

SUT – EVENING TECHNICAL MEETING

11 October 2023

Robotic Solutions for Site Characterisation and Subsea Survey

Challenging The Conventional



**BLUE OCEAN
MARINE SERVICES**

SUBSEA TECHNOLOGY AND ESG

Subsea technology plays a pivotal role in ESG initiatives, ensuring that underwater activities are environmentally sound, socially responsible, and governed effectively.



ENVIRONMENTAL IMPACT

- Marine Biodiversity
- Monitoring & Preservation
- Renewable Energy Production
- Carbon Sequestration



SOCIAL CONTRIBUTION

- Job Creation
- Public Engagement & Communication
- Safety



GOVERNANCE & OVERSIGHT

- Data Collection (Marine Regulations)
- Infrastructure Maintenance
- Transparency in Operations



BLUE OCEAN MARINE SERVICES

Experts in the design and execution of marine surveys and inspection using unmanned and remotely operated platforms

BlueOcean
MARINE TECH SYSTEMS

 **VERTECH
GROUP**

THE ROBOTIC REVOLUTION

The adoption of robotics into marine survey and subsea inspection has revolutionized the marine survey and inspection industry



↓ Cost



↑ Quantity



↓ Schedule



↑ Quality



↓ Logistics



↑ Accuracy



↓ Risk



↑ Resolution



↓ Impact



↑ Accessibility



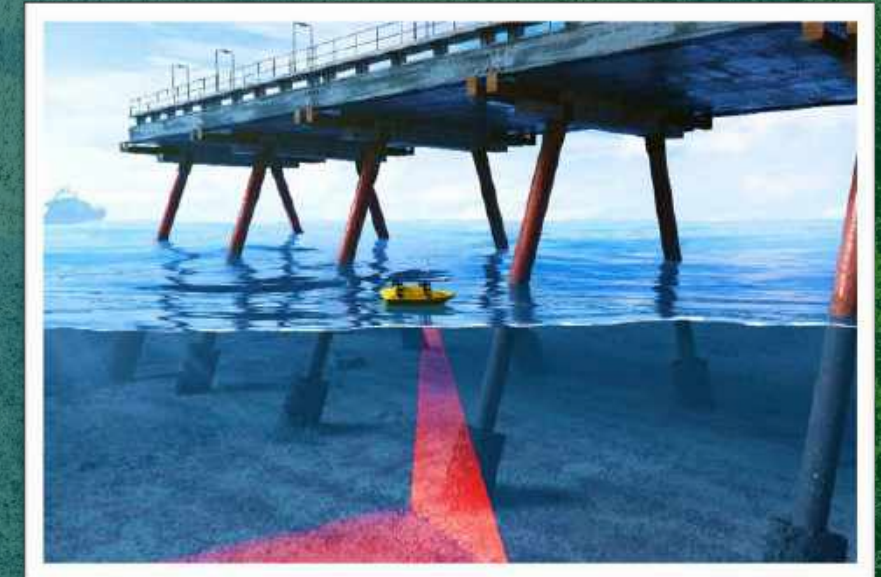
THE TECHNOLOGY TOOLBOX



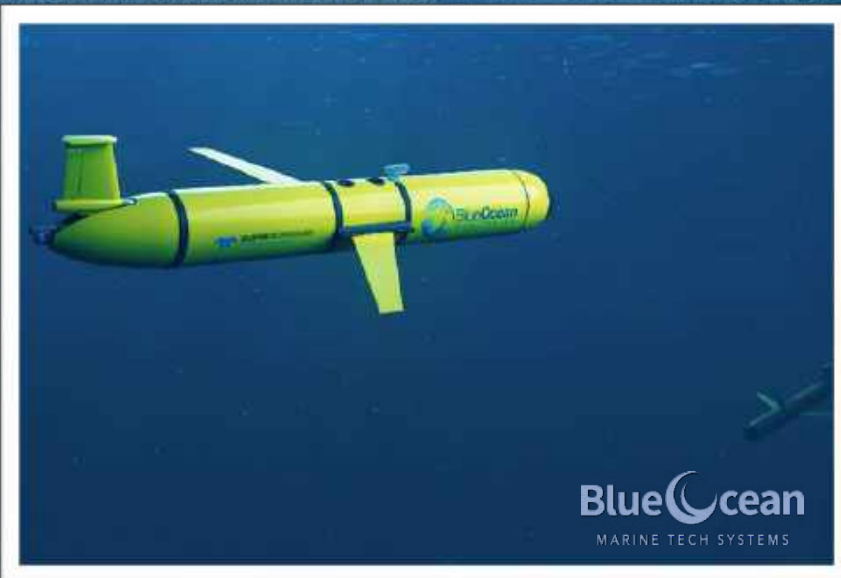
UNMANNED AERIAL VEHICLES (UAV)



REAL-TIME MONITORING SYSTEMS



AUTONOMOUS SURFACE VESSELS (ASV)



