



## **Introduction to Allseas**

**13 July 2023 – Kingston, Jamaica**



Allseas' activities



(video)

## **Allseas – Dare to Pioneer**

Founded in 1985, pushing the boundaries of technology, with innovation and entrepreneurial spirit.

- A world-leading contractor in the offshore energy market.
- Experts in pipelay, heavy lift, subsea construction and deep-sea mineral collection.
- Offices in Switzerland, The Netherlands, Belgium, Houston TX, Australia and Malaysia.
- Over 2,500 employees worldwide.
- Eight offshore construction vessels.

## Pushing the boundaries of technology in 1986

Allseas' first vessel *Lorelay* was the world's first pipelay vessel to operate on full Dynamic Positioning.

This revolutionised offshore pipelaying.

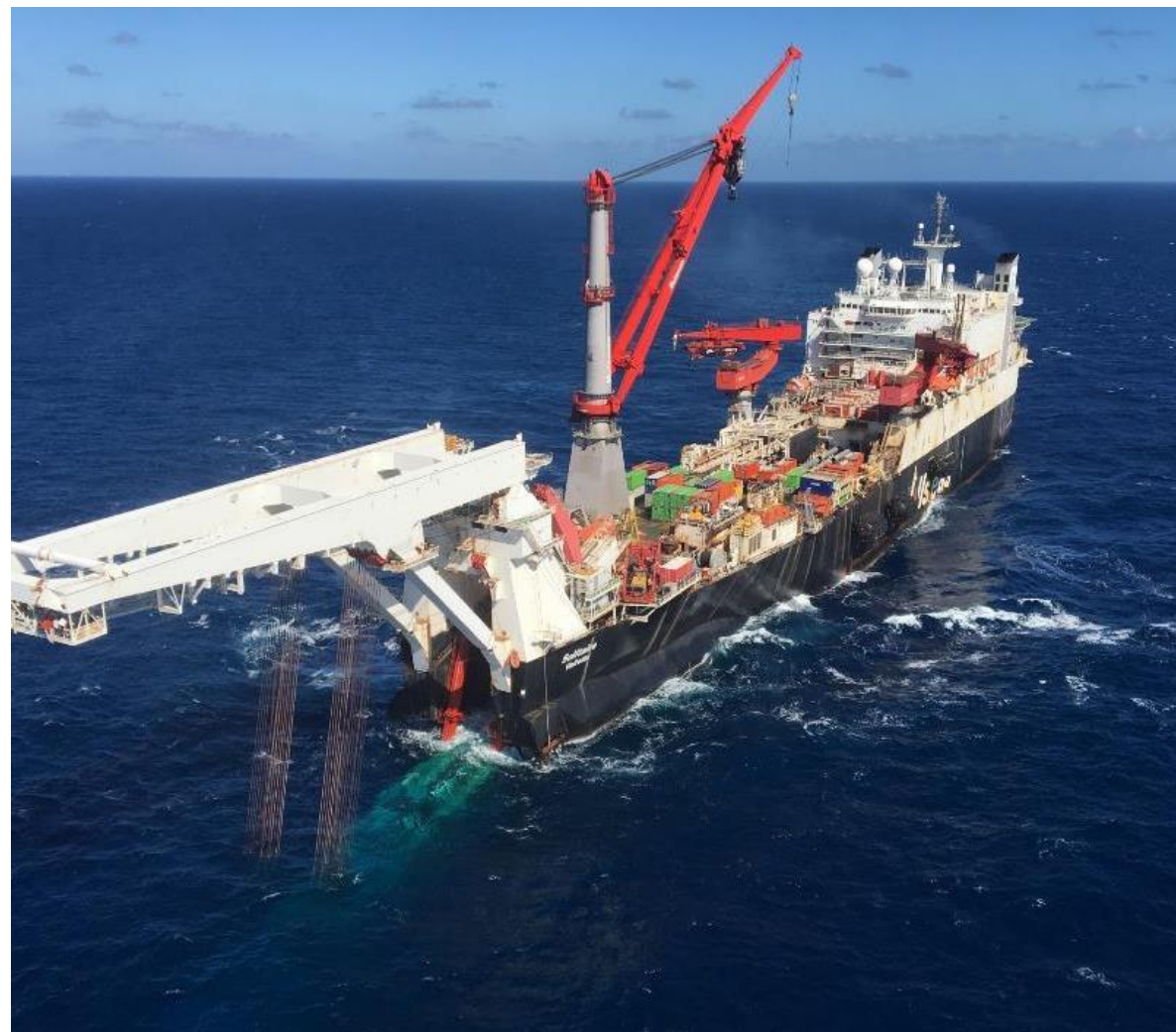
She installed more than 9000 km of pipeline worldwide in depths up to 2730 m.



## Pushing the boundaries of technology in 1998

*Solitaire*, the world's largest and most technically advanced pipelay vessel when launched in 1998.

Holds almost every deep-water pipelay record.



## Pushing the boundaries of technology in 2016

*Pioneering Spirit*, operational since 2016.

Installs and removes large offshore platforms in a single piece and record-weight pipelines in all water depths.

The world's largest and most sophisticated construction vessel.




Capacity and efficiency unrivalled anywhere in the industry.



- 
- (video)



# Pipelines installed

-  27,000 km
-  >300 projects
-  <3000 m deep



# Platform removals

**Shell – Brent**

- Delta topsides (24,000 t) in 2017, Bravo topsides (25,000 t) in 2019 & Alpha topsides (17,000 t) in 2020
- Charlie topsides (34,000 t) in 2023

**CNR – Ninian Northern**

- Topsides (14,200 t) in 2020 and jacket (8100 t) in 2022

**Repsol/SBM – Yme**

- Topsides (13,500 t) in 2016

**Spirit Energy – Morecambe Bay**

- DP3 topsides (5500 t) & DP4 topsides (5400 t) in 2021
- DP3 jacket (3000 t) & DP4 jacket (3000 t) in 2023

**Aker BP – Valhall**

- QP topsides (3400 t) in 2019 & jacket (3600 t) in 2021
- DP topsides (5800 t) & jacket (3000 t), PCP topsides (14,000 t) in 2022
- PCP jacket (9500 t) in 2025

**TAQA – Northern North Sea Assets**

- Eider Alpha jacket (13,500 t) & topsides (11,600 t) TBC
- Tern Alpha jacket (12,000 t) & topsides (22,000 t) TBC
- Cormorant North jacket (13,400 t) & topsides (16,000 t) TBC
- Cormorant Alpha topsides (25,4000 t) TBC

**Repsol – Gyda**


- Topsides (18,400 t) & jacket (11,000 t) in 2022


**Aker BP – Hod**

- Topsides (1000 t) & jacket (3500 t) in 2025

**TotalEnergies – Tyra**

- TEA topsides (14,000 t) & TWA topsides (7600 t) in 2020
- TEA jacket (5000 t) & TWA jacket (3000 t) in 2022

 Executed work

 Future work

# Platform installations

**Equinor – Johan Sverdrup**

- DP topsides (22,000 t) in 2018
- LQ topsides (18,000 t) & P1 topsides (26,000 t) in 2019
- P2 topsides (25,000 t) in 2022

**CNOOC – Buzzard Phase 2**

- Topsides module (500 t) in 2021

**TenneT (Dragados)**


- Dolwin Kappa jacket (5200 t) & topsides (11,000 t) in 2022
- Borwin 5 jacket (3600 t) & topsides (9600 t) in 2025


