



Sustainable port management through Copernicus: the space-based IMPRESSIVE platform

IMPRESSIVE is an Horizon2020 maritime pollution project (<http://impressive-project.eu>) implemented by a consortium of 12 partners from the European private and public sector.

Serious marine pollution events such as oil spill accidents and waste water discharges constitute a common challenge across regions' ports that severely impact the environment at a European and global level. In response to this, **IMPRESSIVE project aims at the development of a universal relocatable geoportal which tracks the marine pollution events** in the ports of the European Union and their areas of influence.

In the framework of the EU's Blue Economy and the Green Port Strategies, **IMPRESSIVE web application achieves at a low cost a better port management** which provides to the end user with all needed information to control pollution incidents.

The use of IMPRESSIVE EO platform could benefit the following target audiences and potential clients of the system as below:

- a) Port authorities** (also Coast guards, Environmental protection Agencies) could improve sustainability and secure safer activity through a better pollution control management in the ports,
- b) local and regional authorities** could enhance industry competitiveness and innovation thanks to job creation and technology transfer of new skilled human resources with EO-data expertise, able to support the end users,
- c) maritime industry** (including Oil/gas industries, Off-shore industries) and SMEs could get a better corporate image concerning their operations within the ports.

impressive-project.eu

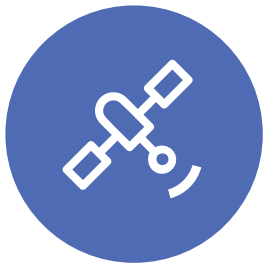
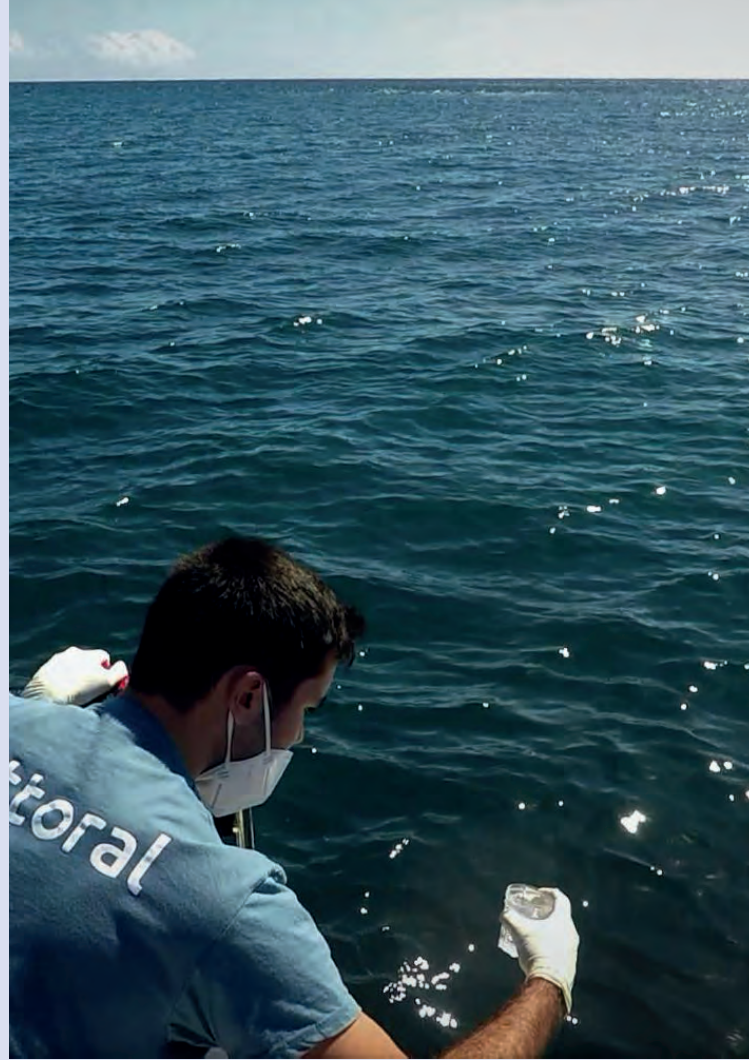




An ultimate goal of IMPRESSIVE's innovation action is to **foster the exploitation of Copernicus by supporting efforts to reduce the amount of pollutants**, to improve the quality of waters and to provide greater access and information to citizens.