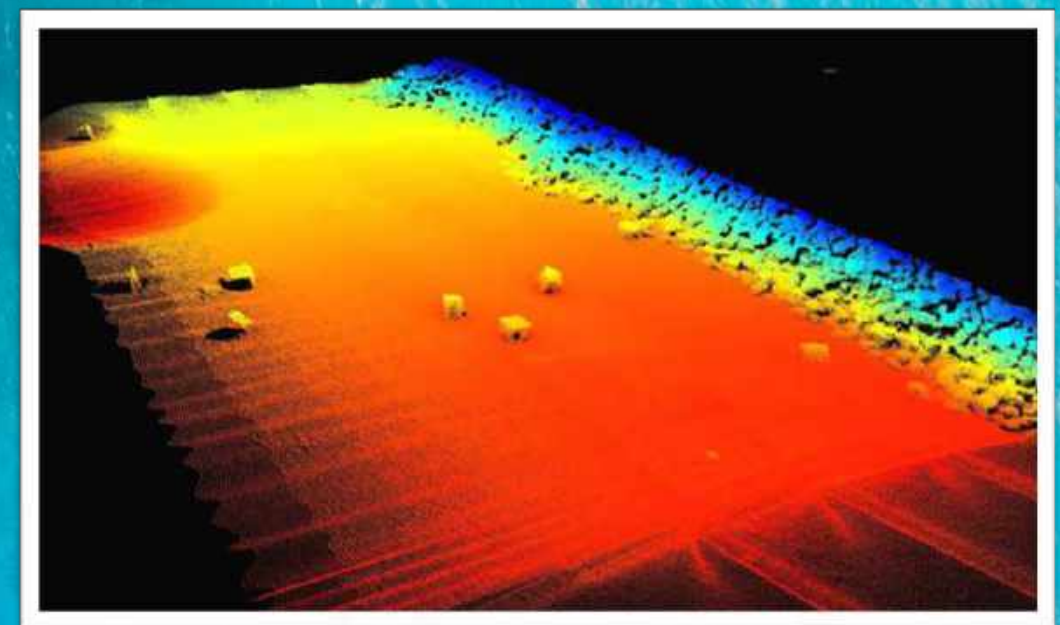
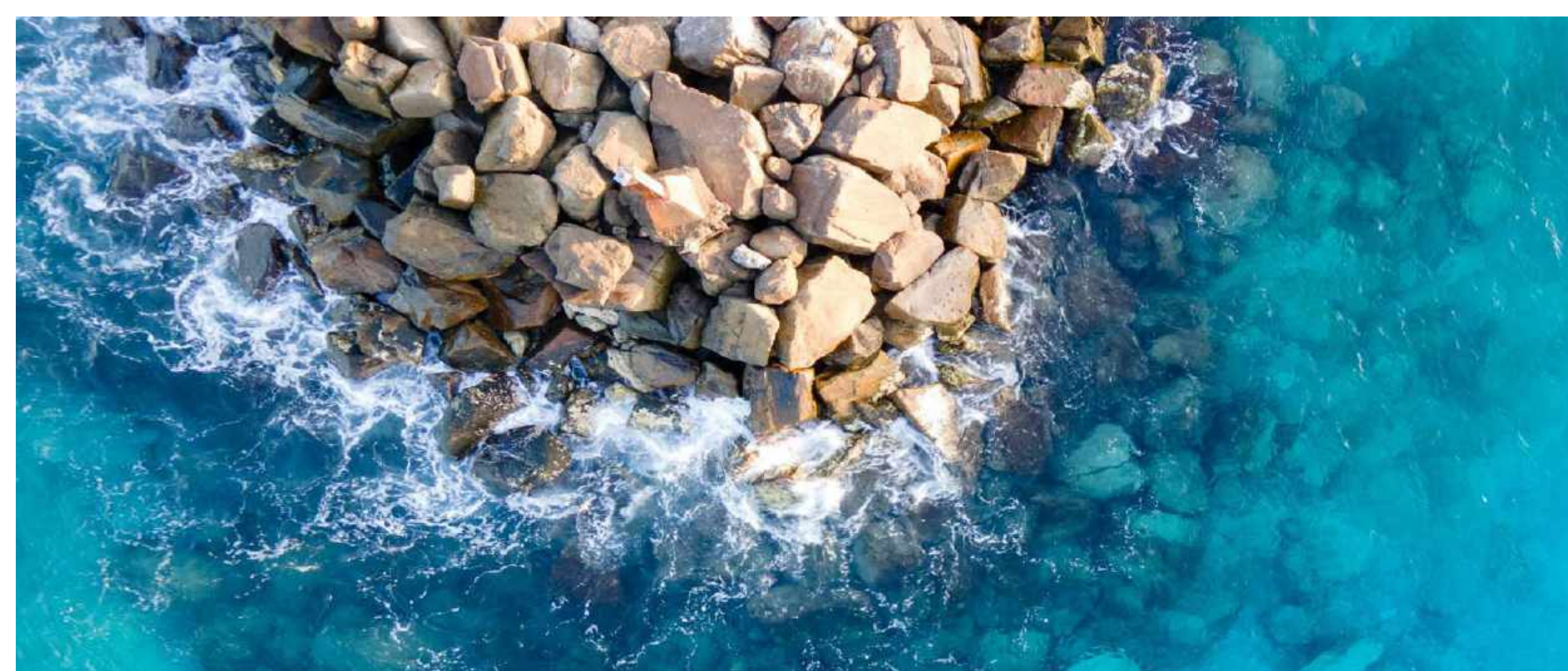
LONG RANGE OCEAN GLIDERS



REMOTELY OPERATED VEHICLES (ROV)



AUTONOMOUS UNDERWATER VEHICLES (AUV)