**Husky – White Rose**

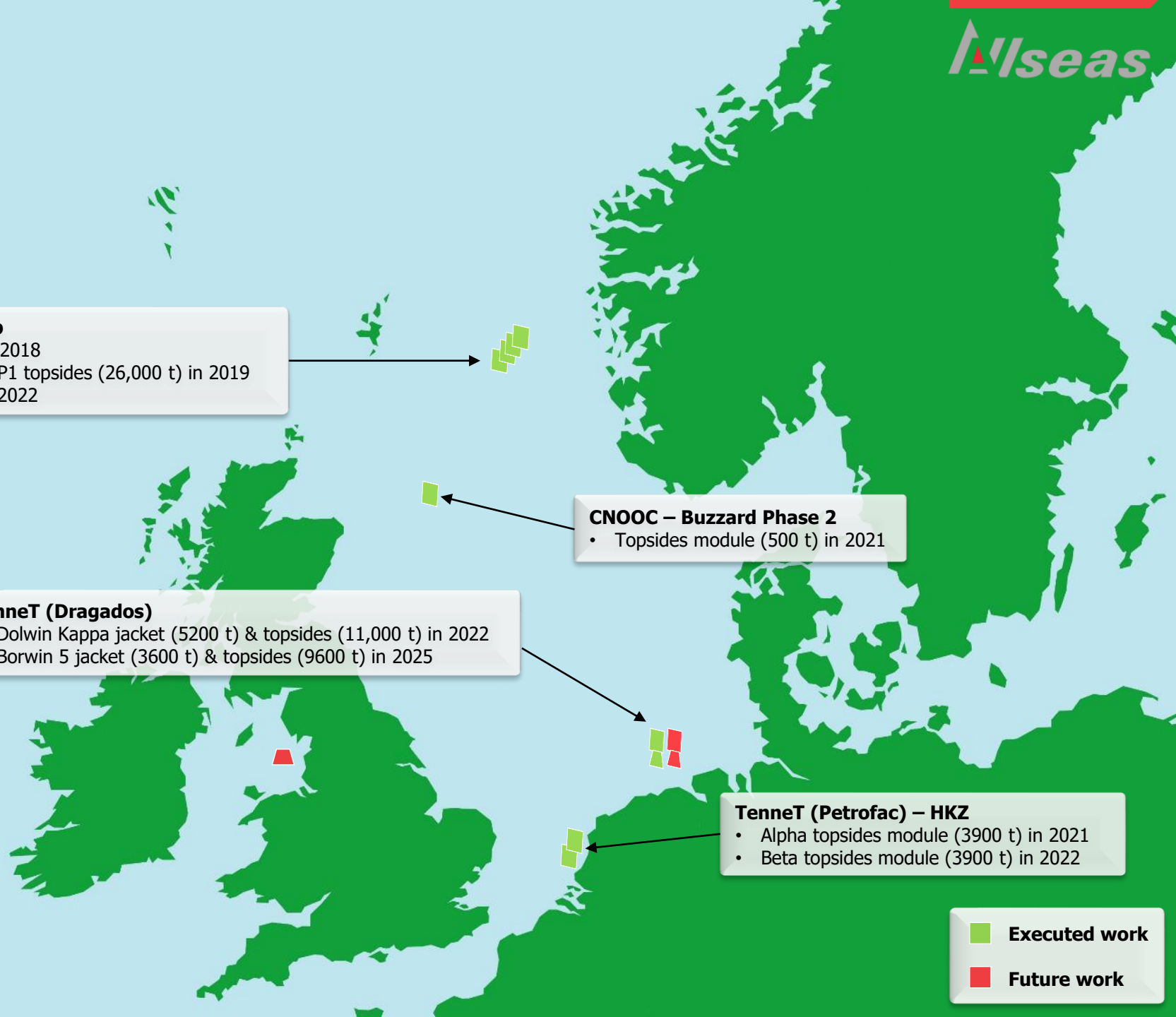
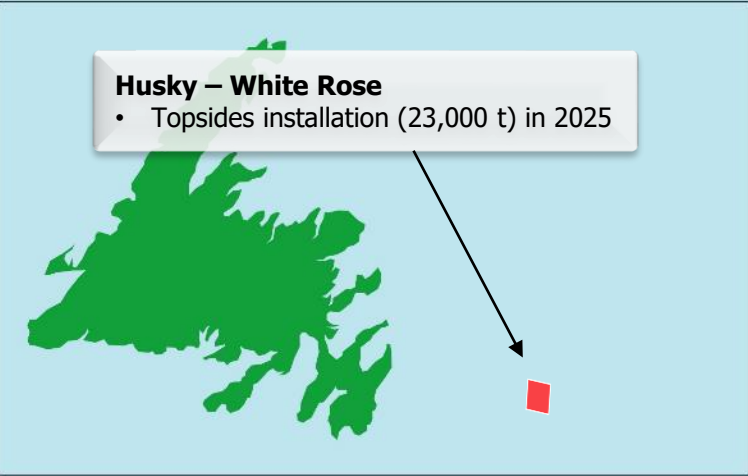
- Topsides installation (23,000 t) in 2025

**TenneT (Petrofac) – HKZ**

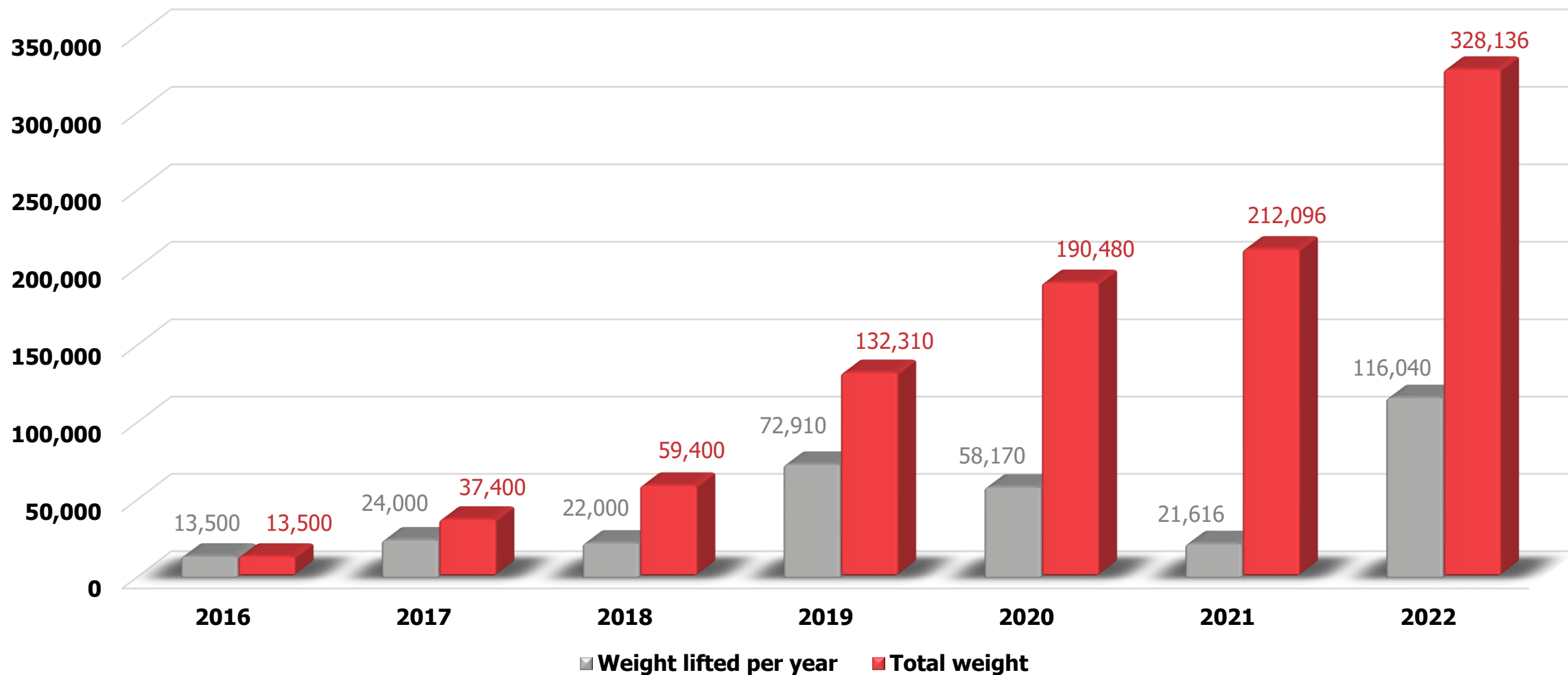
- Alpha topsides module (3900 t) in 2021
- Beta topsides module (3900 t) in 2022

 Executed work

 Future work



# Platform facilities weight lifted year on year (end 2022)



## Our mission

We are pioneers in heart and soul. In a world that is changing more than ever, we are constantly finding new ways to enable and deploy groundbreaking advances in the offshore energy market.

Our mission is to remain a frontrunner in the offshore energy market by continuously pushing the boundaries of technology.

That's how we've always done it...



## Our vision for the future

As new markets emerge, so do opportunities to apply our engineering expertise to develop new technology that will play a key role in the energy transition.

We optimise our solutions to drive efficiency and minimise the potential environmental impact.

We pioneer the development of ground-breaking offshore technology, driven by creative thinkers who dare to try new things.