To achieve this, the IMPRESSIVE web application is **built on different innovative technologies/techniques for earth observation, robotics and advanced mathematical models**, for the development of this integrated, universal and replicable system, based on satellite images and Copernicus Marine products.

impressive-project.eu



**Satellite
monitoring
service**



**Software
package**



**Risk
mapping**



**Autonomous
Surface Vehicles**



**Action
protocol**



**Rapid-response
integrated system**



The positive impact of the project has also been evident in 2020 when the Commission's "Innovation Radar" portal recognised IMPRESSIVE as an excellent innovation product. IMPRESSIVE project was recently selected in the May 2021 edition of RESEARCH*EU Magazine in the Topic "EU researchers tackle pollution for a cleaner, greener Europe". More info in the following weblink: <https://cordis.europa.eu/article/id/429874-a-set-of-new-eyes-to-detect-oil-spills-in-harbours-and-coastal-areas>

Additional information on IMPRESSIVE one may listen in the following podcast episodes of CORDIS following the below weblinks:

- <https://anchor.fm/cordiscovery/episodes/EU-researchers-tackle-pollution-e11kf7n> (Anchor.fm)
- <https://open.spotify.com/episode/6FSDMphypHpAAIAIYU3ku5> (Spotify)
- <https://podcasts.apple.com/gb/podcast/eu-researchers-tackle-pollution/id1552133898?i=1000523170414> (Apple Podcasts)

IMPRESSIVE is an **Horizon2020** project implemented by a consortium of 12 partners



Aratos.Net Ltd



National Observatory of Athens (NOA)



Consejo Superior de Investigaciones Científicas

Puertos del Estado



Puertos del Estado



Euro-Mediterranean Center on Climate Changes (CMCC)



Planetek Italia



Universidad de Las Palmas de Gran Canaria



European Association of Universities in Marine Technology and Related Studies (WEGEMT)



Elittoral s.n.l.e. (Estudios de ingeniería costera y oceanográfica)



Wide Pilot S.r.l



Network of European Regions Using Space Technologies (NEREUS)



CloudFerro sp. z o.o.



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2nd press release: La Luz Port (SP)

The tools and methodology of IMPRESSIVE are tested and validated in three selected European harbors that are modelled as pilot areas: **La Luz Port (Gran Canaria, Spain), Taranto Port (Italy), and Rafina Port (Greece).**

The purpose of these Press Releases is to present the successful outcomes of the three pilot tests and help interested stakeholders understand further details of IMPRESSIVE solution.



Members of Ellittoral, ULPGC and SITMA teams in La Luz Port preparing for the test

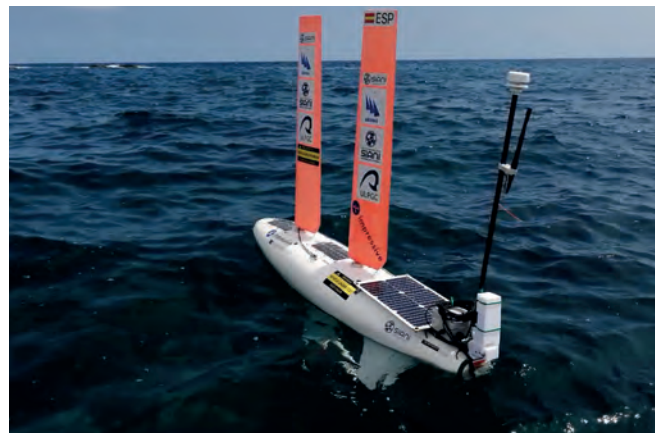
On **23rd & 24th September 2021**, a preparatory test and a **final pilot test** were carried out in the marine area of the **Jinámar Waste Water Treatment Plant (WWTP)** in the wider area of Port of **La Luz (Gran Canaria, Spain)**. The pilot test was implemented after several previous sea trials with the IMPRESSIVE unmanned vehicles involved (a drone and a marine autonomous surface vehicle –ASV–).