AUV BATHYMETRIC SURVEY DATA

BATHYMETRIC SURVEYS

We use both ASV and AUV for bathymetric surveys:

- Inshore or Nearshore ASV in shallow water typically 0- 20m
- AUV in deeper water typically 20-200m

Both systems can be equipped with additional payloads such as side-scan sonar or digital cameras

ASV can also be fitted with LIDAR to tie-in above and below water line surveys



NEARSHORE HYDROGRAPHIC SURVEY ASV

BENTHIC HABITAT SURVEYS

- AUV systems are effective for large-scale surveys down to 200m water depth
 - Rapid surveys up to 4 knots
 - Consistent altitude above seabed
 - Precise navigation allows repetition of surveys for monitoring temporal changes
 - Forward facing digital video is collected concurrently to provide additional context
 - Data can also be augmented with side-scan sonar and bathymetry measurements
- ROV systems are effective for discrete monitoring or investigation
- Drop or towed camera systems can also be used to force multiple whilst AUV is underway on mission



AUV WITH BENTHIC HABITAT SURVEY PAYLOAD

AUV DEPLOYED CLOSE TO PORT INFRASTRUCTURE



ENVIRONMENTAL SURVEYS

We provide a range of environmental survey options using fixed or dynamic survey platforms to record:

- Subsea Acoustics
- Water Quality
- Subsea Imagery and Video



AUV WITH WATER QUALITY AND VISUAL PAYLOAD

AUV systems are very effective for impact assessment due to the precise nature of the survey transects, allowing accurate change over time studies through independent survey campaigns

Glider systems are very effective for longer duration campaigns with ability to stay at sea for weeks or even months at a time.



SUBSEA ACOUSTIC SURVEYS USING GLIDER PLATFORM

AERIAL ASSESSMENTS

Understanding of metocean and environmental data is fundamental to the success of any offshore project as this information can serve to characterise the environmental baseline or available resources, provide engineering design criteria, or provide critical information to develop strategies for future maintenance and accessibility



UAV COASTAL EROSION SURVEYS



UAV INTER-TIDAL MAPPING

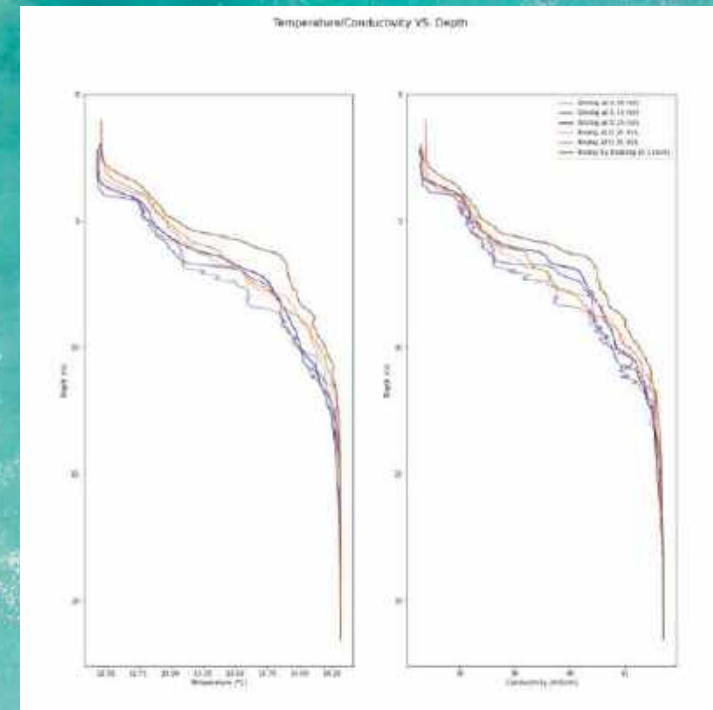
OCEANOGRAPHIC SURVEYS

Understanding of metocean and environmental data is fundamental to the success of any offshore project as this information can serve to characterise the environmental baseline or available resources, provide engineering design criteria, or provide critical information to develop strategies for future maintenance and accessibility