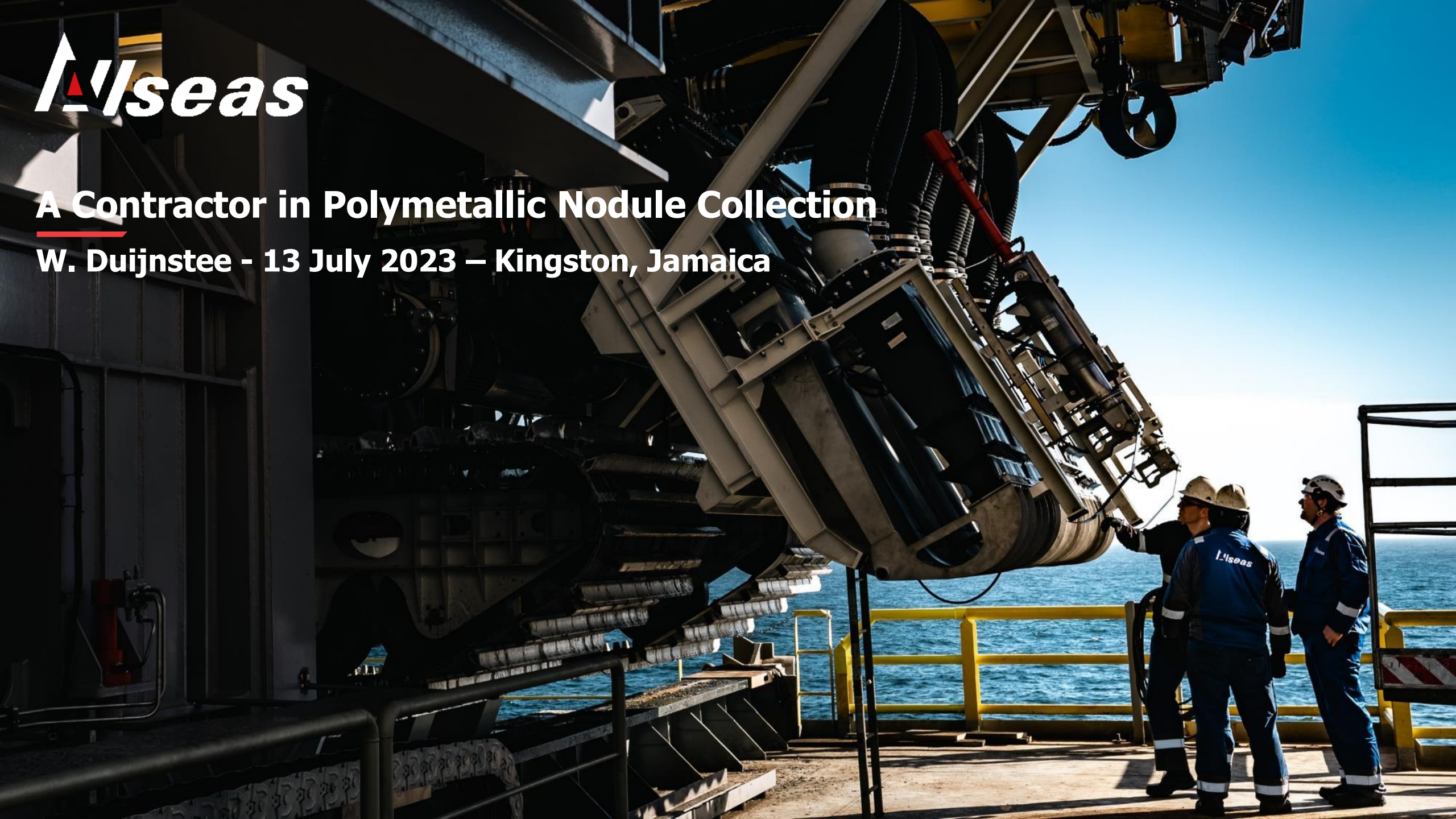
So which technical boundary will we push next...?





# **A Contractor in Polymetallic Nodule Collection**

**W. Duijnste - 13 July 2023 – Kingston, Jamaica**



## Layout of today's presentation

- The start: Design and pilot test preparations
- Pre-testing our concept
- Integrated Nodule Pilot Collection Test, the "Pilot Test"
- What's next? The Follow-up

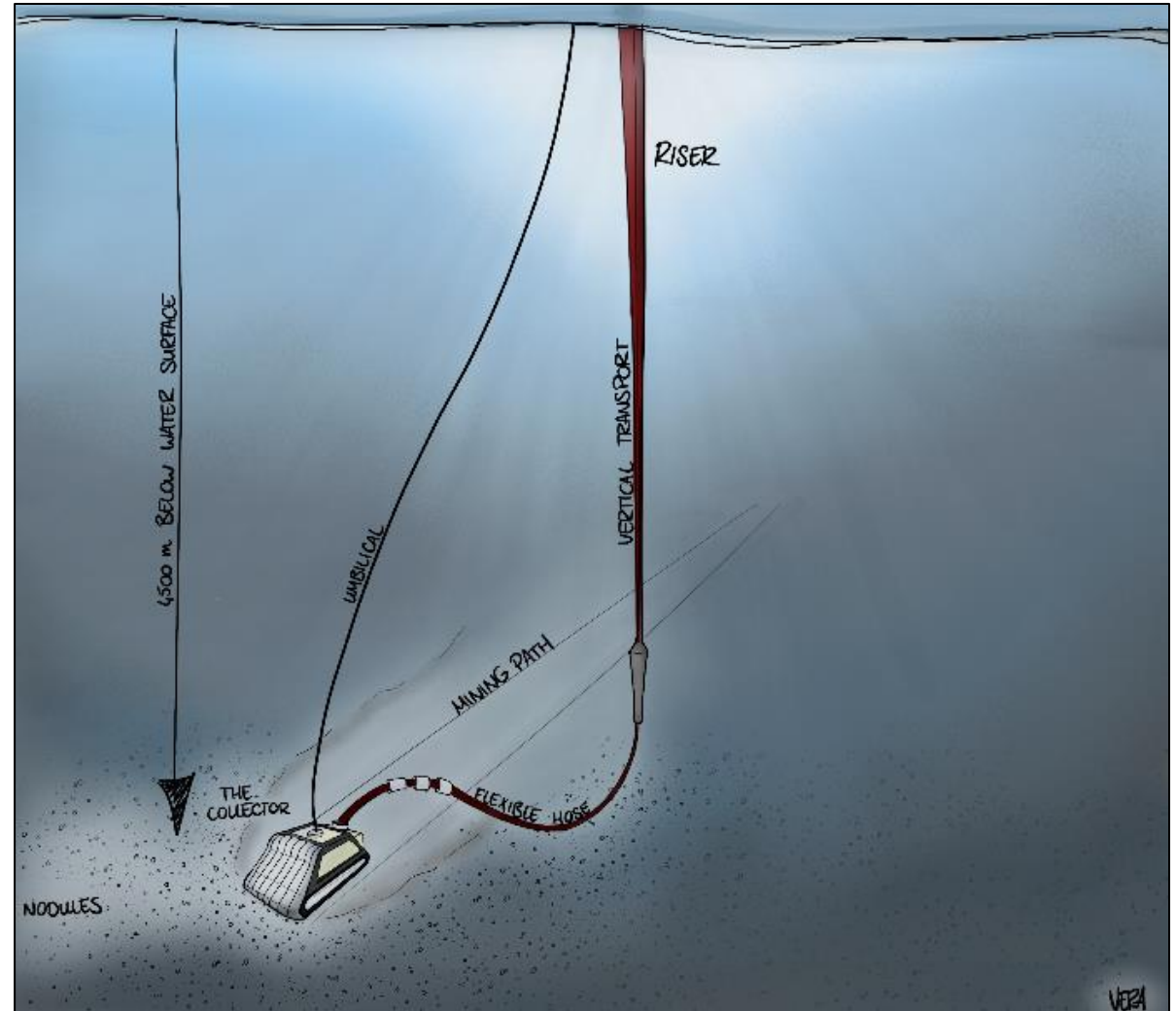
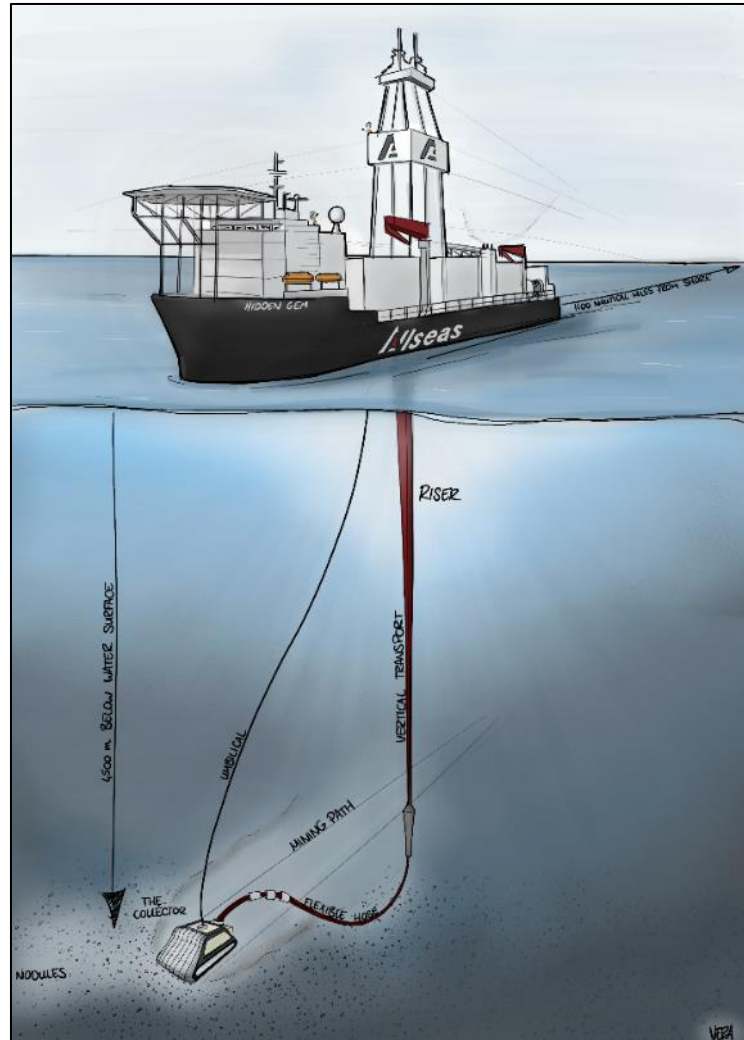