The aim of this 3rd pilot activity was to **perform a dispositive with successive rhodamine spill blobs** in this little bight. The whole IMPRESSIVE elements and tools exploited for La Luz pilot included: **4 Copernicus Sentinel satellites (S1A,B and S2A,B), 1 hyperspectral and 1 RGB drones, 1 ASV, 2 zodiacs, 1 very high-resolution current model (350m*350m), 1 real-time radar CODAR data base (60m*60m) and the Lagrangian metric/hourly projections of the different blobs of rhodamine.**

The pilot test was carried out in the waters surrounding the Jinámar WWTP discharge point (“Barranco del Real” bight), within the context of a marine test site managed by the Oceanic Platform of the Canary Islands (PLOCAN). This allowed the IMPRESSIVE consortium not only to perform a discharge simulation using rhodamine, but also to take data from the water treated by the plant, and to see its dispersion in the sea. During the pilot work, the operation of the WWTP was not hindered and **the surrounding marine environment was not affected.**



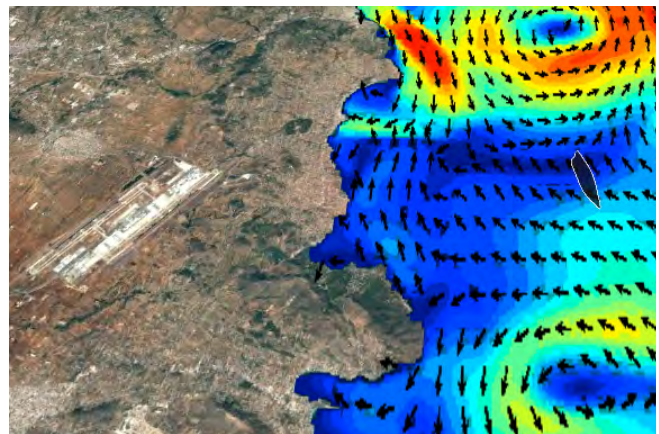
RGB drone taking flight



ASV monitoring the rhodamine spot



Satellite view from Sentinels



Lagrangian projections model

Throughout the tests, several organizations and institutions, members of the project consortium (**Elittoral, ULPGC, SITMA-FCPCT, CSIC, Puertos del Estado**) as well as other collaborators (**ITC, PLOCAN**) participated on the field team. Moreover, other members were providing support for online streaming and video recording (**WEGEMT**). Images and videos of the activities were taken both from the coast and from the sea were taken.



