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LAND-SEA 2026

Poster Abstracts

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1. **Community-Led Observations at Africa's Land-Sea Interface: Building a Continental Biodiversity Monitoring Network through the African Ocean Biodiversity Atlas**



The African Ocean Biodiversity Atlas (AOBA) is an endorsed UN Ocean Decade Action coordinated by Ocean Rock Base and implemented through the Africa Ocean Alliance. The initiative addresses biodiversity and observation gaps across Africa's land-sea interface by mobilizing local communities, fishers, youth, and citizen scientists to document coastal and marine ecosystems using affordable digital technologies.

Operating across more than 20 African countries with over 800 users, AOBA integrates citizen science, Indigenous knowledge, gps tools, and mobile applications to monitor fisheries, mangroves, seagrass meadows, seaweed habitats, estuaries, lagoons, and coastal wetlands. Community-generated observations provide valuable biodiversity and ecosystem data that support conservation and marine spatial planning.

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2. A Hybrid Processing Chain for Suspended Particulate Matter Estimation Across Extreme Turbidity Gradients: From Inland Lakes to Estuaries



Physically based algorithms often lack universal applicability, tending to overestimate in clear waters and severely saturate in hyper-turbid zones. To address this, we present a unified pipeline combining multiple methodologies into a single framework capable of robustly estimating SPM from 0.1 to over 1000 mg/L across diverse environments (inland lakes to estuaries) without saturation. The novelty lies not in individual methods, but in their synergistic combination. First, a Quality Water Index Polynomial (QWIP) filter is applied. While unnecessary for pre-filtered global databases like GLORIA and LOG, QWIP proved crucial for removing aberrant reflectances from Acolite atmospherically corrected satellite matchups over the Seine estuary. Second, an initial Machine Learning (ML) model estimates Particulate Organic Carbon (POC) to compute the POC to SPM ratio, which classifies waters into mineral, mixed, or organic Optical Water Types. Within each category, SPM is retrieved using specific semi-analytical models tailored to the turbidity level to bypass saturation limits. Finally, a conditional ML residual correction is integrated. This correction is strictly inhibited when predicted-to-observed SPM ratios fall within realistic natural bio-optical variability (0.67 to 1.5 margin), thereby preventing the ML from overfitting noise. Spatial discontinuities between classes are resolved using probabilistic soft-blending. Validated by feature importance metrics to guarantee physical interpretability, this hybrid pipeline provides a highly scalable and robust framework for aquatic monitoring across all turbidity gradients.

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3. The dynamic role of estuaries in North Sea biogeochemistry



Estuaries regulate the transport and processing of carbon and nutrients between continents and shelf seas, yet their role is often fragmented in marine and estuarine modelling. Marine models typically impose riverine inputs as unidirectional fluxes, while estuarine models rely on fixed marine boundary conditions. In macrotidal systems such as the North Sea, however, water masses continuously oscillate between lower estuaries and coastal plumes, experiencing rapidly changing environmental conditions and biogeochemical rates.

We present an offline two-way coupling framework linking the 3D marine model COHERENS and the 1D Carbon-Generic Estuary Model (C-GEM). The approach represents the North Sea and its largest estuaries—Rhine, Elbe, Weser, Meuse, Humber, Scheldt, Ems, and Thames—enabling integrated budgets across the river-to-shelf continuum. Annual carbon budgets are derived for estuaries, plumes and basin segments.

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4. **Integrated Science for the Co-Creation of Global Change Adaptation Pathways: the case of Ria de Aveiro Lagoon Region (Portugal), in Coast-Scapes project**



The project Coast-Scapes proposes to rethink land-coast-sea systems under climate change for enhanced resilience and biodiversity gains. We shall co-design systemic resilience solutions for coastal landscapes using transdisciplinary indicators, early and climatic warnings, business models and knowledge-based maintenance to reduce climatic risks and improve land to sea environments. We propose nature-based-solutions (NbS) suited to a broad range of coastal archetypes, governance, climates and resilience deficits, sequenced along resilience-through adaptation pathways. Such solutions, supported by governance transformation and cross-sectoral engagement, will be applied by regions and communities empowered by an unprecedented combination of technical tools, financial models and social commitment.

