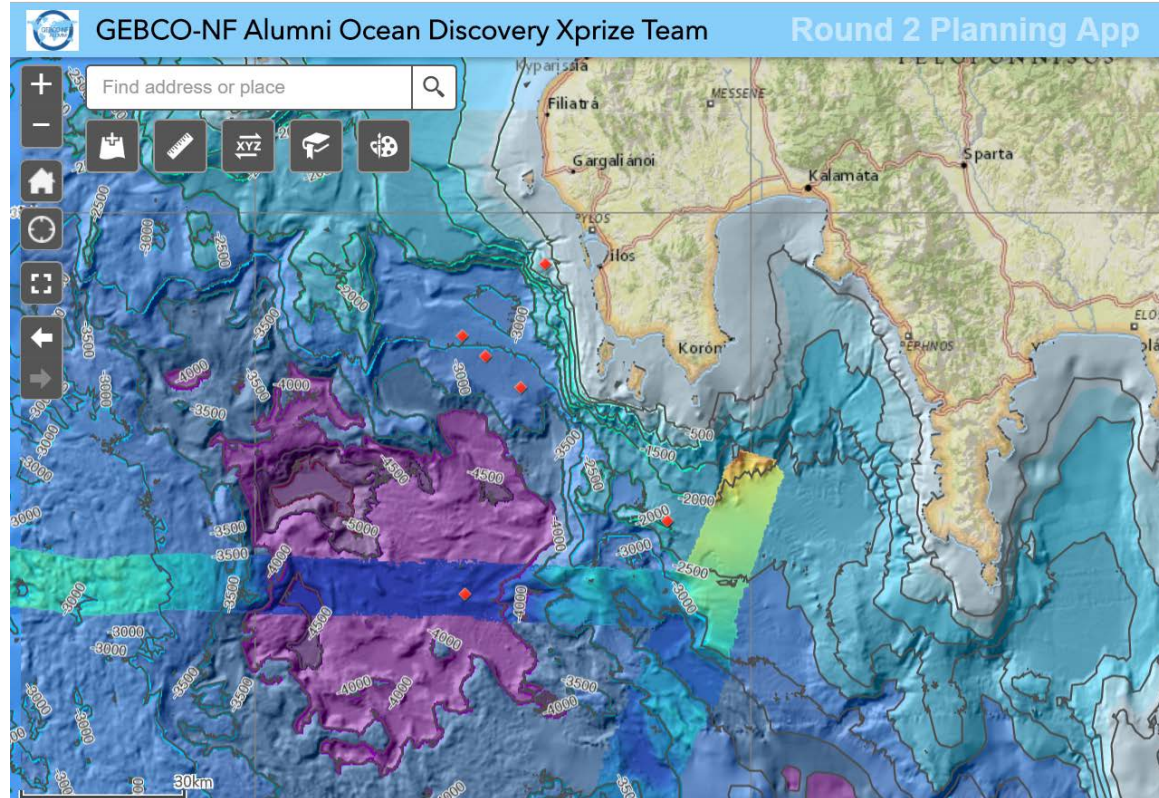


USV Maxlimer - Port (Fluent)



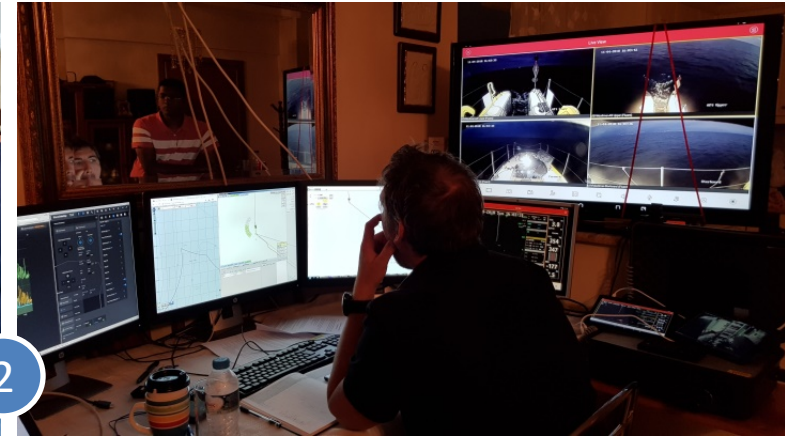


Situation and data analysis, mission planning





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Main working locations:

1. Mapping equipment
2. Operations Control
3. Data Processing (XPRIZE 'Mission Control')

+ NETWORKING





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Final mission

NOV 9TH, 3AM LOCAL TIME



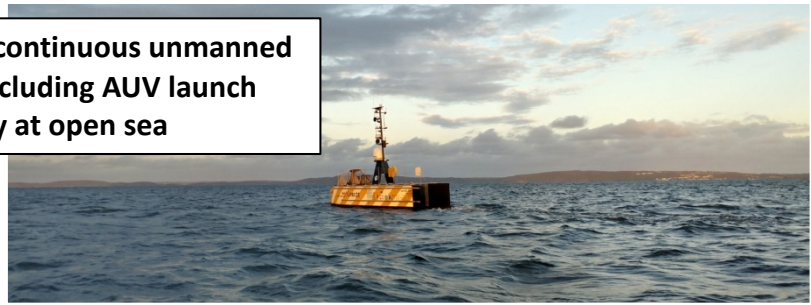


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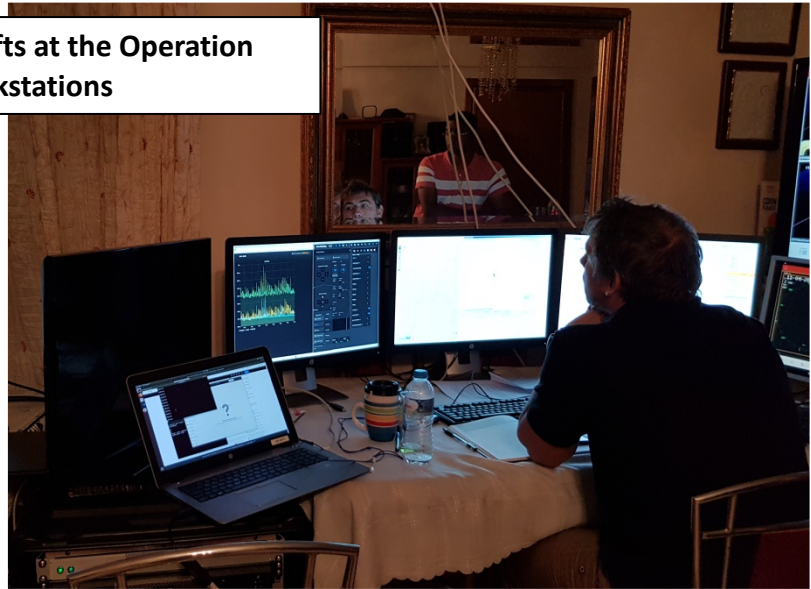


32 hours of continuous unmanned operation including AUV launch and recovery at open sea

<https://www.km.kongsberg.com>



Working shifts at the Operation Control workstations





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2 locations of data processing

CCOM/JHC



'Mission Control'

