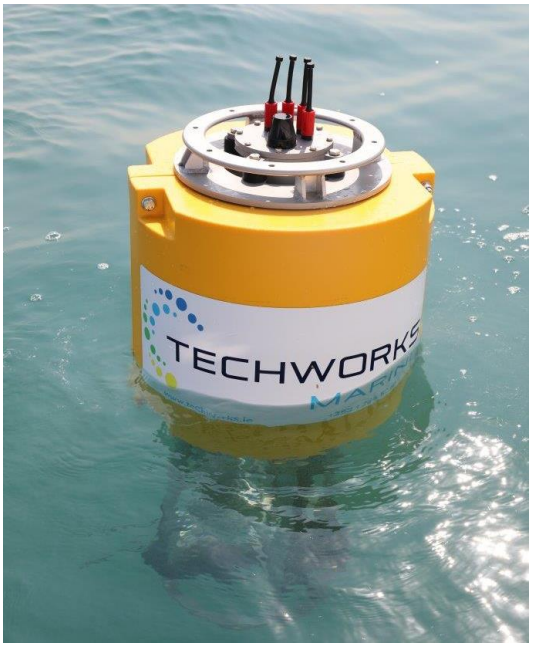
Coast Eye – Mini Buoy

Monitoring the Marine Environment



TechWorks Marine

CoastEye Mini Buoy White Paper

March 2021

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Introduction

The Mini Buoy is TechWorks Marine's latest product innovation. The small, lightweight and ergonomic design enables the buoy to be deployed by two people from a small work boat or RIB, resulting in significant cost savings as a larger vessel with a crane or A-frame is not required.

The TechWorks Marine CoastEye – Mini Buoy is a Robust, Reliable and Secure, Portable Data Buoy. Designed for Coastal and Freshwater applications.

Designed for real-time monitoring in coastal and fresh water environments, the very low power nature of the buoy system enables the user to sample from up to three different sensors at any one time. This makes the CoastEye Mini Buoy ideal for quick emergency response monitoring deployments, as well as for longer term monitoring campaigns

The CoastEye Mini Buoy can be easily deployed in the field, and will immediately start sending back real-time data to the TechWorks Marine CoastEye web portal. Which allows users flexibility, scalability and security of their data.

Users are able to view, analyse and download data from this site, and communicate with the Mini Buoy to change sampling intervals, telemetry options or conduct diagnostics. Ideal for Environment Agencies, Local Authorities and Consultant Engineers, it can be used to measure current profiles and water quality in a single small platform. In Addition to these organisations, TechWorks Marine and the European Space Agency Phi-Lab have come together to develop CoastEO, the innovative coastal monitoring solution which the Mini Buoy will be used to validate satellite EO data.

Two thirds of the world's megacities are situated in coastal areas and depend on coastal resources, which need monitoring, the TechWorks Marine CoastEye – Mini Buoy is ideal for this.

Features

- Flexible input options – up to three sensors
- Flexible telemetry options
- Flexible sampling
- Portable and easily deployable
- Web based data interface
- Full platform monitoring and warning system

Specifications

Storage: 16GB microSD

Telemetry: GSM / GPRS

Location: GPS/GLONASS/Galileo

Sensors: Internal Temperature / Humidity Sensor

3 x RS232 sensor inputs with switched power for sensors (12v)

Connectors: Subconn waterproof connectors

Antenna: Combination low profile GPS/GSM antenna

Battery: 30 days with serial instruments, sampling every 15 minutes with data transmission once per hour.

Currently Supported Sensors:

Seabird Hydrocat-EP

Seabird SUNA V2

WETLabs ECO-FLNTUS

Turner SCUFA Fluorometer

Seapoint STM-S Turbidity

HydroLAB HL4 / HL7

Aanderaa Optode

Data visualisation

Buoy configuration: CoastEye data platform

Case Study: Cork Harbour

Overview

In conjunction with Robert Wilkes from the Ecological Monitoring and Assessment Unit of the EPA Ireland, the Mini Buoy was deployed in Cork Harbour for a 32-day period from the 04/11/2019 to 06/12/2019. On this occasion, the Mini Buoy was deployed with 3 sensors which included a HydroLAB HL4, SCUFA and a SUNA V2. Each sensor transmitted in real-time to our data platform CoastEye which is displayed in the following images showing clear daily changes during this monitoring period.

CoastEye is a data portal which can be used for processing, publishing, visualising, and analysing data from many different sources. CoastEye is a web application backed up by a powerful map server and a spatial database. Data processing chains working on real-time or archived data populate the database, which is then accessed through a web portal. The data content of the system is user-driven and flexible, and we can accommodate data collected by clients.

