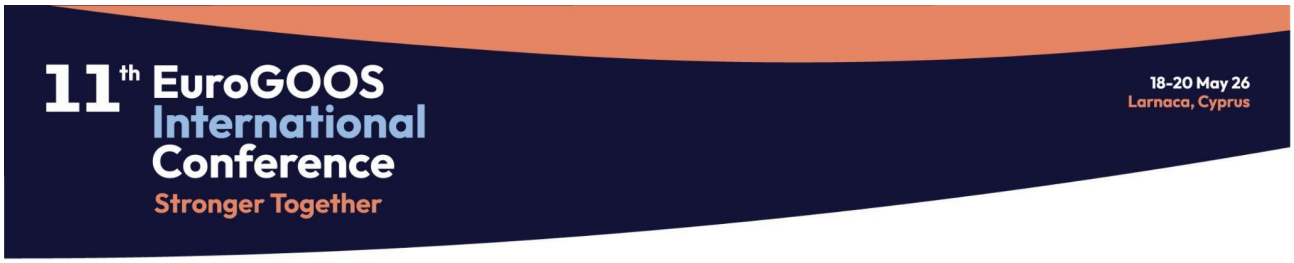

Introduction

EuroGOOS, the European Global Ocean Observing System, has for more than three decades served as the leading forum for European operational oceanography. The 11th EuroGOOS International Conference, held under the theme Stronger Together, took place at the University of Central Lancashire, Cyprus (UCLan Cyprus), in Larnaca from 18 to 20 May 2026. Organised by EuroGOOS in collaboration with the Cyprus Marine and Maritime Institute (CMMI), and convened under the auspices of the Cyprus Presidency of the Council of the European Union 2026, the conference brought together ocean scientists, technologists, modellers, policymakers and practitioners to address the challenges and opportunities facing European ocean observing and operational oceanography. The event was endorsed as a Decade Activity by the United Nations Decade of Ocean Science for Sustainable Development 2021–2030.

Over three days of plenary sessions, parallel breakout sessions, panel discussions and poster presentations, participants assessed the state of European ocean observing and exchanged priorities across five thematic areas: Innovation in Observations, Modelling and Forecasting; Digital Transformation, Integration and Data Quality; Co-Design, Engagement and Inclusivity; Governance and Capacity for Ocean Knowledge; and Monitoring the Triple Planetary Crisis and Addressing Societal Needs. The Conference concluded with session summaries and the Conference messages prioritised by the audience. These outputs, reviewed by the Conference Programme Committee, supported this Conference Statement .

The context is one of urgency. Ocean observing and operational oceanography underpin our livelihoods, safety, the sustainability of our blue economy, European climate commitments and biodiversity targets, and Maritime Spatial Planning. Significant structural challenges persist: fragmentation across national ocean observing systems, insufficient long-term funding affecting deployments, maintenance and knowledge transfer, insufficient data sharing and interoperability, and Europe's unrealised technical and innovation potential. The 11th EuroGOOS Conference confirmed that European ocean observing and operational oceanography stand at a critical juncture — and that acting collectively is the only path to meeting its ambitions.

Priority Areas: Key Messages and Recommendations

1. Innovation in Observations, Modelling and Forecasting

European ocean observing and forecasting capabilities are technically advanced, yet their full operational value is not consistently realised across the knowledge value chain.

High-resolution, multi-scale coastal forecasting — coupling atmosphere, ocean, waves, biogeochemistry and ecology — is essential to serve the sectors that depend on it. Early warning systems for compound extreme events and marine hazards must be developed as standardised, interoperable operational frameworks rather than as case-specific implementations. The structural transition from short-term, research-mode observations to long-term, harmonised operational programmes requires deliberate institutional commitment and sustained investment.

Environmental DNA (eDNA) offers a transformative approach to biodiversity observation at scale. Realising its operational potential requires harmonised protocols, long-term funding continuity and technical integration with physical observing networks. Systematic quantification of observational and forecast uncertainty is a further priority, fundamental to user confidence and to rigorous model evaluation.

Artificial intelligence and machine learning are accelerating data quality control, anomaly detection, model emulation and gap-filling. Conference attendees consistently identified this as a high investment priority for innovation. It was equally emphasised, across all five innovation sessions, that AI must complement rather than replace physics-based models and expert oversight — particularly for operational safety-critical applications. Structured validation frameworks must accompany the integration of AI across forecasting workflows.