The Ria de Aveiro lagoon region in Portugal—a shallow 50 km by 15 km Natura 2000 protected area fed by five rivers with a single outlet to the Atlantic Ocean—exemplifies these coastal pressures. The region faces significant threats from coastal and fluvial flooding, coastal erosion, urban residential expansion, and port and industrial development. Management responses span retreat, accommodation and protection. Implemented protection measures include traditional hard-gray measures (as well as nature-based measures).

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5. JERICO: a European Research Infrastructure for integrated coastal observation



JERICO is the European Research Infrastructure dedicated to integrated, multidisciplinary and multiplatform observation of coastal marine systems. Recently included in the ESFRI Roadmap 2026, JERICO brings together national observing capacities to provide sustained, high-quality observations, FAIR data, access to facilities and fit-for-purpose services across European coastal seas. Within LandSeaLot, JERICO provides the coastal component of an integrated approach to the land-sea continuum, complementing DANUBIUS-RI and ICOS capacities from river catchments and estuaries to the atmosphere. Through harmonised observations, interoperable data flows and coordinated operations, JERICO contributes to addressing key challenges at the land-sea interface, including carbon and nutrient fluxes, climate change impacts, pollution and biodiversity loss, and to building a sustained European observing capacity from land to sea.

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POSTER ABSTRACTS

6. Preliminary simulation of microplastics dispersion for the Danube Delta LIL



The hydrodynamic 3D model SHYFEM, which is capable of simulating conservative tracers, has been used to simulate dispersion of microplastics in the Danube Delta LIL. The grid covers the whole Danube Delta, needed for the injection of tracers, and the whole Romanian coastal area, reaching 1600 m deep at its southern boundary. The dispersion of plastics is simulated through different sinking coefficients, both positive, for microplastics heavier than water, and negative.

The model provides beaching of sediments on the coast and burying of sediments all over the domain. We are currently presenting the preliminary results. Next steps will include validation of the model, based on the observations, as well as plastic dispersion and accumulation scenarios under combined hydrodynamic, climatic and anthropogenic pressures.

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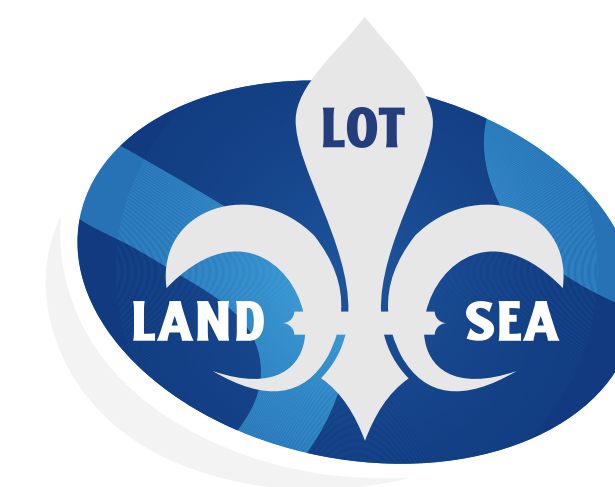
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POSTER ABSTRACTS

7. Land-Sea Interactions in the North Aegean: Nutrients and Plastics at the Evros Delta



The Evros River discharges into the North Aegean Sea, delivering elevated nutrient and plastic loads that threaten coastal ecosystem health. Within the LandSeaLot project, the North Aegean Living Lab combines *in situ* observation, remote sensing, and modelling to study these challenges. Activities include multi-platform sensing in the river and at sea, nutrient sampling, camera-based macroplastic classification, and net sampling of microplastics by local stakeholders. Low-cost sensors (e.g. small salinity-temperature probes) are tested alongside citizen science for affordable coastal observation. A high-resolution hydrodynamic-biogeochemical model (~1.5 km) assimilates satellite SST, SSH, and Chl-a data. A Lagrangian particle-drift module simulates plastic dispersal, validated against *in situ* data. For nutrients, a hydrological model (MIKE SHE) of the Evros catchment and a coastal ERSEM-based biogeochemical model are used. Earth observation for plastics is explored.