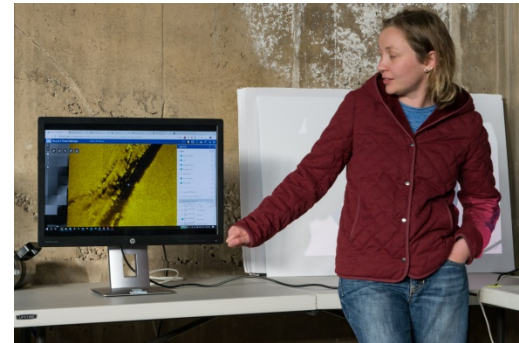




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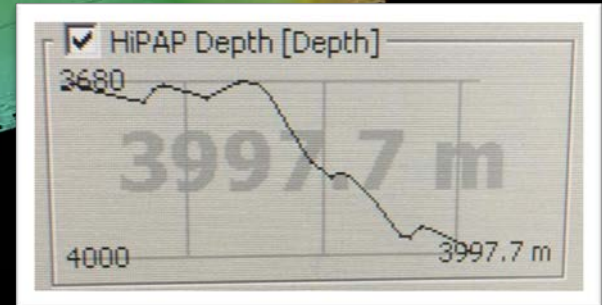
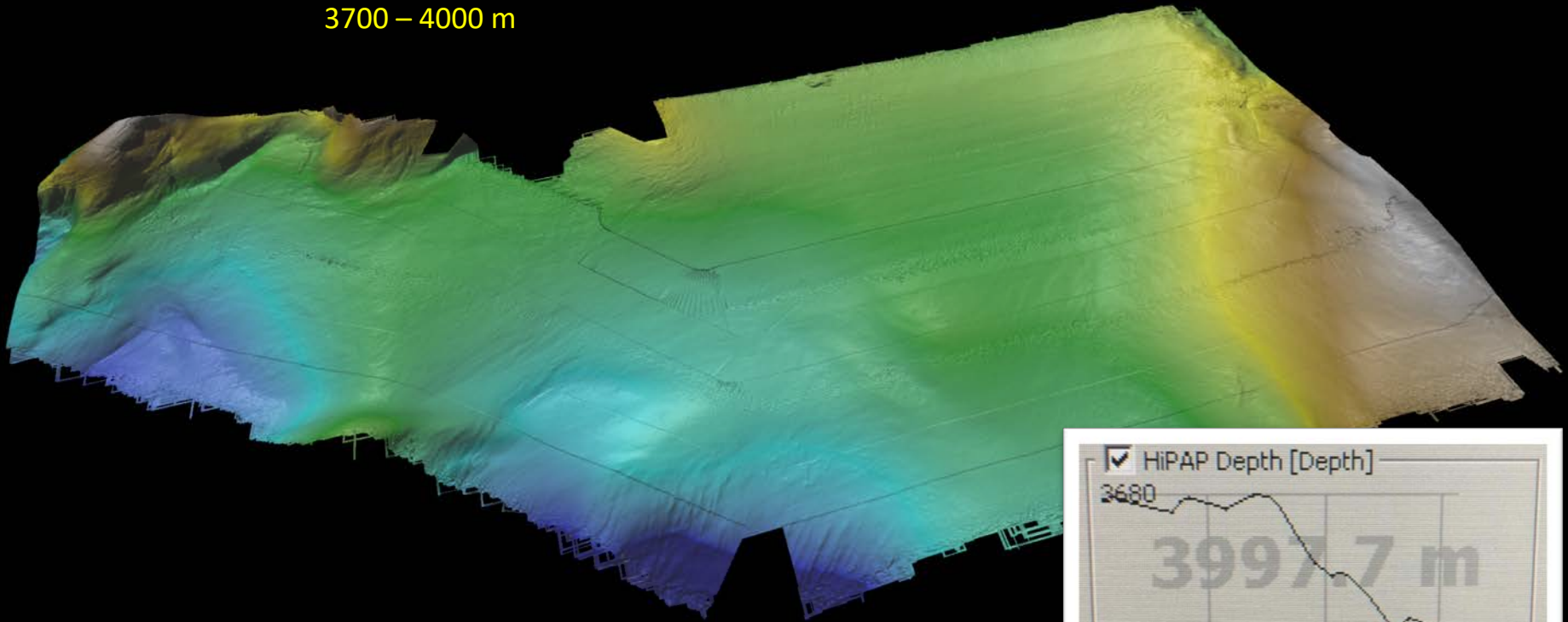
48 hours after leaving the survey area data and products are **submitted to judges**