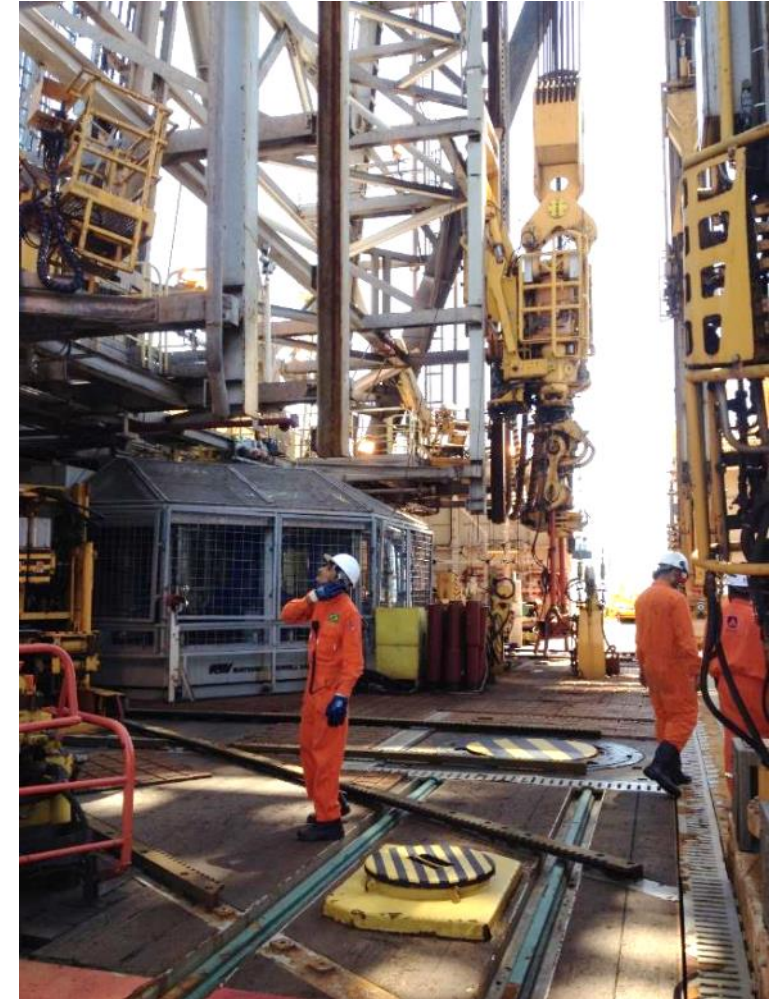
## Design and pilot test preparations

# How to: Nodule collecting concept



# Nodule Collection Support Vessel

- Former drilling vessel:
  - Capabilities to build a riser pipe;
  - More sustainable compared to a new vessel;
  - With minimum adjustments, fulfils all requirements.



# Method of collecting

(video)

Film of test

Before



Nozzles are designed to minimize seabed disturbance in combination with high pick-up efficiency.

Multiple tests were done in a Dutch water and soil flume (water tank) using artificial nodules.

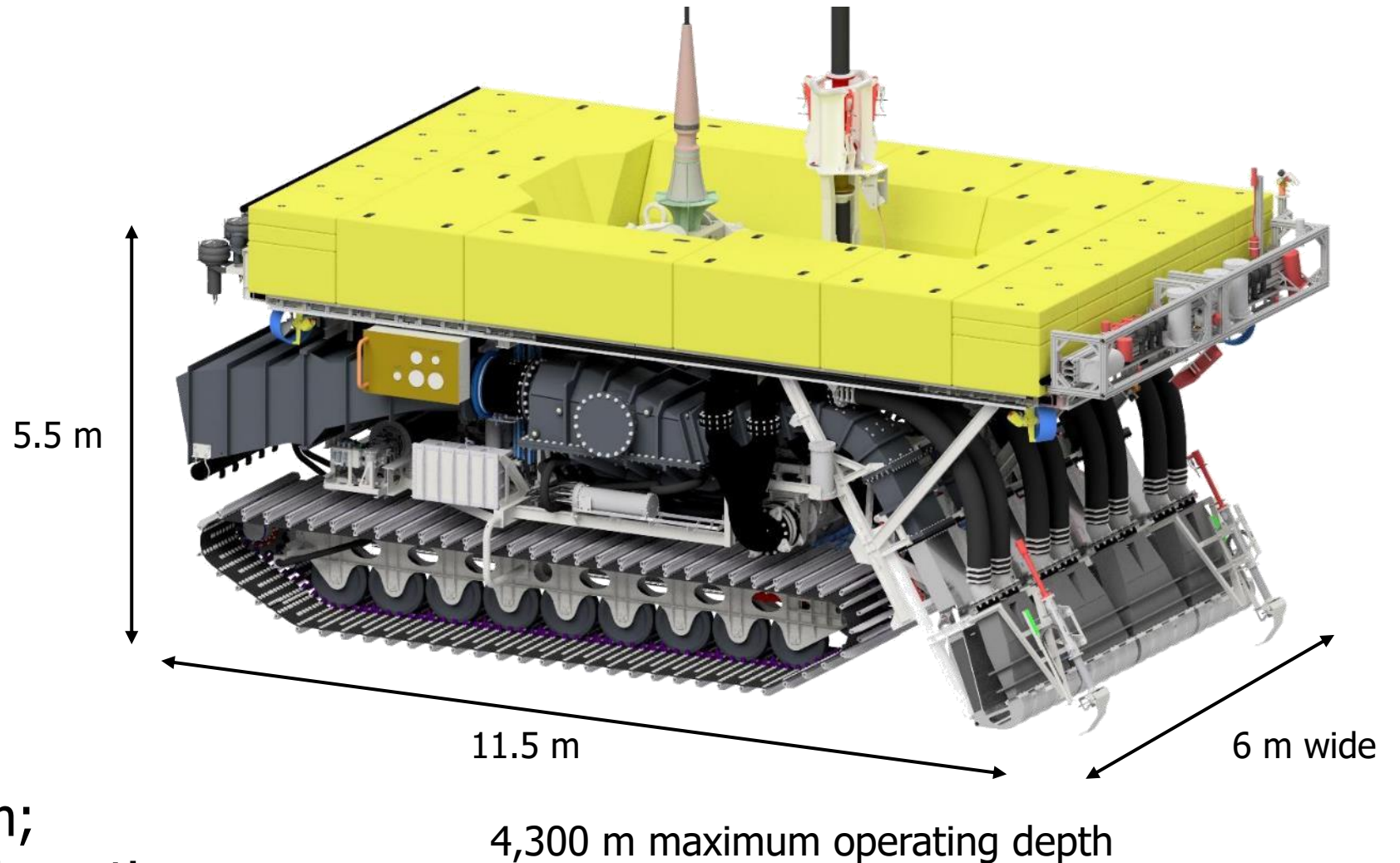
After



## Designing a collector

Designed to minimize environmental impact:

- Low-impact tracks;
- Fines rejection system;
- Efficient diffuser configuration;
- Coandă-effect nozzles.