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POSTER ABSTRACTS

8. The European Digital Twin Ocean: Transforming ocean knowledge into action



The European Digital Twin Ocean is a virtual replica of the ocean that will make ocean knowledge readily available to all via a free, public platform (EDITO). Its aim is to democratise access to ocean knowledge and empower decision-makers, researchers, innovators, and citizens with insights and tools to shape a sustainable future.

EDITO integrates and upgrades existing European assets, combining data from EMODnet and the Copernicus Marine Service into a single digital framework. This enables the harmonisation of high-resolution ocean observation data, forecasts, and analysis, while advanced computing resources, such as cloud and high-performance computing (HPC), support complex simulations and scenario modeling.

EDITO is a free, public platform intended to evolve into a long-term European operational service by 2030, acting as a global benchmark for digital ocean solutions.

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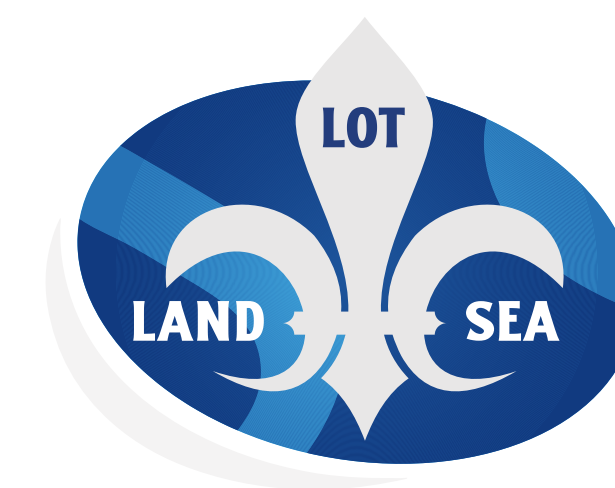
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9. **FOCCUS: Enhancing Europe's Coastal Hazard Resilience Through Co-Designed Applications Advancing Coastal Monitoring and Forecasting**



The Horizon Europe FOCCUS project (Forecasting and Observing the Open-to-Coastal Ocean for Copernicus Users, foccus-project.eu), brings together 19 partners from 11 different European countries and is endorsed by the UN Ocean Decade and part of the CoastPredict program (coastpredict.org). In collaboration with Member State Coastal Systems (MSCS) and users, this interdisciplinary and international effort aims to improve existing coastal monitoring capabilities and develop innovative coastal products that will contribute to resilience against coastal hazards and climate change. FOCCUS develops these through 3 key pillars: i) novel coastal observations, ii) improved hydrological and coastal models, and iii) coastal applications for enhanced coastal risk management. Novel high-resolution data products are created by data fusion and integrating multi-platform coastal observations (from *in-situ* coastal and remote sensing) with simulated data to enhance weather and marine services, and monitor ocean health, ecosystems and coastal changes. FOCCUS builds on existing pan-European hydrological models and improves river discharge (sediment, nutrients, water volume and active tracers) for ocean and coastal ocean models and their two-way feedbacks at the land-sea interface. New methodologies are also being tested to improve MSCS, taking advantage of stochastic simulation, ensemble approaches, and AI. FOCCUS facilitates advanced, seamless ocean monitoring and forecasting through demonstrations of new products and improved co-produced services designed with coastal management in mind. This includes targeted coastal applications that are co-designed with stakeholders to help bridge the science-policy gap. The focus is on three areas of coastal protection: i) coastal management and protection, including the prediction of coastal erosion risk, marine pollution, and sediment tracking, ii) enhancing the blue economy, such as supporting the co-use of wind and aquaculture resources, and iii) building resilience to coastal climate change, including tracking marine heatwaves, monitoring ecosystem degradation and harmful algae blooms, and predicting storm surge and wave impacts.