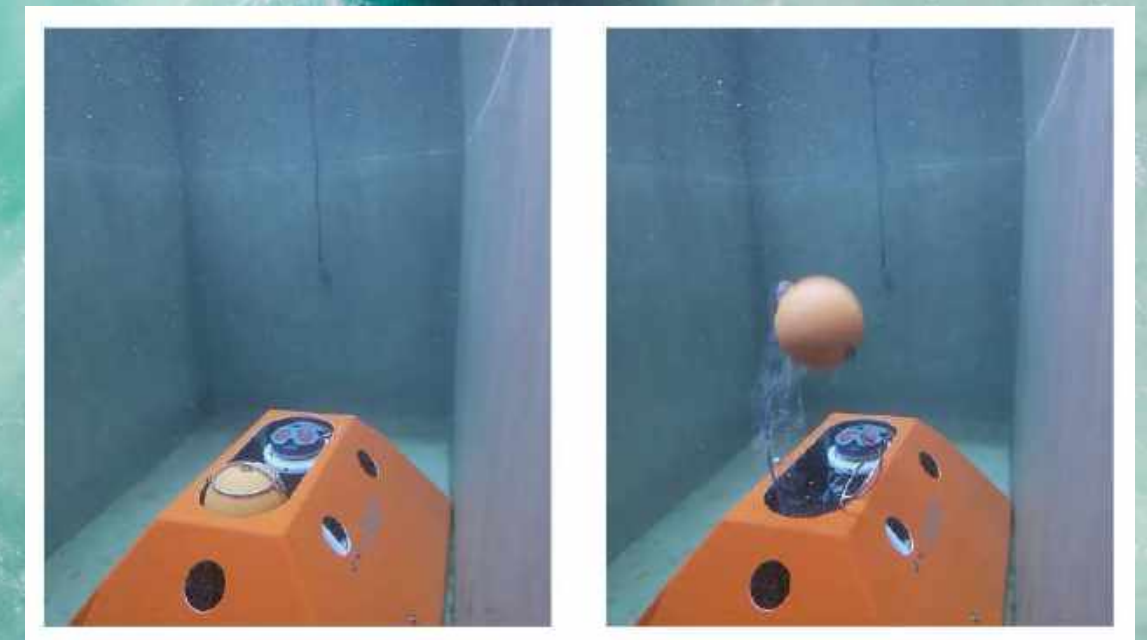


DRIFTING METOCEAN BUOYS WITH REAL-TIME TELEMETRY

We specialise in a range of traditional and new generation technologies to achieve the most effective results for our clients



CTD PROFILING USING AUV



REMOTELY ACTIVATED POPUP SEABED MONITORING STATION



DREDGING AND SPOIL DISPOSAL MONITORING

We have several tools we can deploy to support dredge and spoil disposal studies:

- AUV - Pre and Post Dredge Benthic Habitat Assessments
- ASV – Pre and Post Dredging Bathymetric surveys
- AUV – Short Term WQ Monitoring
- UAV – Dredge / Spoil Plume Aerial Assessment
- Glider – Longer Term WQ Monitoring



GLIDER DEPLOYED WITH TURBIDITY SENSORS FOR SPOIL DISPOSAL SURVEY



SUBSEA ASSET SURVEY & INSPECTION



AUV DEPLOYED FROM SHORE FOR PIPELINE INSPECTION

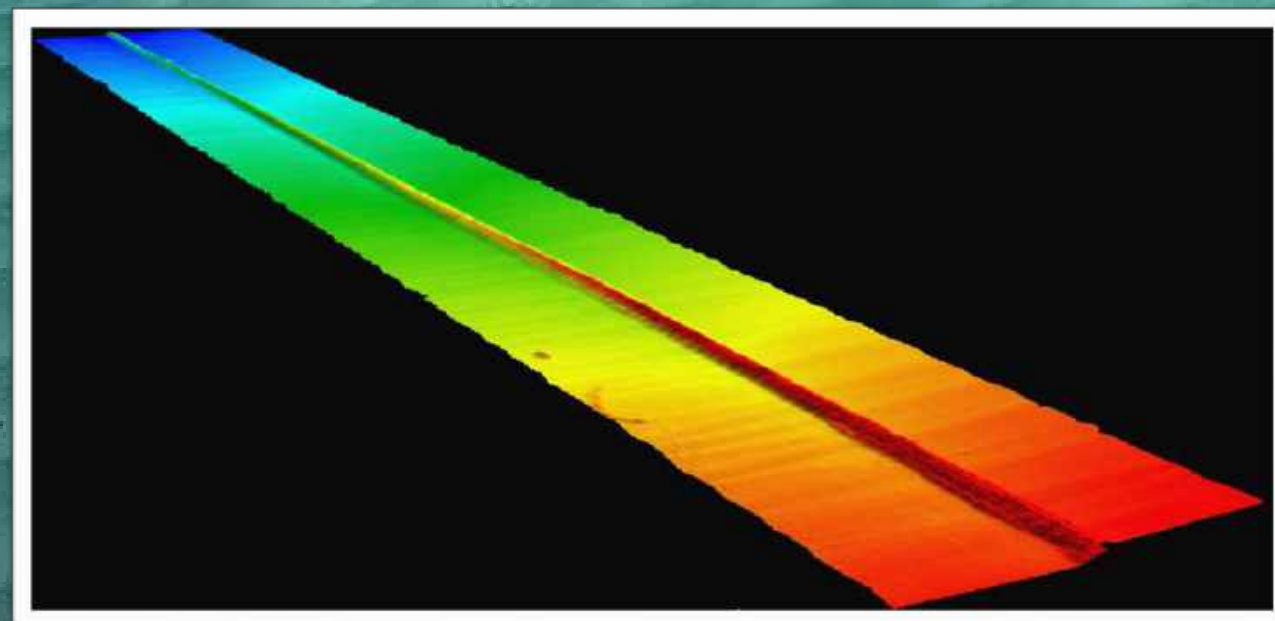
AUVs are particularly effective for pipeline, cable or outfall surveys maintaining a fixed distance from the assets with changing water depths

Other benefits of AUV systems include:

- Shore or small vessel deployment
- Cost effective and low logistics
- Repeatability for impact assessments