Sensors

HydroLAB HL4

The Hydrolab HL4 is a multiparameter water quality sonde. The field proven sensor options coupled with the robust construction and easy calibration delivers high quality reliable data. The HL4 sonde has a temperature sensor, four sensor ports and an optional internal depth sensor. The software allows for easy data retrieval and setup of logging files.

SCUFA

The fluorescence channel of the SCUFA (Self-Contained Underwater Fluorescence Apparatus) Fluorometer is configured to detect either chlorophyll a, cyanobacteria or rhodamine WT tracer dye. Temperature compensation of fluorescence data is an optional parameter. The temperature data is used to automatically correct the fluorescence data for temperature effects.

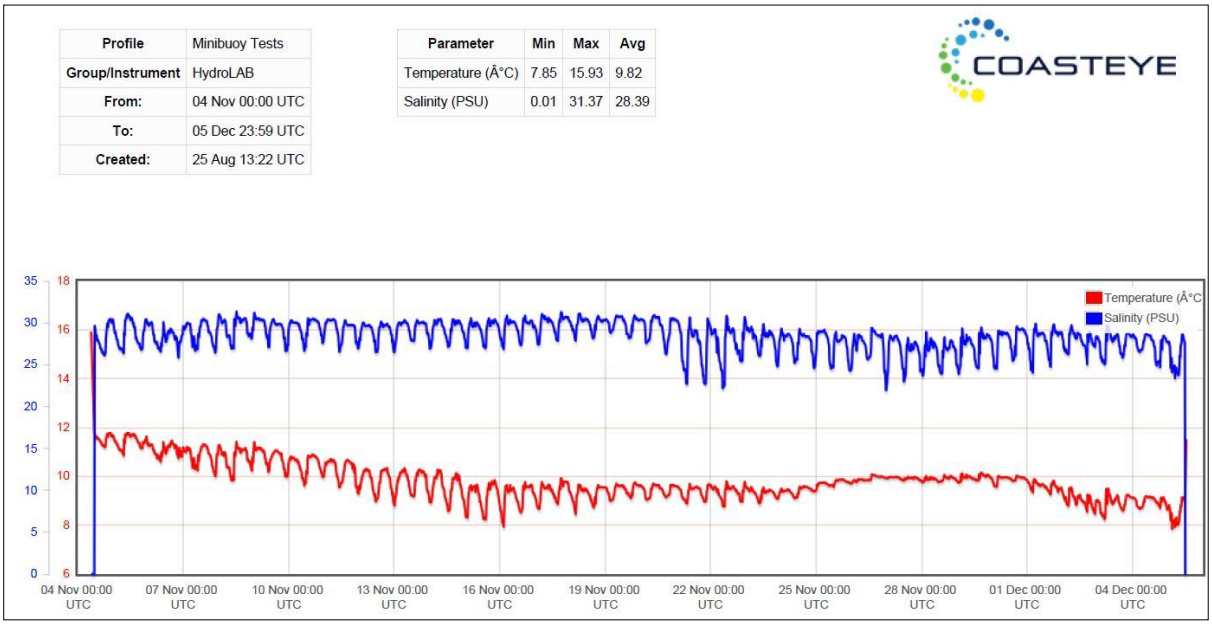
SUNA V2

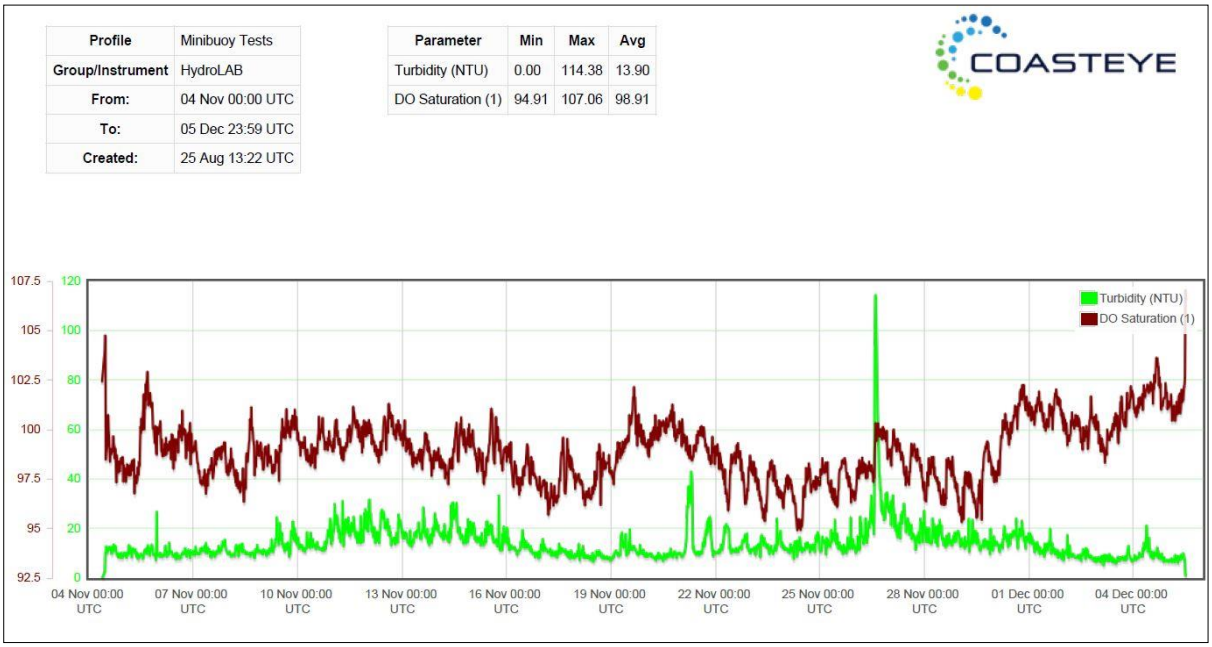
The SUNA V2 UV nitrate sensor is the ultimate solution for real-time nutrient monitoring. This sensor measures nitrate over a wide range of environmental conditions, from blue-ocean nitraclines to storm runoff in rivers and streams.

Case Study: Cork Harbour

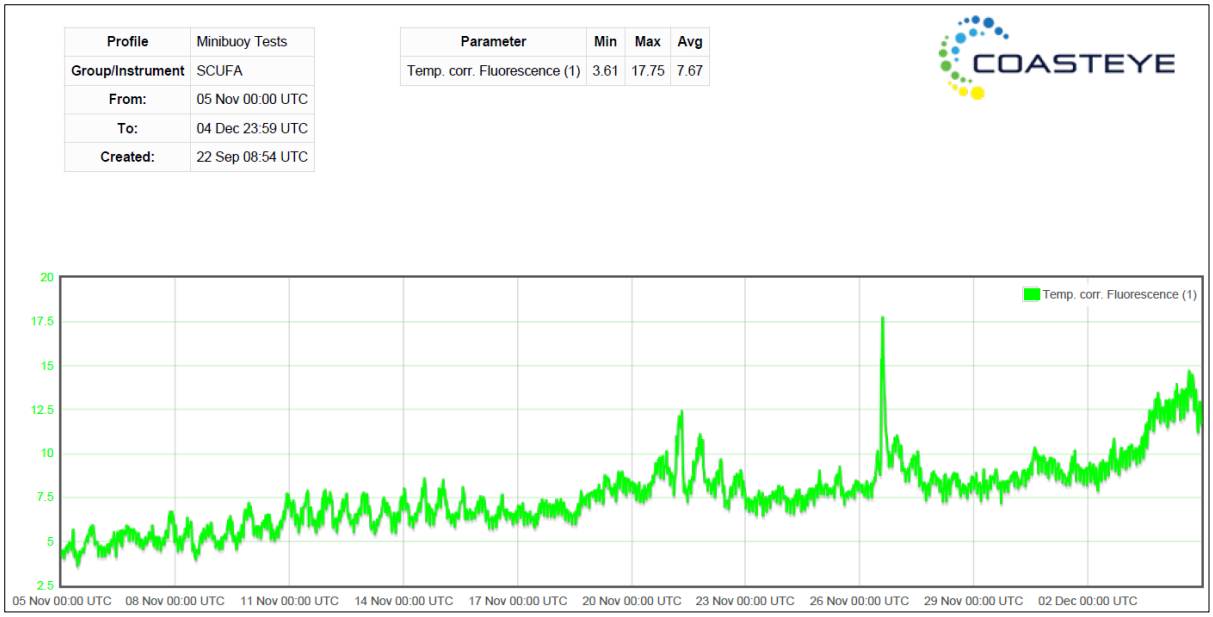
Data

- The HydroLAB recorded temperature, salinity, turbidity & dissolved oxygen saturation.