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POSTER ABSTRACTS

10. The European Digital Twin Ocean: Transforming ocean knowledge into action



Phytoplankton phenology in coastal ecosystems is driven by natural variability and anthropogenic pressures, especially in highly dynamic land–sea interfaces. We used daily ocean colour observations from the ESA’s Sentinel-3 OLCI sensor (300 m spatial resolution) to monitor inter- and intra-annual phytoplankton bloom dynamics. Surface chlorophyll a concentration, derived from OLCI imagery, was used as a proxy for phytoplankton biomass and analysed as a time series. A dynamic linear model was applied to extract key features of the seasonal cycle, providing a robust framework for describing bloom timing and intensity. Then, a clustering was performed to identify phenoregions, enabling an explicit mapping of phytoplankton phenology. This allowed to better understand how riverine inputs and human pressures may drive bloom dynamics. Next, the identified phenoregions will be investigated using *in-situ* and model data to better characterise the physical drivers of intense phytoplankton events.

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POSTER ABSTRACTS

11. UN Ocean Decade Marine citizen science data sharing guidelines



There has been an increase in projects with a citizen science component being endorsed as activities by the UN Ocean Decade, which increases the amount of data available for the creation of the UN Ocean Decade's Global Digital Ocean Ecosystem. Building trust in data generated by citizen scientists requires: thoughtful project design; training for data collectors, aggregators and decision makers; robust data quality assurance; and appropriate validation mechanisms. This poster, presents the marine citizen science data sharing guidelines, developed by the Ocean Decade, the Decade Coordination Office for Ocean Data Sharing, Decade Actions and other Decade bodies, to give a high-level overview of key principles, existing standards, frameworks, and recommended practices to support citizen science in properly sharing their data.

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POSTER ABSTRACTS

12. Carbon observations between the Ocean and Land (COOL): A synergy case between ESA and EC Horizon projects



In the ESA project “Carbon from earth Observation between Ocean and Land (COOL)”, we aim to estimate carbon pools and fluxes for which algorithms are relatively mature, and hence we can have some certainty in their application in the coastal ocean at the global scale in the near future. These include Particulate Organic Carbon (POC), Particulate Inorganic Carbon (PIC), Dissolved Organic Carbon (DOC) and Primary Production (PP). This poster will present the complementarity of COOL with Landsealot Integration Labs.

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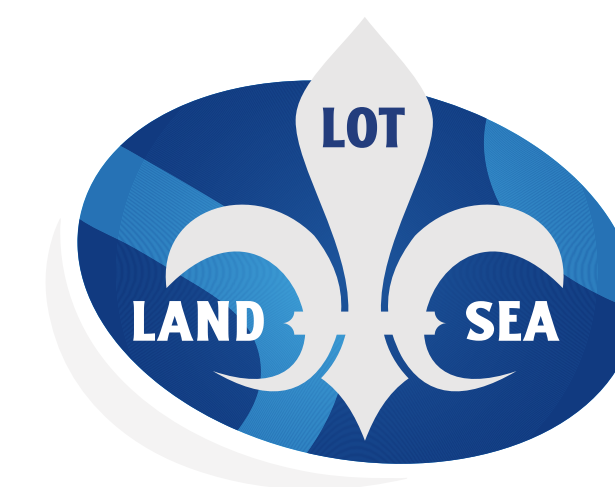
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POSTER ABSTRACTS

13. AQUARIUS - Aqua Research Infrastructure Services for the health and protection of our unique, oceans, seas and freshwater ecosystems



AQUARIUS is a Horizon Europe project advancing coastal and land-sea observation through integrated access to Europe's leading marine and freshwater research infrastructures (RIs). Research vessels, autonomous platforms, satellites, sensors, observatories, laboratories and data services support multidisciplinary research aligned with the EU Mission "Restore Our Ocean and Waters by 2030".