Surveys can be complimented using ROV technology for specific target assessments

AUV PIPELINE INSPECTION DATA



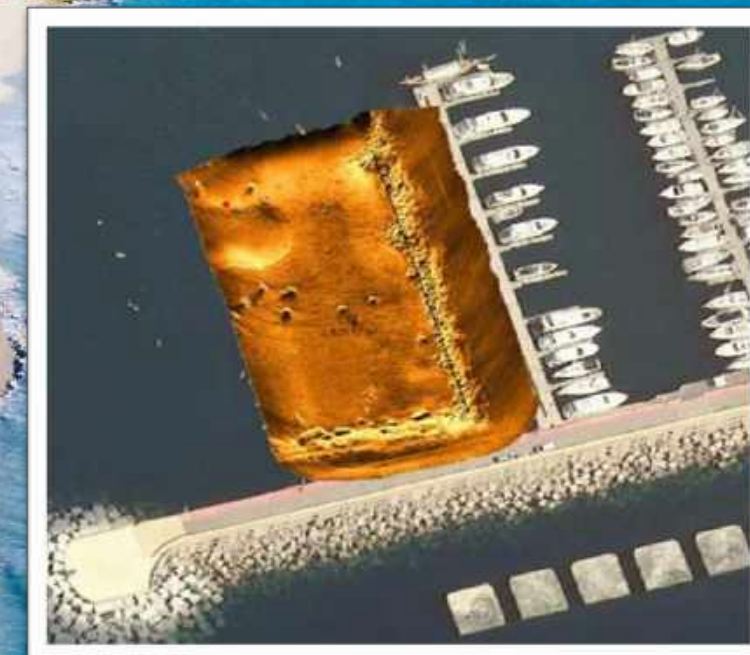
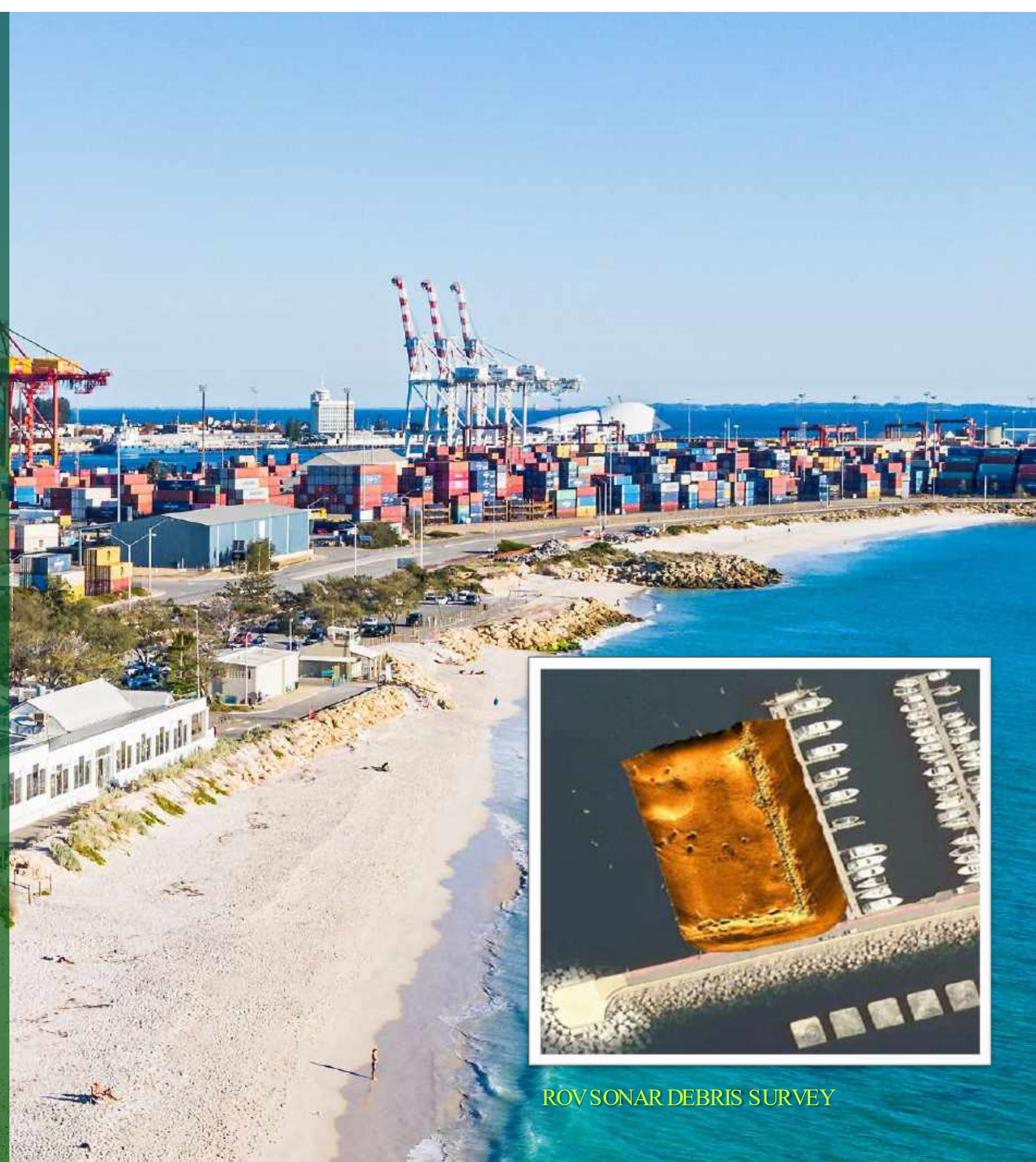
PORT SURVEYS & SUBSEA INSPECTIONS