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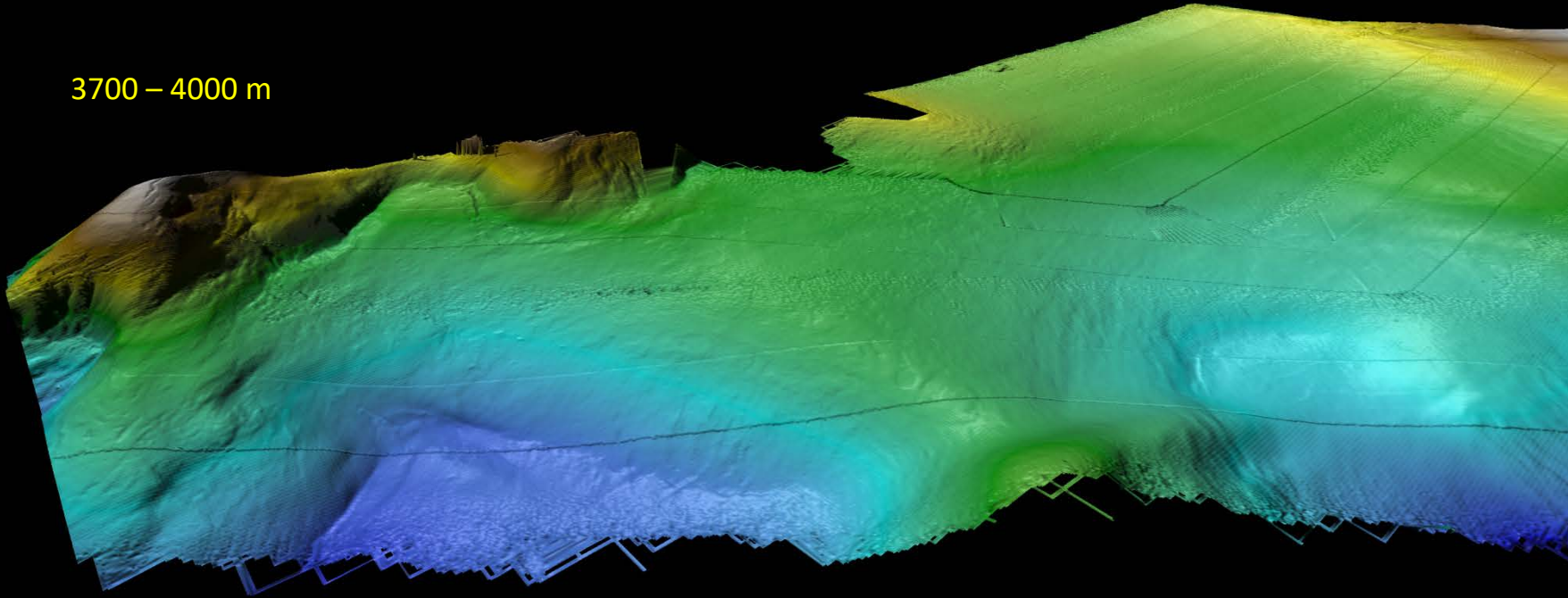
3700 – 4000 m





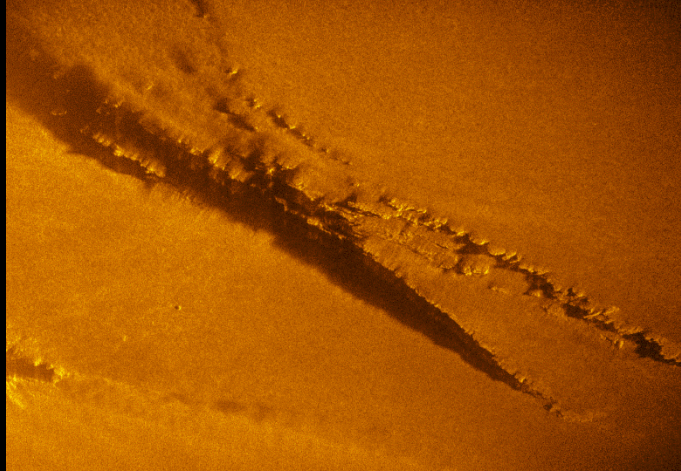
Shell
OCEAN DISCOVERY XPRIZE[®]