Two access calls have funded 28 projects, providing access to 40 RIs. Research topics include North Atlantic climate processes, Ebro Delta hydro-morpho-ecological dynamics, harmful algal blooms, carbon cycling, rockslide impacts in Arctic fjords, and land-sea interactions in the Black Sea. Outcomes support biodiversity assessment, pollution monitoring, ecosystem restoration, data interoperability and open science.

Capacity building is central to AQUARIUS, with training opportunities including scientific and technical internships, floating universities, and summer schools on ocean observing technologies.

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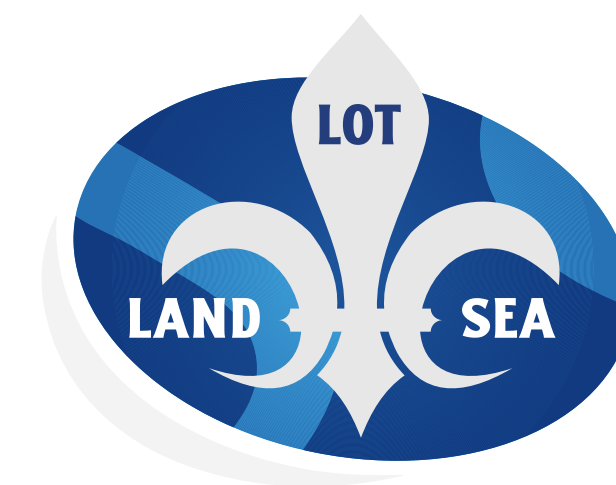
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14. EMODnet's service offer for the land-sea interface



The European Marine Observation and Data Network (EMODnet) is the EU's *in situ* marine data service, managed by the European Commission Directorate-General Maritime Affairs and Fisheries (DG MARE). Continuously consolidating and evolving, EMODnet offers an unparalleled diversity of inter-disciplinary marine knowledge assets on the marine and coastal environment and human activities at sea, all harmonised at European (or wider) scales.

Detailed in the EMODnet Community Vision 2035, key domains for accelerated progress to develop and evolve EMODnet's service offer are coastal and land-sea interface areas. This poster will detail EMODnet's current service offer for these areas, including the EMODnet river node, and future plans for development in line with the Vision 2035, including work via the LandSeaLot project.

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POSTER ABSTRACTS

15. OceanQuest: Audit-Ready Verified Evidence for the Land-Sea Interface

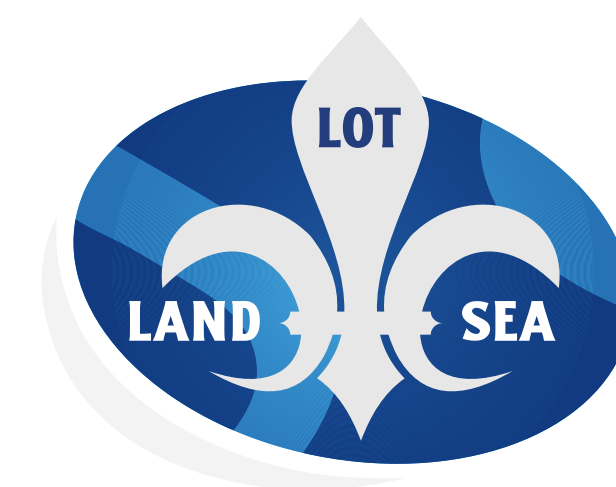
Land-sea interface (LSI) observation remains fragmented across *in-situ*, satellite and citizen-science efforts, rarely reconciled into one trusted evidence base. SaveOcean AS (Norway) built OceanQuest: citizen field observations are GPS/time-stamped and cryptographically sealed at capture, then cross-checked against independent satellite imagery and local sensor data turning reports into triangulated, audit-ready evidence rather than self-reported claims. This low-cost, smartphone-based layer can extend LSI coverage in under-monitored coastal areas, directly relevant to LandSeaLot's Danube Delta Integration Lab (marine litter, habitat condition, river-to-sea pollution tracing). OceanAcademy, our citizen-science/education component, is live while the other modules including the AI verification engine is in pilot testing with early partners. We welcome discussion with LandSeaLot partners and coordinators on where this kind application could complement Common Observation Strategy.