ROV PRE-CONSTRUCTION VISUAL ASSESSMENT

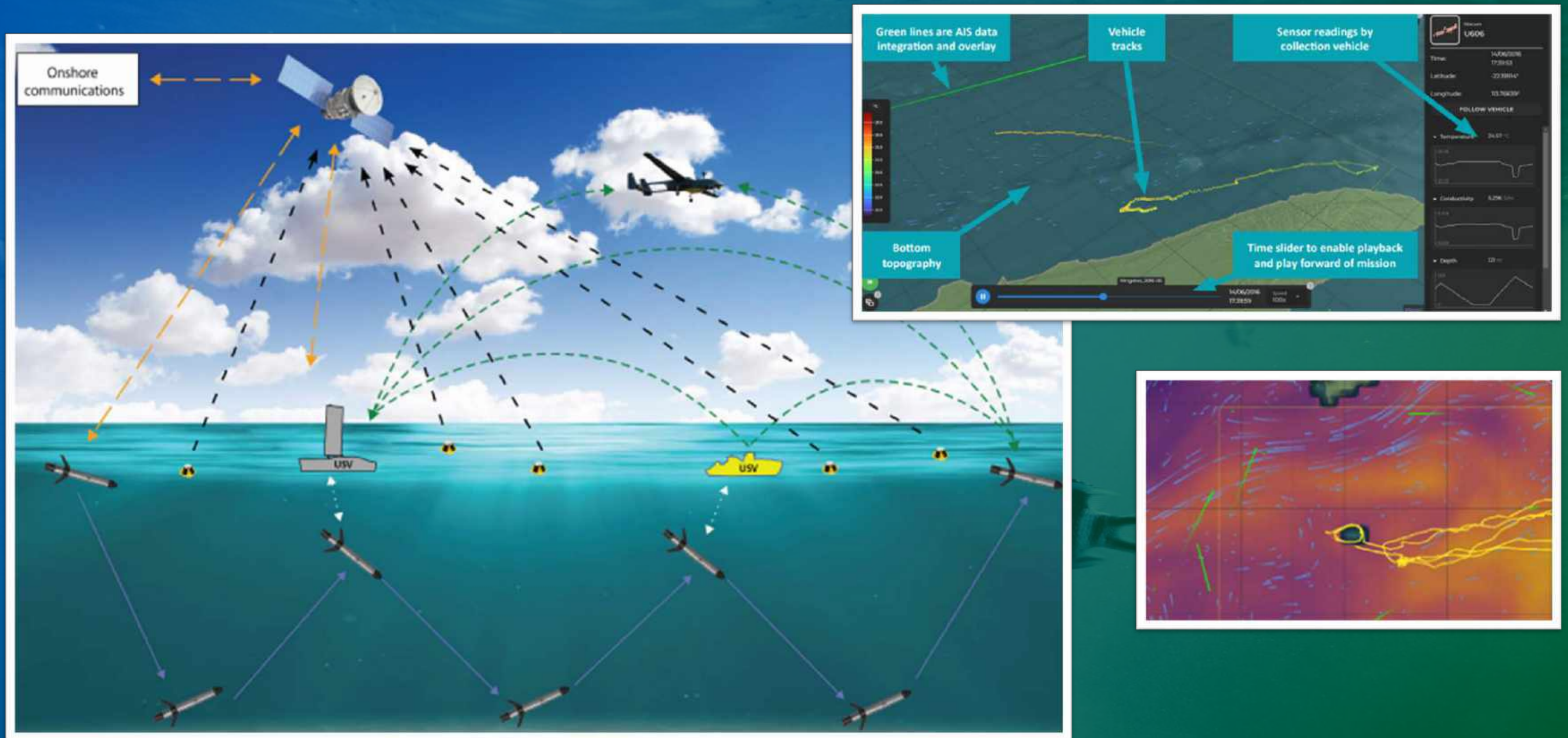
Robotic systems are effective for a range of port infrastructure assessments, removing the requirement for divers and significantly reducing project risks:

- Debris Surveys and Site Characterisation
- Wall and Breakwater Inspection
- Vessel and Mooring Chain Assessments
- Cleaning and Non-Destructive Testing
- ASV Bathymetric Surveys