3700 – 4000 m

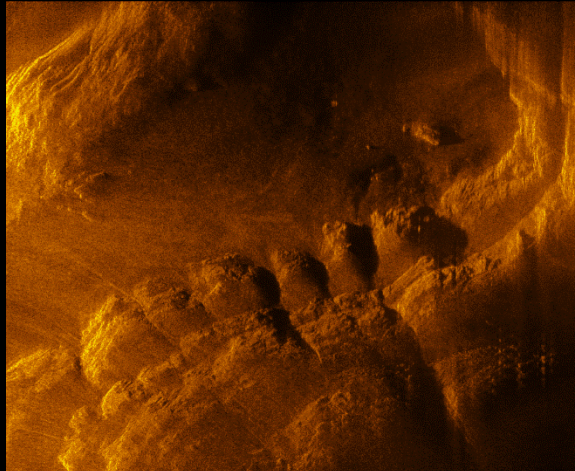




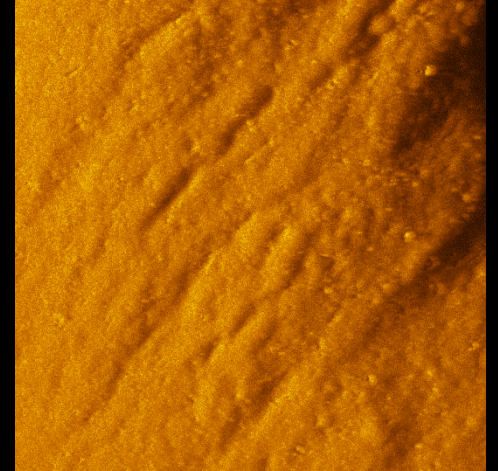
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Fault structure
1556 m



Steep rocky slope
1742 m



Seabed sediments
1357 m



The trophy design by UK-based artist Alexander Clarke.
All images: XPRIZE Foundation

MARINE GEOLOGY

Seafloor mappers to compete for XPRIZE

Faster, cheaper autonomous systems could aid in resource extraction and science

By **Julia Rosen**

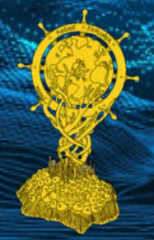
Science **362** (6414), 507-508.
DOI: 10.1126/science.362.6414.507

Race to the bottom

The eight teams competing for the ocean mapping XPRIZE use a mix of uncrewed surface vehicles and autonomous underwater vehicles (AUVs).

TEAM NAME	COUNTRY	SURFACE OPS	NUMBER OF AUVS
Arggonauts	Germany	Five ships	Five
Blue Devil Ocean Engineering	United States	Two aerial drones	Two
CFIS	Switzerland	None	20
GEBCO-Nippon Foundation alumni	International	One ship	One
Kuroshio	Japan	One ship	Two
PISCES	Portugal	One ship, two acoustic beacons	One
Team Tao	United Kingdom	One ship	Five
Texas A&M	United States	One ship	One

Competition still in progress





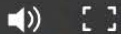
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LIVE

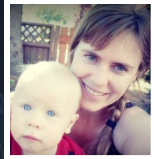
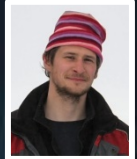
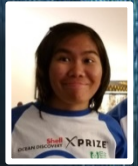
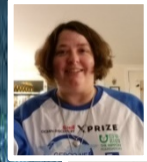
nest

<https://video.nest.com/live/CFtn5TXHEM>





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Thank you!