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POSTER ABSTRACTS

16. Low-cost Observation Networks and Observation-Informed Forecasting for the Land–Sea Interface



Understanding the land–sea interface is limited by sparse *in-situ* observations and gaps between models and real-world conditions. LandSeaLot highlights the need for integrated, scalable observation systems combining *in-situ*, satellite, and modelling approaches.

This work presents a complementary approach using low-cost Spotter sensor networks to increase observation density, combined with Shorecast, an emerging observation-informed forecasting capability. By integrating real-time measurements with existing models, this approach improves understanding of local ocean dynamics and enables more accurate, location-level predictions.

Early results demonstrate potential to enhance monitoring, reduce data gaps, and support improved modelling and decision-making across the land–sea interface.

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POSTER ABSTRACTS

17. The European Marinas Network

The European Marinas Network aims to transform marinas into coastal observation points, addressing critical gaps in near-shore monitoring by leveraging existing infrastructure for environmental data collection. Through a coordinated network of sites equipped with standardised, low-cost sensors, the initiative aims to generate real-time data on parameters such as water temperature and level, contributing openly to EMODnet. The network acts as a Knowledge Hub, bringing together scientists, marina operators, industry, and communities to co-develop guidelines, share data, and foster ocean literacy.

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POSTER ABSTRACTS

18. Traversing European Coastlines (TREC): Towards a Systems Biology of Ecosystem Interfaces



The TREC expedition addresses the fragmentation of ecosystem research through a coordinated, standardised, multidisciplinary approach to biodiversity, environmental change, and anthropogenic pressures across the European land-sea continuum. TREC sampled contrasting coastal ecosystems across 22 European countries, from near-pristine areas to rivers, lagoons, agricultural landscapes, cities, ports, and industrial coasts. Sites captured broad gradients in climate, geology, soils, sediments, and water properties. At each land-sea interface, coordinated sampling linked aerosols, soils, sediments, shoreline and offshore waters. Harmonised sequencing, imaging, chemical profiling, and biogeochemical analyses enable assessment of biodiversity, environmental gradients, and ecosystem connectivity. TREC provides FAIR, interoperable resources and strengthens European scientific collaboration.

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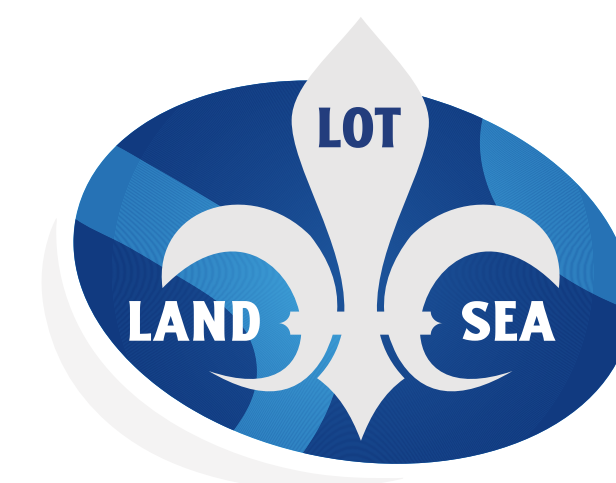
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POSTER ABSTRACTS

19. The Irish Sentinel Sites Programme: Observing Climate and Ecosystem Change Across Contrasting Irish Coastal Environments