2. Digital Transformation, Integration and Data Quality

CMEMS and EMODnet are delivering value to end users, yet the transition to fully integrated digital services — including a complete and operational Digital Twin Ocean — remains a work in progress.

Interoperability across observing systems, modelling platforms and research infrastructures was identified as the primary digital transformation priority. Breaking silos across observing domains, disciplines, modelling and infrastructures is the primary digital transformation priority. The transition from disconnected, siloed data repositories to dynamic, integrated digital services integrating observations, models and AI-enabled operational applications requires a key European focus.

Consistent implementation of Essential Ocean Variables (EOVs) across European Member States — with harmonised terminology and metadata, machine-readable specification sheets and standardised uncertainty information — represents a concrete and cost-effective step towards greater interoperability and fitness for purpose of observing and forecasting services. Digital Twin Ocean (DTO) applications further require shared technical standards for modelling platform reproducibility and scalability, which must be developed collaboratively across the European community.

AI is increasingly being used to support mission planning, downscaling, forecasting and digital twin applications, complementing physics-based models and enhancing operational capabilities. This heightens the importance of robust data governance. Human oversight, transparency and accountability must remain central to operational AI-supported workflows. Frameworks combining machine-readable metadata, persistent identifiers, digital signatures and clear provenance chains must be implemented systematically to ensure that ocean data remain identifiable and attributable as AI processing becomes more widespread. Stronger integration between Research Infrastructures, operational services and Regional Sea Convention monitoring frameworks should be encouraged to support interoperable and policy-relevant ocean data systems.

3. Co-Design, Engagement and Inclusivity

Ocean observation must be recognised and actively communicated as a public good and critical infrastructure for European resilience, safety and sustainability.

This message, which received the strongest attendee support across the Co-Design priority, reflects a broader consensus: the value of operational oceanography cannot be assumed. It must be demonstrated consistently to decision-makers, funders, sectoral users and the wider public. Structured, well-resourced ocean literacy and engagement activities are as essential to the mission as technical capability.

Co-design with end users — including aquaculture operators, fisheries managers, civil protection authorities, coastal planners, offshore energy developers and maritime spatial planners — is a primary requirement for operational systems, not a secondary consideration. It must be institutionalised and resourced at all stages of system development. Citizen science and community monitoring, including through low-cost and cost-effective sensors and IoT platforms, represent a significant and rapidly emerging observational resource, whose full potential will be unlocked through the adoption of open-data standards and direct integration with major data aggregators.

Ocean observing is fundamentally a system of people. The knowledge, trust and community ownership built through sustained engagement are assets of lasting value.

4. Governance and Capacity for Ocean Knowledge

The most pressing challenge is one of coordination and governance: Europe has the capability — what is needed now is the political and institutional will to operate its assets as a coherent, sustained system.

Strengthening Europe's leadership in operational oceanography and global observing coordination was the highest priority item highlighted by Conference speakers and attendees, followed by the call to develop and integrate national observing systems within an interoperable ocean knowledge and digital ecosystem. Together, these results articulate a clear mandate to both EuroGOOS and the European Ocean Observing community.

Europe possesses world-class assets: Copernicus Marine Service, EMODnet, the European Digital Twin Ocean, a rich network of EuroGOOS's Regional Operational Oceanographic Systems (ROOS) and an extensive Research Infrastructure landscape. The national system-of-systems approaches demonstrated by Italy's IT-IOOS and France's Fr-OOS offer instructive examples of progress towards harmonising national observing capabilities and assets under a planned coherent, interoperable European Ocean Observing System (EOOS). Alignment with GOOS and ESFRI frameworks must be systematically pursued, as well as connectivity with the established systems like EuroGOOS.

The private sector holds significant ocean data volumes from shipping, fisheries and seabed operations that remain largely inaccessible to the scientific and operational community. Incentive structures, governance frameworks and trust-building mechanisms to unlock this data must be actively developed. Structured public-private coalitions for ocean observing, such as the FVON North Atlantic Arc project, demonstrate the practical viability of such approaches. Long-term investment in skills, careers, early career ocean professionals (ECOPs) and operational expertise must be treated as core infrastructure investments, not discretionary expenditure.

A permanent, structured forum to align national ocean observing governance and to close the persistent disconnect between observing activities and formal monitoring obligations would represent a substantial advance for European ocean observing and operational oceanography.