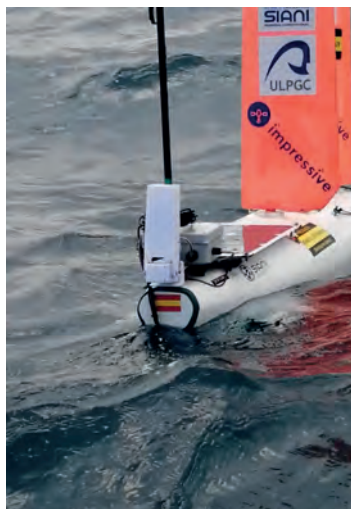
Rhodamine preparation



ASV trajectory programming



Water analysis on the Zodiac



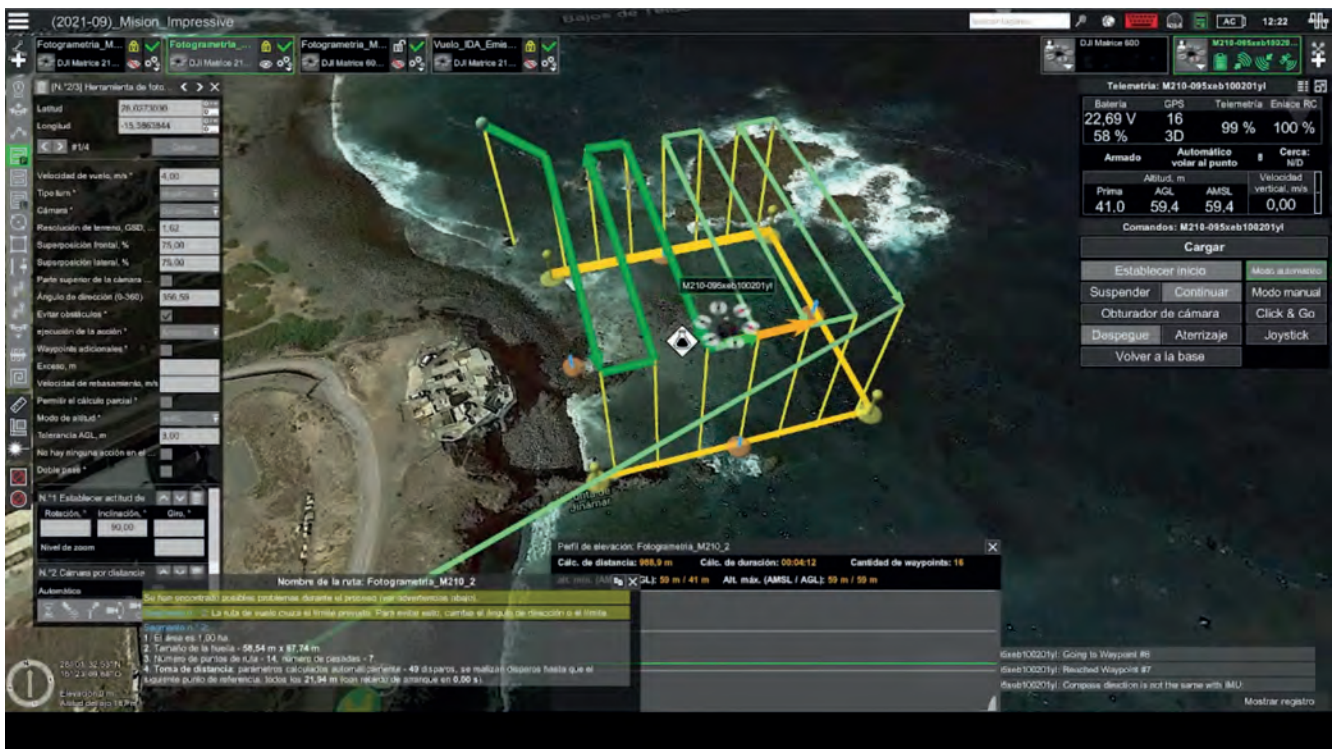
ASV deployment



Drone with hyperspectral camera

The tests were carried out between 8.30 a.m. and approximately 2 p.m. for the two days. In both cases, the start of the tests were conditioned by weather and sea conditions.