The Irish Sentinel Sites Programme delivers sustained, high-frequency, long term observations of Essential Ocean Variables (EOVs) in Irish coastal waters, addressing important gaps in estuarine and coastal monitoring. The programme consists of three observatories on Ireland's west coast representing contrasting coastal environments: the ocean-influenced waters of Mace Head, the aquaculture-focused Lehanagh Pool, and the hypoxia-prone tidal lagoon of Lough Furnace. Together, these three sites provide a unique framework for investigating how climate and ecosystem change manifest across different coastal systems. The programme combines a common monitoring framework with site-specific instrumentation to collect physical, biogeochemical and biological observations, including temperature, salinity, dissolved oxygen, nutrients, pCO₂, pH, phytoplankton and zooplankton. Autonomous observations are complemented by regular water sampling to support data quality and ecosystem assessment. Early observations have already identified increasing trends in seawater temperature and pCO₂ at Mace Head, demonstrating the value of sustained coastal observing. As these time series mature, they will provide essential evidence to support climate adaptation, marine management and biodiversity assessment.

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POSTER ABSTRACTS

20. The Copernicus Marine High-Resolution Coastal Service and its Evolutions



The high-resolution coastal service offered in the Copernicus Marine Service provides water quality parameters derived from satellite data (Sentinel-2) at 100-meter resolution. Using an approach based on optical water types, it deals with various waters along the coasts, from very turbid water, e.g. in river mouths to clear water, e.g. in the Mediterranean coast. The service covers all European coastal waters in a 20-km strip. It can provide a solid foundation for further analyses and the development of higher-value products that can be used, for example, in reports or as a basis for scientific research. Within the service, a merged product from 100-m and 300-m input products is developed, which is highly valuable for the land-sea interface.

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21. The Land–Sea Interface: Building Sustainable Marine Engagement Pathways between Industry, Recreation, Research and Conservation



Marinas occupy a strategic position at the land–sea interface. Their fixed infrastructure provides regular and safe access to the water, while their communities connect marina operators, boat owners, visitors, researchers and environmental organisations. However, their potential contribution to marine observation remains limited by operational pressures, technical uncertainty and weak connection between data collection and locally meaningful outcomes. Through the LandSeaLot project, TransEurope Marinas is investigating how marinas can become effective points of coordination between the recreational marine sector, research and conservation. The study involves UK marinas representing different coastal and freshwater settings and contrasting governance models. Its co-design approach combines interviews, surveys, workshops, site visits, practical demonstrations and follow-up support.

Participating marinas have received cost-effective tools, including EnvLoggers for recording water temperature and Secchi disks for observing water clarity. The work examines the complete data journey: selecting a relevant monitoring question, deploying and maintaining equipment, retrieving and checking records, interpreting results and communicating findings to marina communities. Preliminary findings show that participation is more likely to continue when monitoring builds on existing marina activities and local environmental initiatives. Activities must be simple, relevant to the site and connected to a clear purpose. Limited staff time, seasonal workloads, differences in environmental knowledge and fragmented communication channels remain major barriers. Participants also emphasised the need for clear responsibilities, accessible guidance, scientific support and regular

feedback showing how their observations contribute to research or local action. The next phase will identify suitable conditions for sensor deployment, strengthen partnerships around participating marinas and test approaches for returning useful information to contributors. These findings will support a scalable strategy for long-term collaboration between marinas, recreational water users, researchers and conservation practitioners.

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22. Resolving Coastal Processes Along the Danube Delta Coast Through the Integration of Coastal Observations and Process-Based Modeling



The Danube Delta exhibits rapid evolution of nearshore morphology. Our objective is to develop, within the Danube Delta and Coastline LandSeaLot Integration Lab, a framework combining coastal observations (GeoEcoMar) with coupled morphodynamic modeling (Hereon) to resolve the processes driving these changes. Observations, including GNSS-RTK shoreline surveys, sediment sampling, and nearshore bathymetric echosounder measurements, were integrated with the Geesthacht Coupled cOAstal model SysTem (GCOAST), which combines the seamless-scale SCHISM modules with the morphodynamic model XBeach. Preliminary results reveal the interaction between the river plume and sediment mobilisation across the nearshore zone. The observed trends in shoreline rate changes coincide with modelled patterns. The results provide insight into how nearshore processes and riverine discharge interact. Future work will track volumetric changes in coastal profiles using a high-resolution XBeach setup.

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