All categories

Fri. Nov 13, 2026 11:00 AM - 12:30 PM JST | Fri. Nov 13, 2026 2:00 AM - 3:30 AM UTC | Room A (Oshidori) (2F)

Demos A2

Chair: Takehisa Yamakita, Ibrahim Hoteit

11:40 AM - 12:00 PM JST | 2:40 AM - 3:00 AM UTC

[7AASr9aS-03] An Open, Democratizing Ocean Intelligence (DOI) - Interoperable Digital Twin for the Ocean - (DTO)

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1. Rationale & Objectives
Operational marine data often remains locked in dense, low-accessibility formats, limiting its utility for coastal managers, port authorities, and local stakeholders. Moving beyond static reporting, this work presents an end-to-end Digital Twin of the Ocean (DTO) framework grounded in SaveOcean.Net’s paradigm: Science you can see, Action you can measure. The framework integrates deep-tech software architecture with ocean IoT infrastructure to deliver real-time, transparent, and auditable decision dashboards accessible to all.

2. System Architecture & Methodology
Built upon Nordic open data space principles and FAIR data standards, the proposed DTO architecture connects physical ocean dynamics with decentralized observational networks:

Multi-Source Ingestion: Ingestion of satellite streams, in-situ IoT sensors, and opportunistic vessel data (via SaveOcean.Net's 10,000 Ships for the Ocean initiative).

AI Surrogates: Hydrodynamic models coupled with deep learning surrogates enable low-latency scenario modeling for thermal stress, acidification, and pollution tracking.

Interactive Decision Layer: An open decision-support interface replacing static reports with "What-If" simulation engines, converting oceanographic data into CSRD-compliant metrics and SDG 14 tracking tools.

3. Results & Case Validation
Validated through regional coastal operational deployments, the system demonstrated up to a 60% reduction in simulation latency while closing in-situ observational gaps using mobile vessel IoT streams. By bridging deep tech, AI surrogates, and community sensing networks, this open-access twin directly aligns with UN Decade of Ocean Science goals, turning ocean science into measurable everyday action.

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