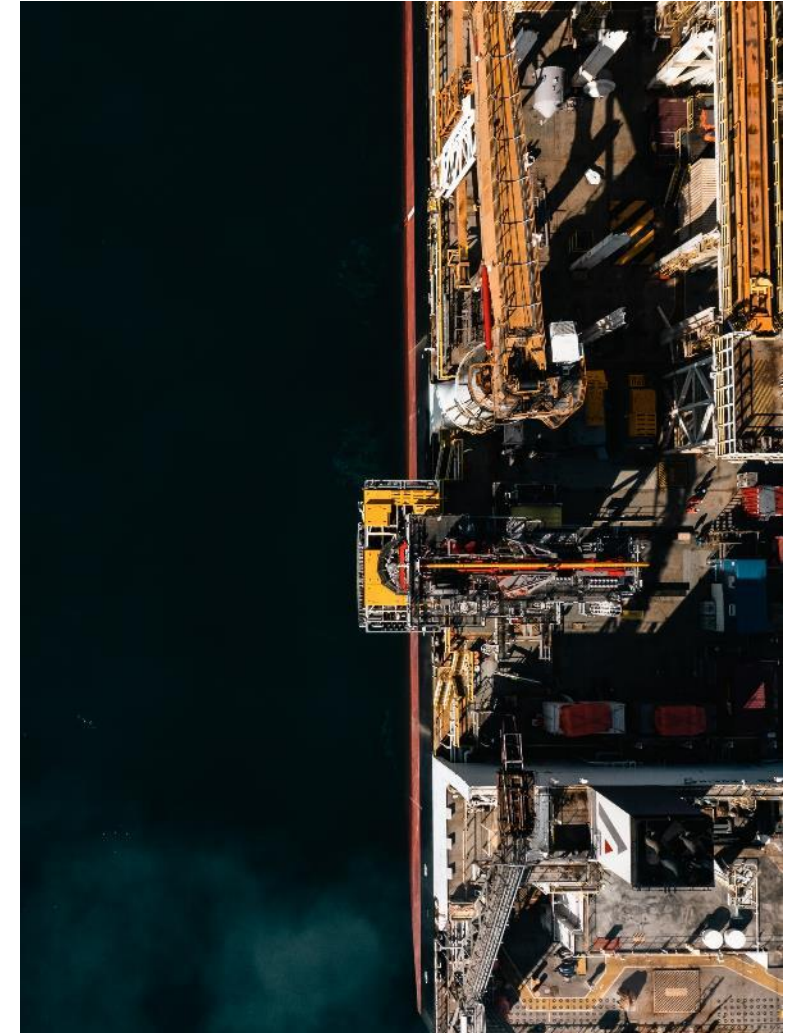
## Pre-testing our concept

## The goals for the pre-tests

- Functional and integration test of equipment.
- Prove the functioning of mechanical and software systems of the collector during driving on the seafloor.
- Prove the functioning of the system under high load.

First pre-test (21): North Sea, Dutch Section.

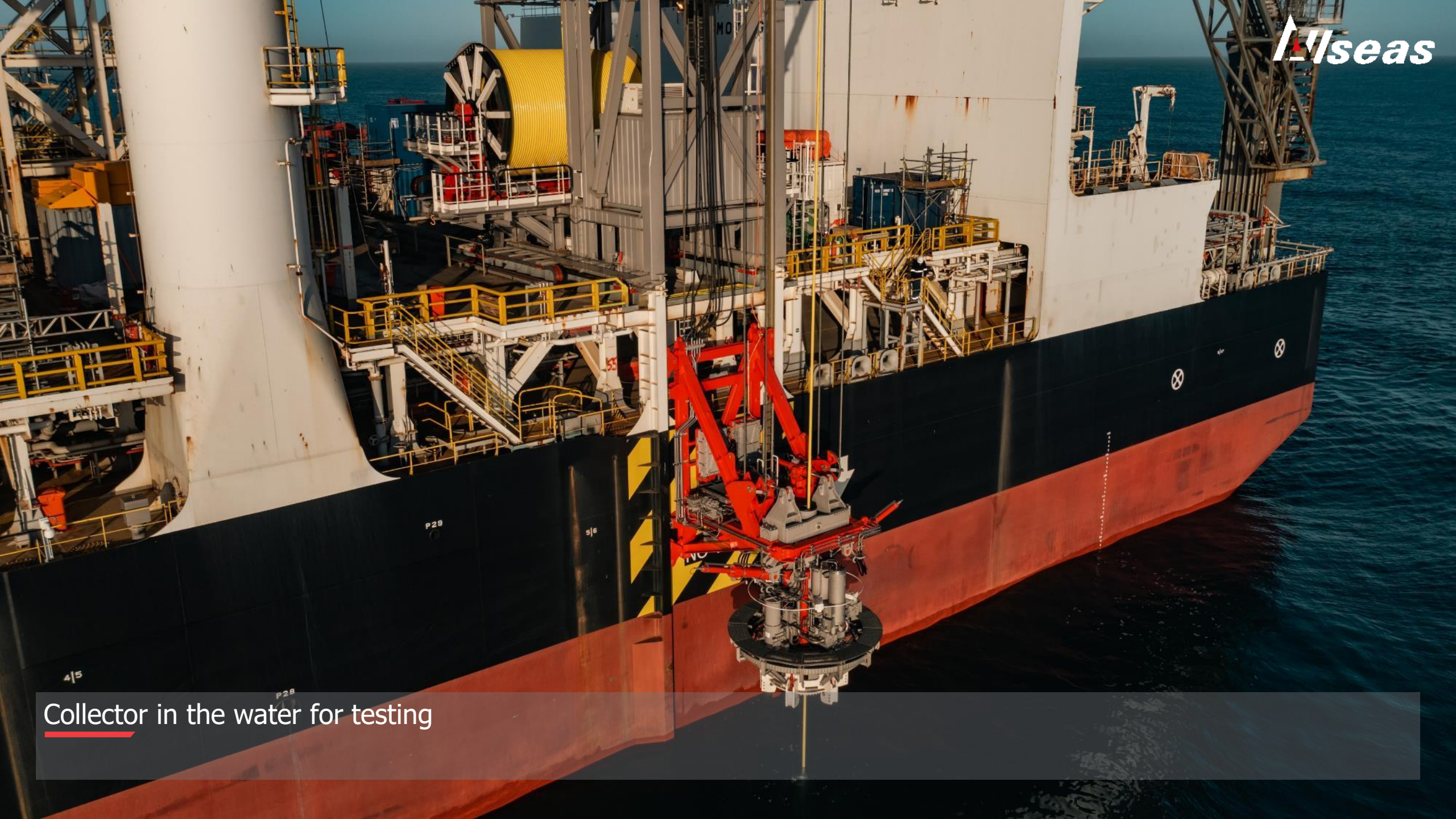
Second pre-test (9): Atlantic, Canary Islands, Spain.





Hidden Gem ready for drive testing on the North Sea, Dutch Section





Collector in the water for testing



Testing of vertical lift system, Atlantic, Spain.

Testing of vertical lift system, Atlantic, Spain.