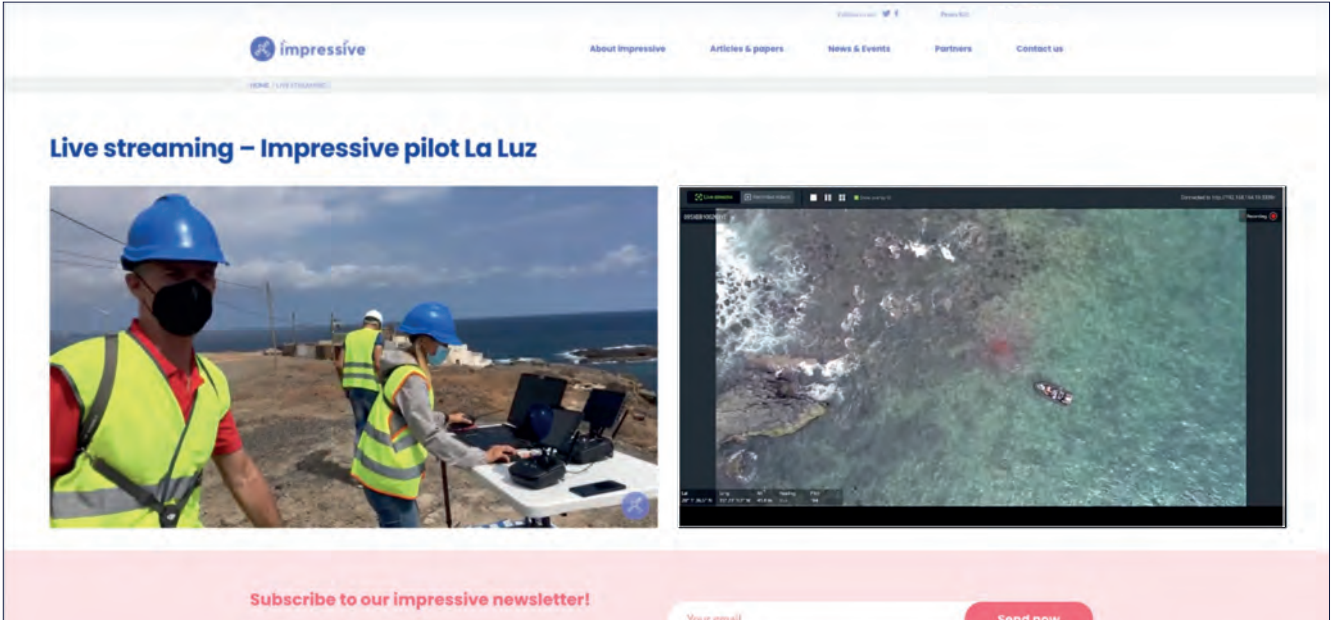
On the first preparatory day, a drone with an RGB camera was used to track the rhodamine at sea, together with a support boat to ensure the safety of the drone flight. On the second day –dedicated to the final pilot test– the use of a drone flight equipped with RGB camera (first flight) and with hyperspectral camera (second flight) was combined with the ASV sampling at sea in autonomous mode (towed from port and supervised from a boat), as well as with water sampling with a multiparameter probe (from a second support boat that was also ensuring the drone safety operation).



Drone scanning path

The main part of this final pilot test was transmitted online through streaming via IMPRESSIVE’s social networks allowing CE Project Officers, other consortium’s members, and invited experts to watch the operation remotely.

In both events, the rhodamine “spill” was perfectly visualized and its evolution could be followed until its complete disappearance.



The screenshot shows the 'impressive' website with a navigation bar containing links for 'About Impressive', 'Articles & papers', 'News & Events', 'Partners', and 'Contact us'. The main content area is titled 'Live streaming – Impressive pilot La Luz'. It features a live video feed on the left showing two workers in blue hard hats and yellow safety vests at a workstation with laptops. On the right, there is a smaller video player showing an aerial view of a coastal area with a spill. Below the video feeds is a red banner with the text 'Subscribe to our impressive newsletter!' and a 'Send Now' button.

Live streaming on impressive-project website

The **ASV** developed two main tasks in real-time autonomous mode during the final pilot test: a) **sampling of three different parameters** (rhodamine fluorescence, temperature and turbidity), thanks to the specific sensors installed on-board for the objectives of IMPRESSIVE project; b) **direct water sampling through a special device** designed within the context of IMPRESSIVE project and also installed on-board the ASV.

On the other side, the imagery data collected with the hyperspectral sensor was processed and the **rhodamine index was obtained**. Measurements from the support boat were useful to obtain data used as “ground true” to certify the presence of the rhodamine.

Concluding remarks

In conclusion, the IMPRESSIVE DISPOSITIVE has touched in a very difficult bight the monitoring of a metric/hourly spill with emergent tools and the metric/hourly FORECAST of the potential path that the metric spill would follow (+72h).