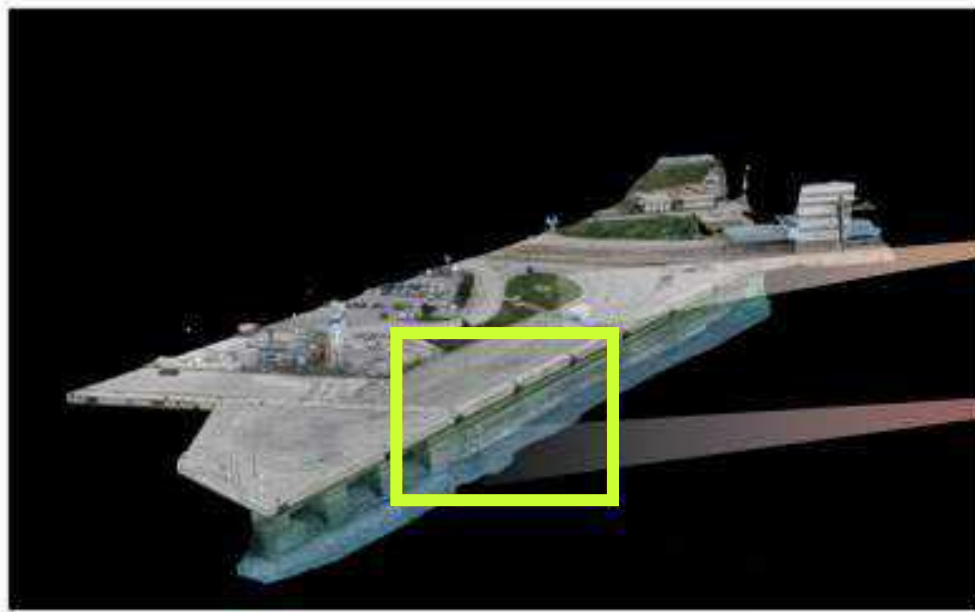


ROV SONAR DEBRIS SURVEY

ROBOTIC SWARMS & TECHNOLOGY COMBINATIONS



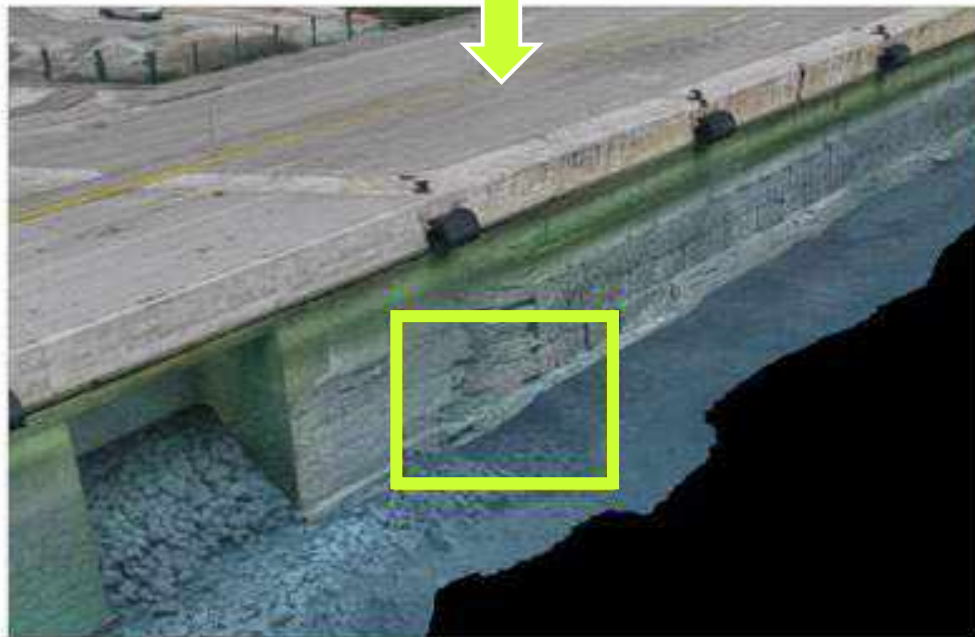
DIGITAL TWINS & DATA PORTALS



Unmanned Aerial Vehicle (UAV)



Remotely Operated Vehicle (ROV)