## The results of the pre-test

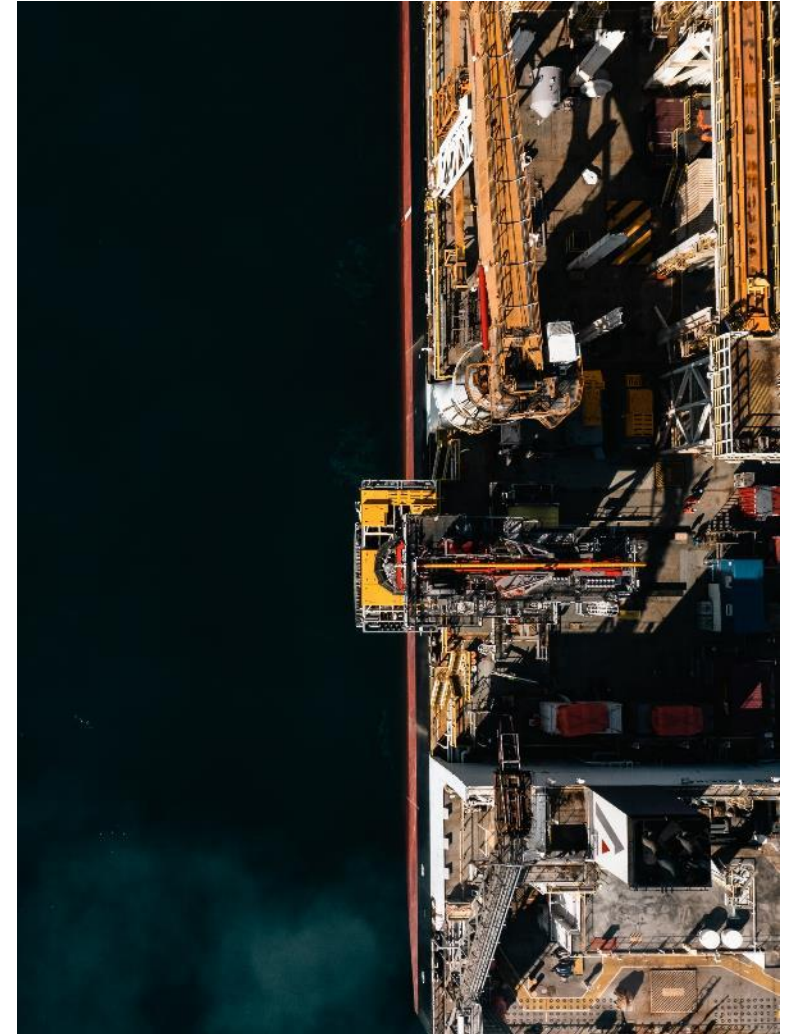
- Functional and integration test of equipment - **PASSED**.
- Prove the functioning of mechanical and software systems of the collector during driving on the seafloor - **PASSED**.
- Prove the functioning of the system under high load - **PASSED**.
  
- The system passed a total of 30 tests offshore.
  
- System ready for the Integrated Nodule Pilot Collection Test in the Clarion Clipperton Zone.



## Integrated Nodule Pilot Collection Test

## The goals for the pilot test

- Assess environmental impact both short and long term;
  - Monitoring of the mid-water and benthic plumes;
  - Monitoring of the physical and biological impacts.
- Proof of concept of prototype collecting equipment;
- Reliable collecting system:
  - Operate 24/7;
  - Minimize mechanical downtime.
- Nodule collecting efficiency.





Allseas vessel Fortress delivers final project material



Arrival in Nori D field on 19<sup>th</sup> of September





20/09/2022  
02:34:34  
010°20.056130'  
-117°11.491855'

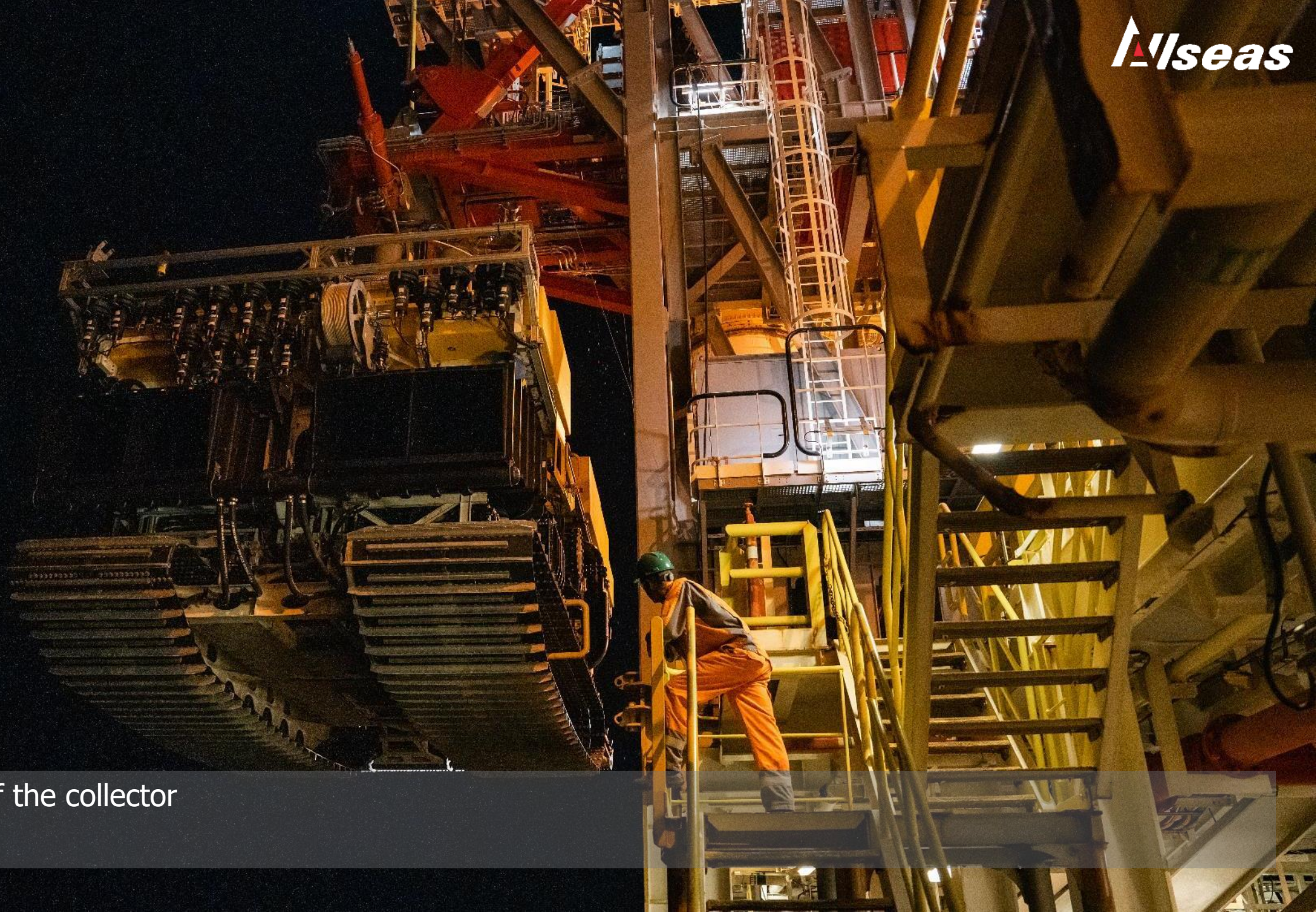
121 SE

DCC 0.00  
KP 0.00  
East 479030.84  
North 1142377.09

4281.3

First ROV dive – first glimpse of the nodules on the seabed

useas




First deployment of the collector

260 W

 Iseas

The seabed after collecting

A worker in a blue uniform and white hard hat is standing on a metal platform, reaching up to adjust a large, dark, rectangular collector. The collector is positioned over a large, dark, cylindrical pipe. The worker is wearing a safety harness and gloves. The background shows a complex industrial structure with various pipes, ladders, and platforms. The sky is clear and blue.