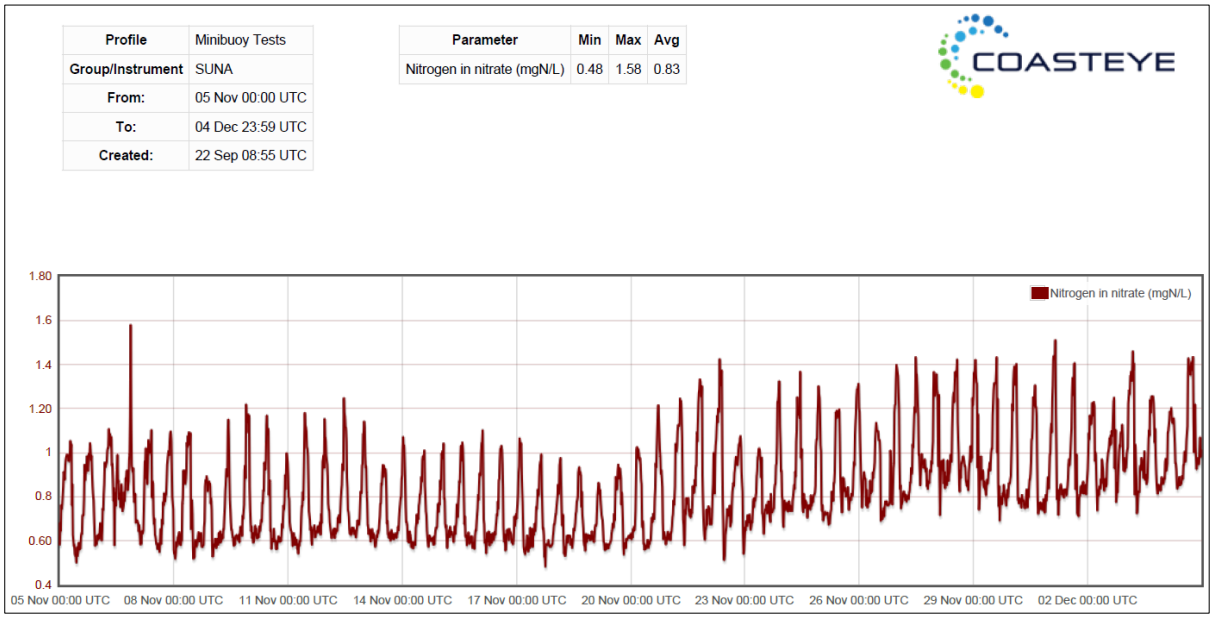
- The SCUFA recorded temperature corrected fluorescence.



Profile	Minibuoy Tests
Group/Instrument	SCUFA
From:	05 Nov 00:00 UTC
To:	04 Dec 23:59 UTC
Created:	22 Sep 08:54 UTC

Parameter	Min	Max	Avg
Temp. corr. Fluorescence (1)	3.61	17.75	7.67

- The SUNA recorded nutrients mass concentration.



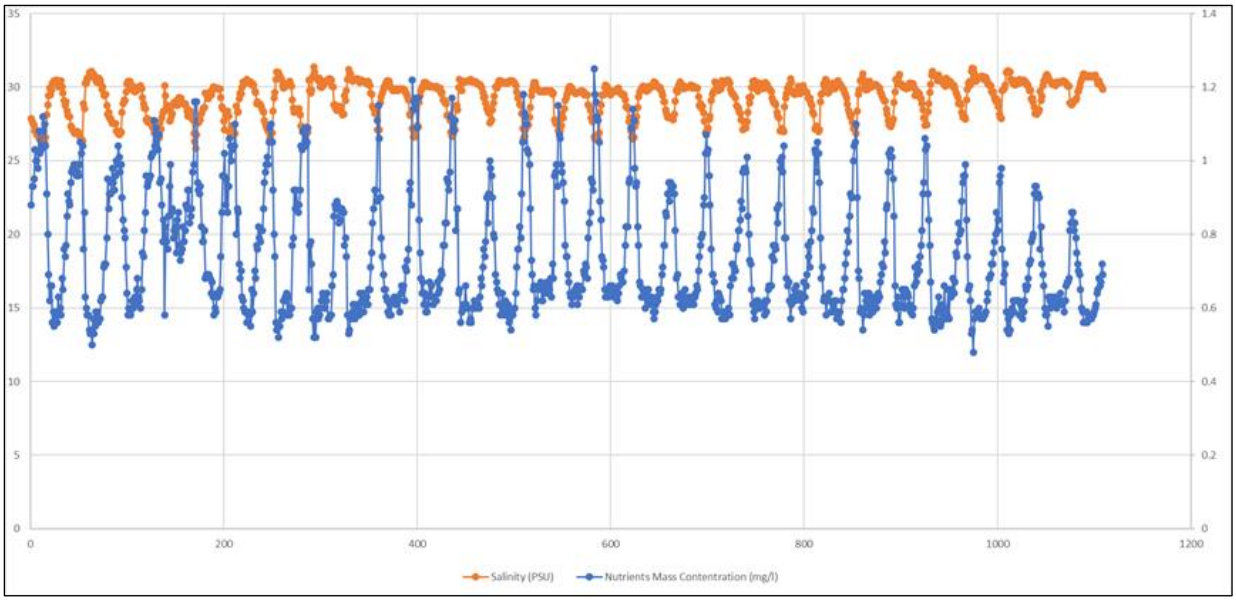
Profile	Minibuoy Tests
Group/Instrument	SUNA
From:	05 Nov 00:00 UTC
To:	04 Dec 23:59 UTC
Created:	22 Sep 08:55 UTC

