# TechOceanS

TECHNOLOGIES FOR OCEAN SENSING

Developing novel tools to support sustainable and climate-resilient pathways for Europe's Seas and the world's oceans

## Goal:

- Understanding complex, inter-related short- and long-term drivers of climate change is critical to innovating lasting, sustainable solutions for the future of Europe's Seas and the environments and economies that rely on them.

## Challenge:

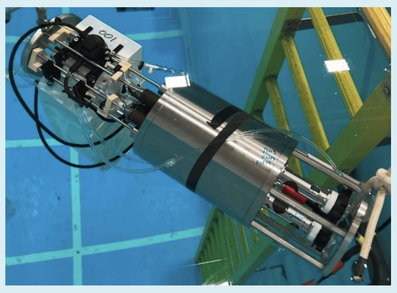
- Oceans buffer **climate change** and take up greenhouse gases. They provide resources and food.
- Yet they are degrading via warming, pollution, acidification and unsustainable exploitation.
- We need data to understand, mend and manage our oceans.
- Many chemical and biological data can only be collected with samplers using ships' limiting resolution.

## Innovation:

- The project **develops new sensors** covering **samplers and image processing/artificial intelligence** for missing data.
- These can be used on **low-emission platforms** that can collect much **more data** (e.g**. long-range AUVs**).

## Genomics: detecting and quantifying biology via their nucleic acids (DNA or RNA) using robotic samplers and *in situ* sensors

- New generation of low-cost, in situ nucleic acid sensors and samplers for **marine ecological monitoring**.
- **Detection and quantification of marine organisms** via environmental DNA (eDNA).
- **Measure multiple targets in parallel over long periods** of time.
- Enable real-time, high-resolution measurements for **early warning systems and marine biodiversity monitoring**.

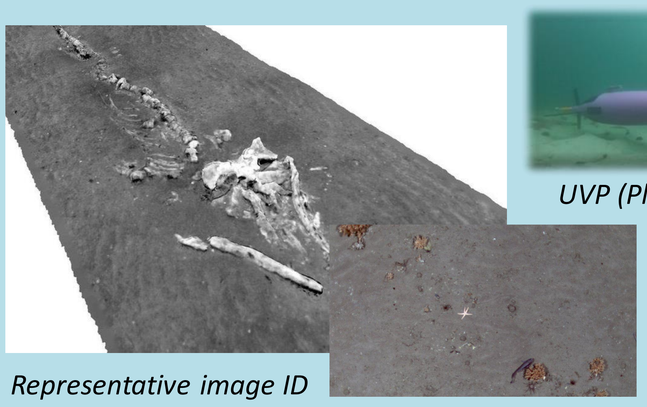


*Robotic Cartridge Sampling Instrument (RoCSI)*

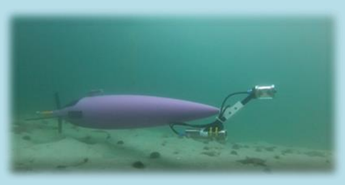
*Pebble-R qcLAMP platform (colorimetric detector)*

## Imaging and optics: automating data extraction from images

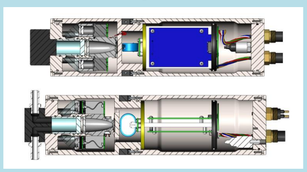
*BioCAM (Benthinc images)*



*Representative image ID for benthic & pelagic data streams*



*UVP (Plankton images)*

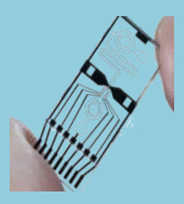


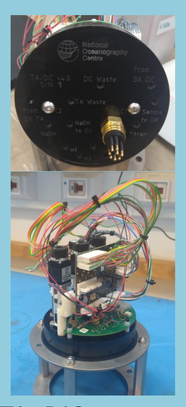
*MicroSTAF (Primary production)*

- Sensor agnostic "**gold-standard" labels and automated data processing**
- **Rapid and remote awareness** of multiple sensors observations in the field
- **Photogrammetrically calibrated** system
- **Computer Vision-registered** images
- Optimised **3D reconstruction**
- Representative **image ID for benthic and pelagic data streams**

## Microsensors: in situ high performance water analysis

- **A Cytometer for phytoplankton and microplastics** that's able to count and discriminate between:
  - Microplastics
  - Phytoplankton
  - Detritus, sediment and other particles





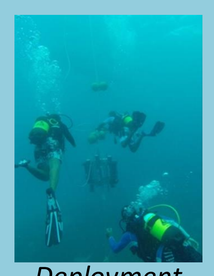
*TA+DIC prototype*

**Optimised lab-on-chip** chemical sensors:

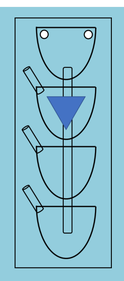
- **Cheaper** (per measurement, per parameter: e.g. 2 parameters per sensor)
- **More reliable & user friendly**
- **Faster** (samples/time)

Target (example) parameters:

- **Nutrients** (nitrate, phosphate, silicate)
- **Carbonate variables** (TA, DIC)



*Deployment (CMEP project)*



*Load Zone*

*Antibody Zone*

*Test Zone*

*Control Zone*

**Bioassay enabled Lab-On-Chip:**

- Development of **new assays**
- Implementation **on autonomous devices**
- **Toxins, pharmaceuticals, organic** pollutants

## Cross-cutting and Testing

- Develop and publish **sensor and measurement system best practice** through the OBPS/UNESCO system
- **Standardized methods for integration of sensors with platforms** (e.g. robots, floats, moorings)


**Test Site 1) Naples NEREA Augmented observatory**

**Test Site 2) Canary Basin and PLOCAN**

## Find out more:

**www.techoceans.eu**

**@TechOceanS**

## Communications & Press

**comms.techoceans@aquatt.ie**

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101000858 (TechOceanS). This output reflects only the author's view and the Research Executive Agency (REA) cannot be held responsible for any use that may be made of the information contained therein.