First nodules recovered by the collector

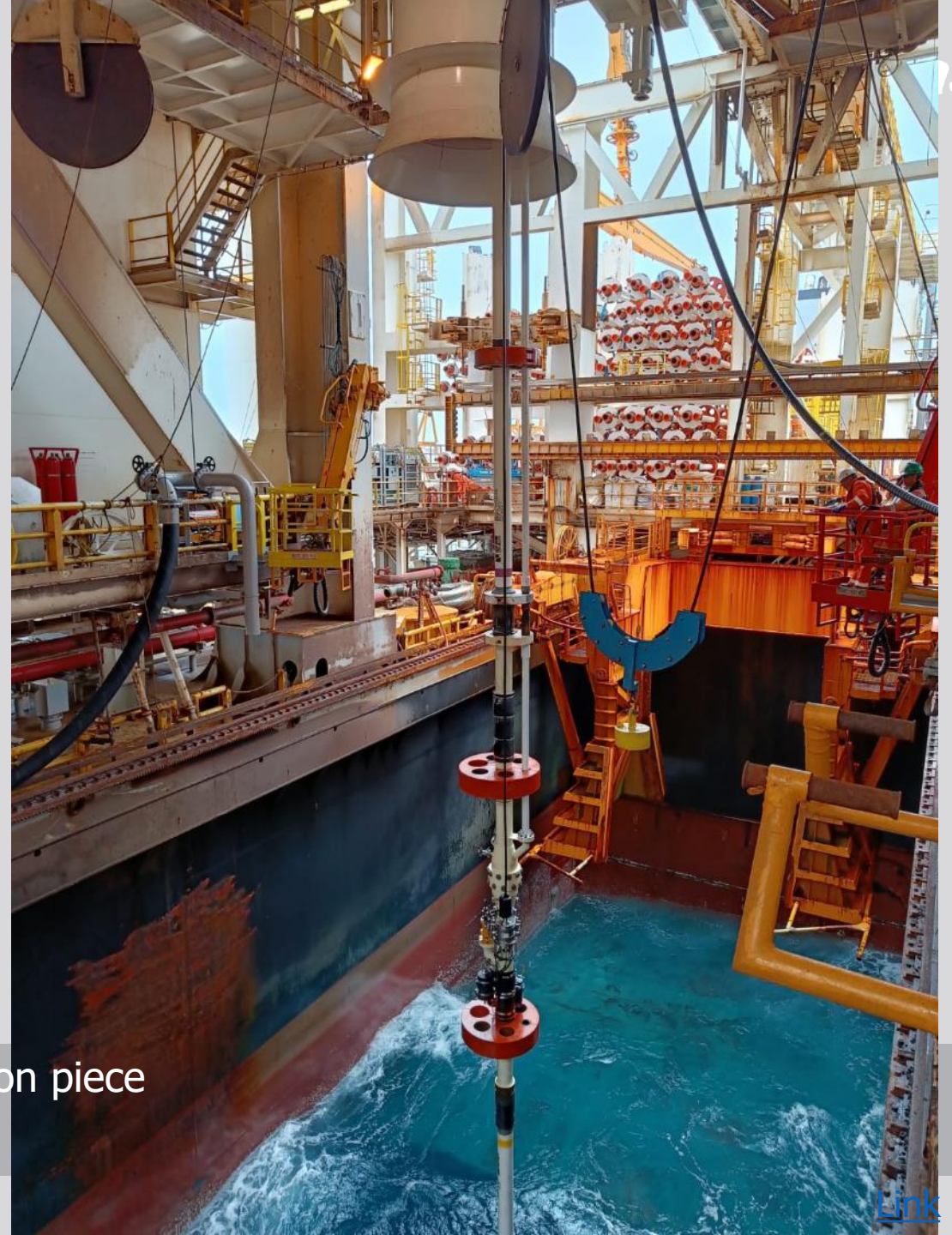
3t bulk sample of nodules from the diffusor



Deployment of the flexible jumper including its buoyancy elements



Deployment of riser special sections; riser base and airinjection piece





Connection the rigging to lift the riser sections





Environmental sampling of return water



Analysing the samples in the refurbished mud laboratory

Trainee from the International Seabed Authority



... to make P-work.

8m)  
m)  
).

reduce

at

14:07 Drill Floor Fireworks  
Issues with the Rain.

10/10/22

14:35

Set umbilical ready to start

14:37

All 4 skids down @ 0.02m from

14:43

Start Diffusers and Coanda Knorzles

14:50

Start driving forward to start collecting

15:00

Paid-in 2 meters on umbilical wire

15:03

**NODULES !!**



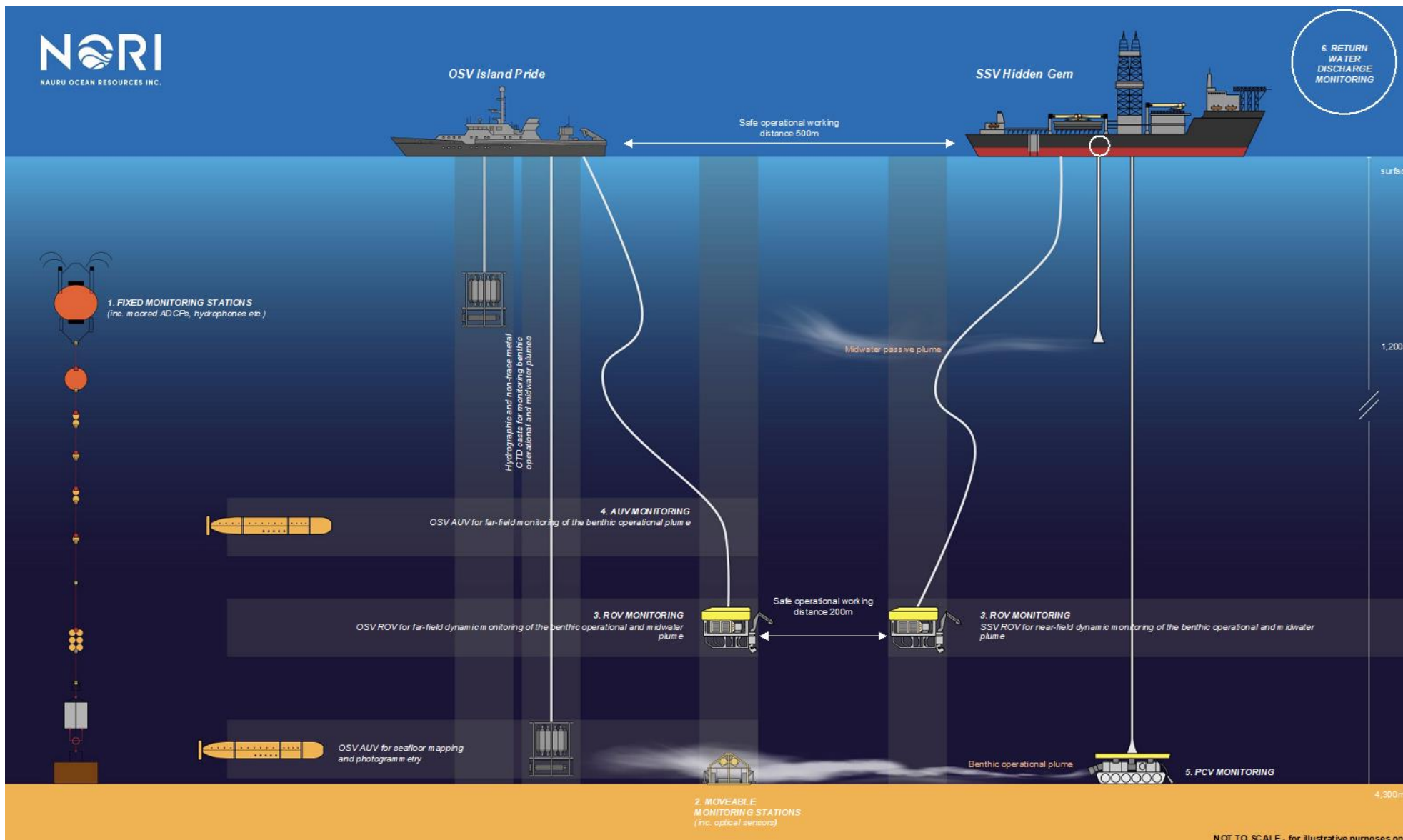
Cyclone feeder of the separator deck

Nodules bouncing on the vibrating separator deck



Nodule production on the conveyor belt

# Environmental scope during pilot test





## **Figures of the environmental scope**

**50** monitoring stations distributed in and around the test field to monitor and map the far field plume *in situ*

### **BENTHIC PLUME ARRAY**

- 7 x Fixed Landers with ADCPs, CTDs, OBS – optical backscatter
- 2 x Fixed bottom current and turbidity landers with acoustic modems that we interrogate in real time
- 3 x McLane sediment traps
- 20 x sediment plates measuring sedimentation
- 4 x Camera landers recording sedimentation
- 1 x acoustic mooring
- 1 X acoustic lander
- 1 x midwater mooring that we interrogate for midwater currents
- 7 x DGTs diffuse gel samplers
- 2 x AUVs mapping near and far field

### **MID WATER PLUME ARRAY**

- 3 x ROVs (1 x on Island Pride with 10 x Niskin array for water sampling + ADCP + CTD and
- 2 x ROVs on Hidden Gem
- 1 x Trace metals CTD rosette with 12 Go-Flos for water samples
- 1 x Hydrographic CTD rosette with 24 niskins for water samples
- 1 x McLane Pump rosette with 7 x pumps

# Biological and physical impacts: Collaborating with leading research institutions



## The results of the pilot test

- All samples for environmental impact assessment are collected;
- All commissioning tests successfully executed;
- The collector has driven **83.4 km** on the seabed;
- In total, **3,020 t** of nodules were collected.
- Proved confidence in minimal environmental impact by system.