5. Monitoring the Triple Planetary Crisis and Addressing Societal Needs

The integrated observation and modelling of climate change, biodiversity loss and pollution demands a coherent, multi-stressor approach.

This message received the broadest support in the Triple Planetary Crisis priority. European coastal areas face compounding pressures: increasing frequency of extreme events, marine heatwaves, sea-level rise and cumulative human impacts. Early warning systems remain fragmented and insufficiently standardised. Developing integrated, high-resolution forecasting systems that translate ocean data into sector-specific indicators and actionable information for aquaculture, fisheries, coastal management and safety is a clear and urgent operational priority.

Biological and ecosystem data, including Essential Ocean Variables, Essential Biodiversity Variables and Essential Climate Variables in the biological domain are insufficiently managed and shared according to FAIR and CARE principles. These requirements must be incorporated into observation campaign design from the outset. Strengthening biodiversity observations to support the implementation of the Marine Strategy Framework Directive, the Water Framework Directive, the EU Biodiversity Strategy and the Nature Restoration Regulation and the fully implemented of Marine Protected Areas requires both sustained commitment and improved data governance.

Pollution monitoring, including marine plastics and debris, remains fragmented. Greater harmonisation, and linkage to the Regional Sea Conventions is needed.

The offshore renewable energy sector is expanding rapidly in complex, dynamic marine environments; its specific monitoring, modelling and environmental assessment needs, including Digital Twin approaches, for cumulative impact assessment, must be addressed as an operational priority within European ocean observing planning.

Cross-Cutting Priorities

Underlying all five thematic areas, the conference identified a set of cross-cutting imperatives that appeared consistently across sessions and were confirmed by the audience vote.

Long-term, stable funding as a structural requirement

Securing sustained, multi-year funding for ocean observations, forecasting systems, data infrastructure and operational services was the highest-rated cross-cutting priority. The persistent reliance on project-based funding is structurally incompatible with the operational continuity that ocean observing systems require. Member States, the European Commission and international partners must collectively commit to stable, long-term financing mechanisms for the sustained components of EOOS.

Fragmentation must be systematically overcome

European ocean observing remains fragmented across national systems, research infrastructures, Regional Sea Conventions and operational services. Clear governance mandates, aligned national observing plans and a sustained commitment to an overarching European Ocean Observing system as a coordinating framework are required. The Ocean Pact, OceanEye and the EU Mission Restore our Ocean and Waters by 2030 provide the policy architecture within which observing investments should be explicitly anchored.

FAIR data as the operational default

Data sharing, machine-readable standards and open-access publication must become the default behaviour for European ocean observing and marine science. FAIR and CARE principles must be applied consistently and uniformly. As AI systems become more prevalent in ocean data workflows, rigorous data provenance, licensing and attribution practices become even more important.

Breaking disciplinary, institutional and sectoral silos

The challenges of climate change, biodiversity loss, blue economy development and maritime safety do not respect disciplinary or institutional boundaries. Effective responses require systematic collaboration across science, policy, industry and society. Capacity building for cross-sector and cross-discipline collaboration must be treated as a necessary investment, not an optional addition.

People and the next generation

There is no marine knowledge and operational oceanography without people. Providing adequate, stable resources for human capacity, including skill development, training and early-career support - across a wide range of disciplines from operations, to modelling, management, and engagement — is a prerequisite for a functioning European Ocean Observing System. The conference reaffirmed the importance of creating attractive career pathways and of ensuring that the next generation of ocean professionals is fully equipped to sustain and advance what is being built today.

Looking Ahead

EuroGOOS represents the collective voice of the European ocean observing and operational oceanography community. The 11th EuroGOOS International Conference demonstrated both the depth of European capability and the scale of the coordination challenges that remain. Europe possesses the scientific excellence, the technical infrastructure and the international partnerships to make a decisive contribution to ocean knowledge for society. What is required now is the governance will, the sustained funding and the collective action to operate these assets as a genuinely unified and sustained European system.

EuroGOOS will continue to serve as the primary forum for European operational oceanography, strengthening Europe's engagement with GOOS, contributing actively to the UN Ocean Decade Solutions, and advocating for the policy and funding conditions needed to make EOOS an operational reality.

#EuroGOOSConference · Adopted Larnaca, Cyprus · 20 May 2026