COMPUTER AIDED INTERPRETATION & MACHINE LEARNING

AUV IMAGES

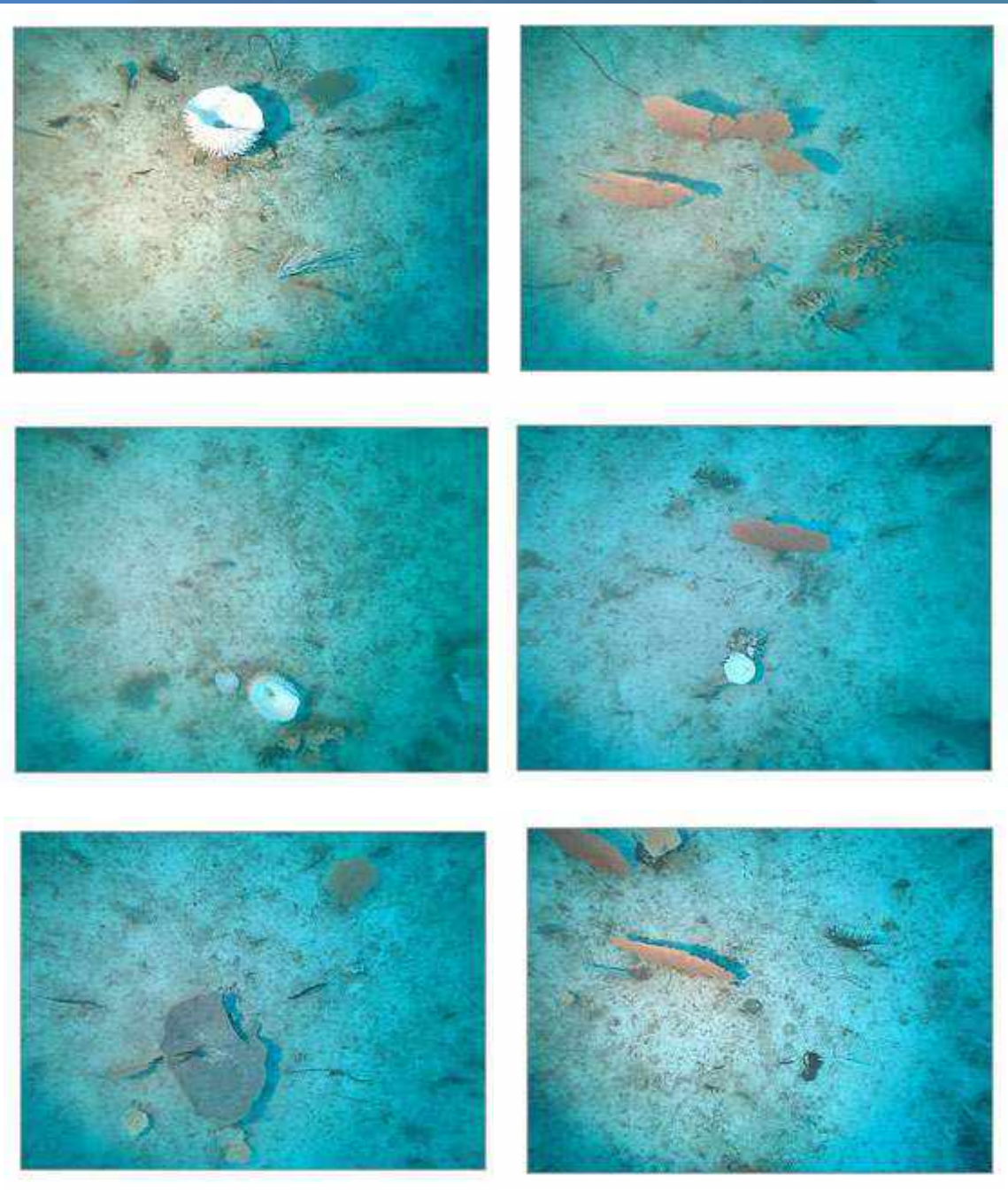
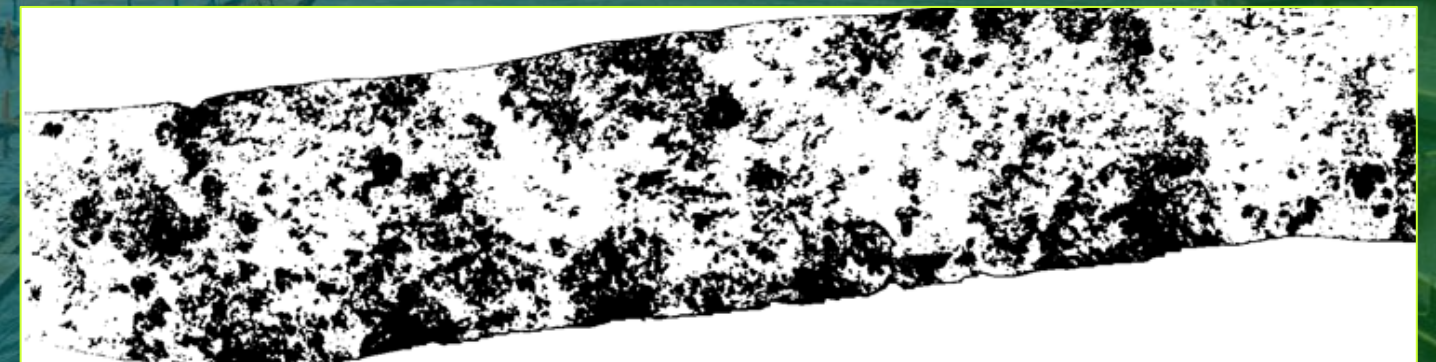


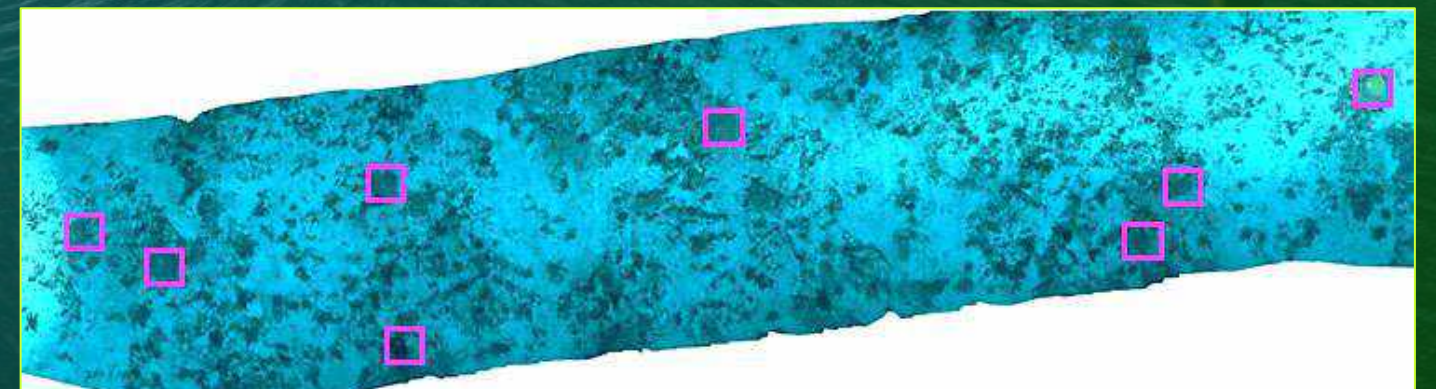
IMAGE ENHANCEMENT & MOSAICING



PERCENTAGE COVERAGE



TARGET ID





BLUE OCEAN MARINE SERVICES



www.blue-ocean.com.au



Blue Ocean Marine Services