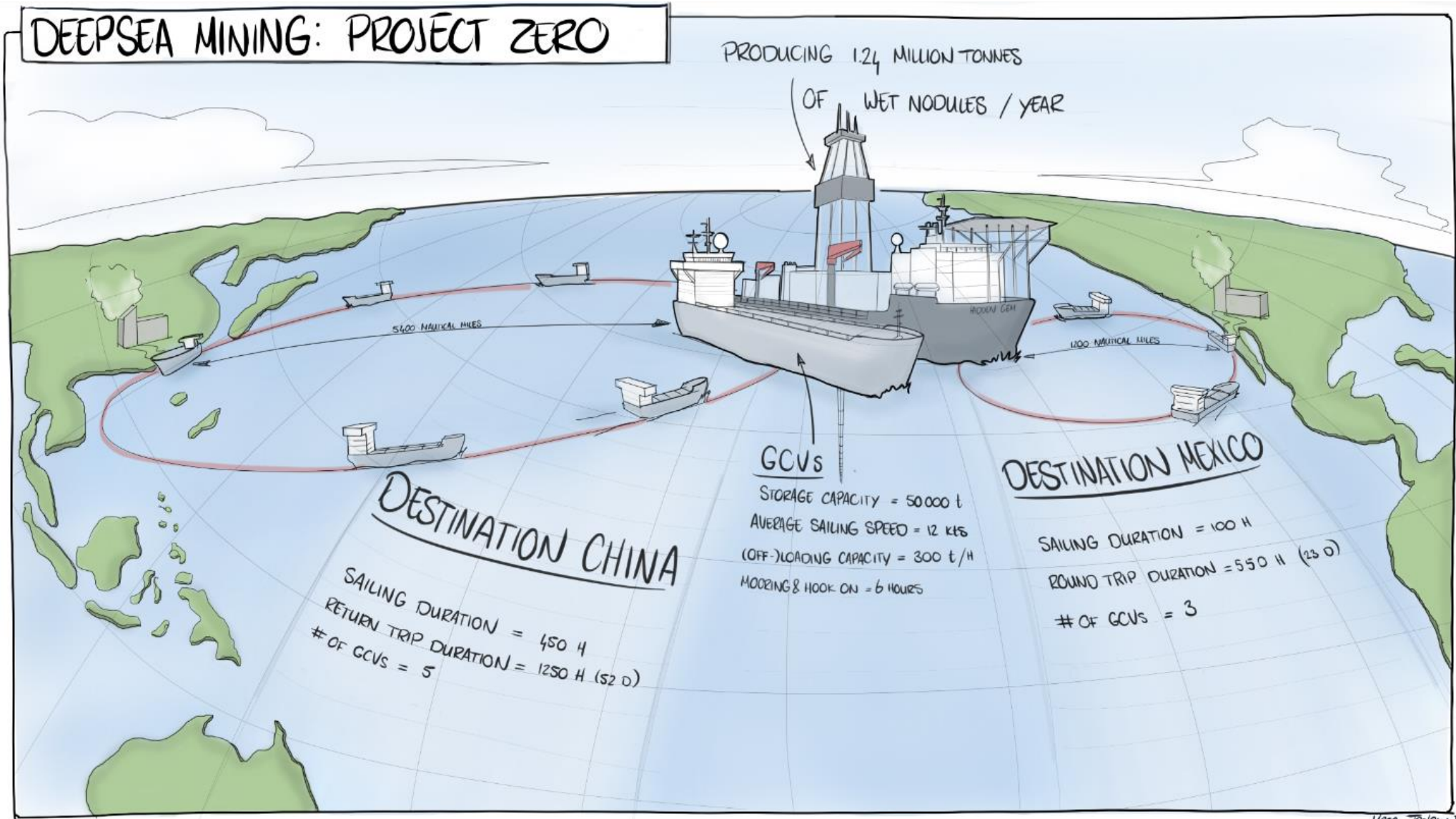


(video)



## Follow-up

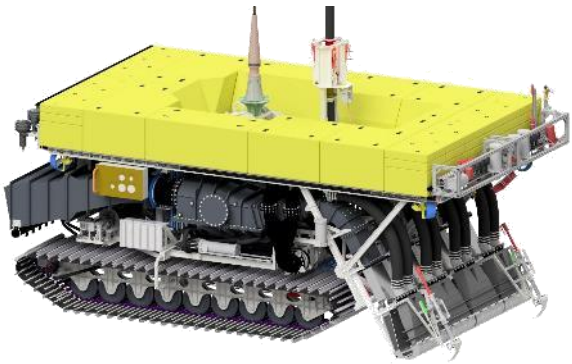
# New scale



Vera Brilow

# Design of a new, more efficient, lower-on-impact, collector

## Pilot Collector

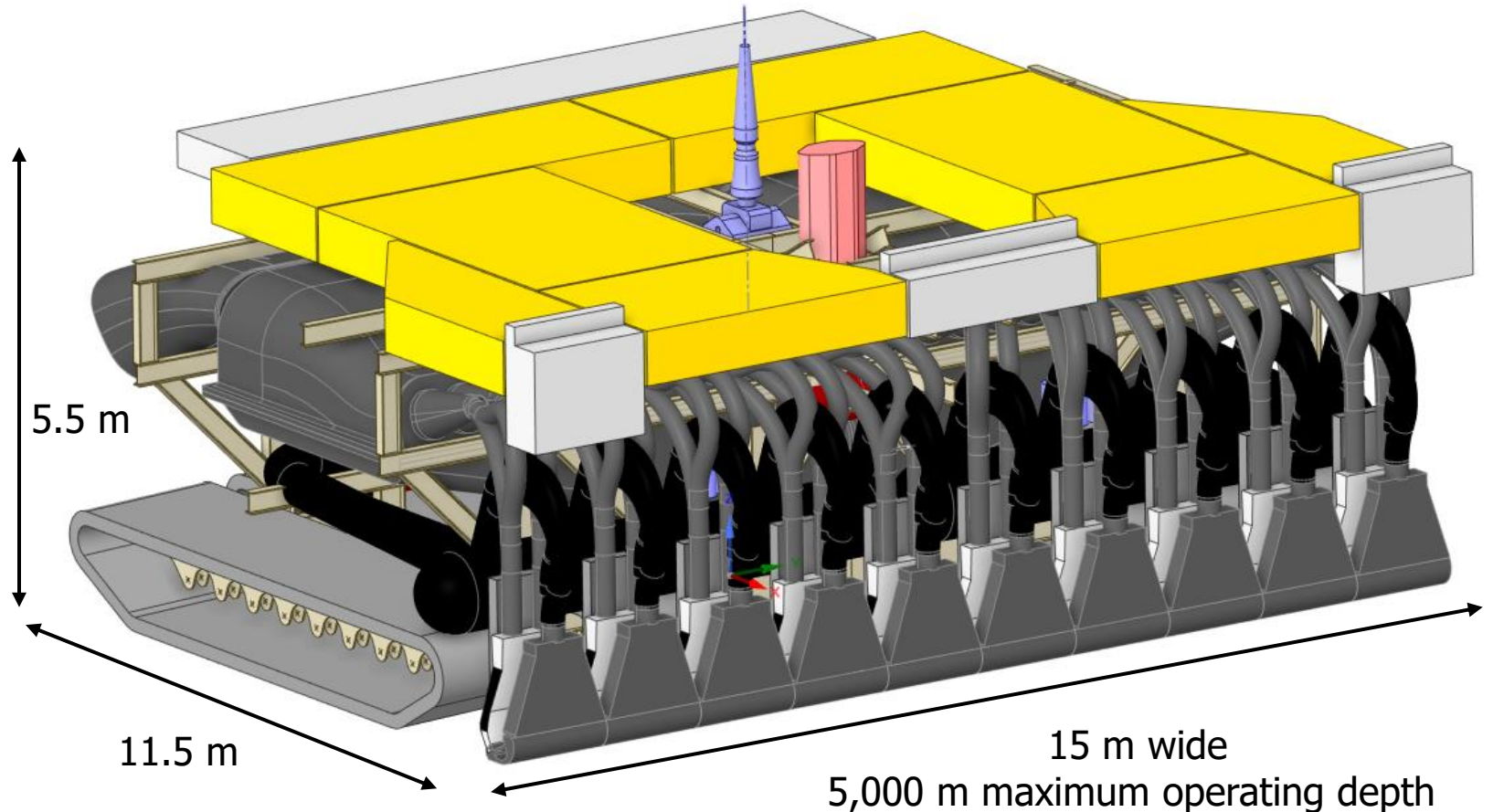


6 m wide  
4,300 m maximum operating depth

Improve design to further lower the environmental impact:

- Low-impact tracks;
- Fines rejection system;
- Efficient diffuser configuration;
- Coandă-effect nozzles.

## Project Zero Collector



## Improvements highlights on the system

- Lowering the return water line outlet;
- Installation of additional sensors for even closer and real-time monitoring;
- Improved Coandă-effect nozzles for higher pick-up efficiency and plume reduction.