Parameter	Min	Max	Avg
Nitrogen in nitrate (mgN/L)	0.48	1.58	0.83

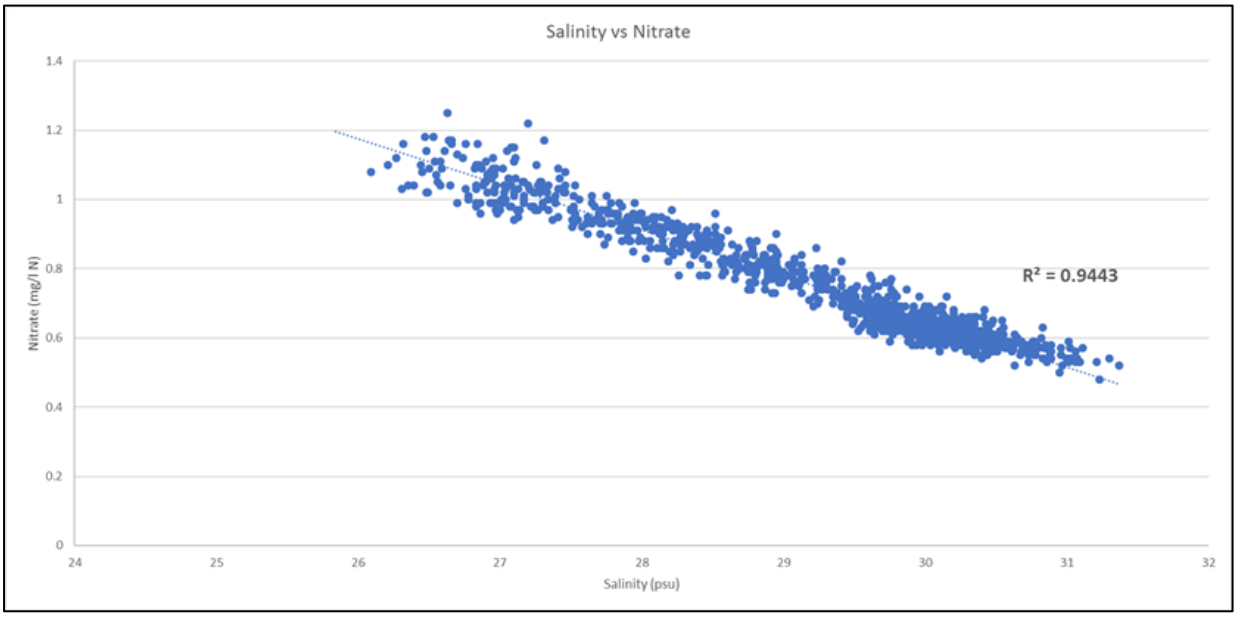
Case Study: Results

The Mini Buoy was placed near East Ferry in Cork Harbour. The sensors were set up to look at the changes in nitrate concentration in relation to salinity to help evaluate the estuarine contribution of nutrients to the Cork harbour system. Sensors were set up to record every 20 minutes.

A clear relationship between nutrient and the salinity of the water was seen. Nitrate concentration decreased as the salinity increased with the rising tide.



A very strong relationship between these 2 parameters was found (r2=0.94). The strong correlation clearly shows that the dominant source of N is from the freshwater end of the estuaries and that the catchment loads are more likely affecting ecological status in the water body.



Conclusion

The TechWorks Marine CoastEye – Mini Buoy is a Robust, Reliable and Secure, portable Data Buoy.

The CoastEye Mini Buoy can be easily deployed in the field and will immediately start sending back real-time data to the TechWorks Marine CoastEye web portal, which allows users flexibility, scalability, and security of their data.