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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

11:00 AM - 11:20 AM JST | 2:00 AM - 2:20 AM UTC

[7AASr9aS-01] The SURIMI Model GUI

*Timo Szczepanska[1] (1. NORCE Research AS (Norway))

11:20 AM - 11:40 AM JST | 2:20 AM - 2:40 AM UTC

[7AASr9aS-02] py-off-bgc: A Python-based offline simulator for ocean biogeochemistry

*Hakase Hayashida[1] (1. JAMSTEC (Japan))

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)

*Asif Kabani (1. SaveOcean.Net (Norway))

12:00 PM - 12:20 PM JST | 3:00 AM - 3:20 AM UTC

[7AASr9aS-04] react-earth: Open-Source 3D Globe Visualization for Ocean Data

*Clara Ni[1] (1. JAMSTEC, Seasonal Prediction Center for Shipping digital transformation (SPDX) (Japan))

12:20 PM - 12:30 PM JST | 3:20 AM - 3:30 AM UTC

Discussion

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[7AASr9aS-01] The SURIMI Model GUI

*Timo Szczepanska[1] (1. NORCE Research AS (Norway))

The usability of socio-ecological simulation models by non-technical stakeholders remains a challenge in applied social simulation. Most scientific models either lack a dedicated user interface or rely on the interface provided by their host modelling software, which constrains their accessibility in policy and management contexts. This paper presents the SURIMI Model GUI, a graphical user interface developed to make coupled socio-ecological fisheries simulations explorable and comparable by non-expert users, and to support their integration into the European Digital Twin of the Ocean (EDITO).

The interface functions as a gateway to three use cases: the Western Mediterranean Sea, the Aegean Sea, and Anchovy Bay. Through a guided scenario-definition pathway, users specify simulation parameters, compare outputs across scenarios, and access metadata describing the behaviour of the four coupled models both individually and in combination. Scenarios span short-term (5-year) and long-term (up to 50-year) horizons, five IPCC climate pathways (SSP1-1.9 to SSP5-8.5), and top-down mitigation measures such as harvest control rules. Results are reported across socio-economic indicators (catches, discards, employment by fisheries segment) and ecological indicators (stock status, biomass over time, bycatch, food-web effects).

Interface requirements were derived through a series of multi-actor co-design workshops involving policymakers, advisory councils, NGOs, the fishing industry, and scientists. These identified priorities of high interactivity, navigation between aggregate and detailed views, ready access to metadata, and the transparent visualization of uncertainty. This demonstration presents the current work-in-progress version of the SURIMI model interface and its integration into the EU Digital Twin of the Ocean.

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[7AASr9aS-02] py-off-bgc: A Python-based offline simulator for ocean biogeochemistry

*Hakase Hayashida[1] (1. JAMSTEC (Japan))

Accurate regional and seasonal prediction of marine ecosystems requires robust and flexible modelling tools. We introduce py-off-bgc, a Python-based modelling framework designed to simulate ocean biogeochemistry offline. By utilizing prescribed daily-mean 3D physical fields (temperature, salinity, and velocity) from established ocean reanalysis products (e.g., JCOPE, LORA, BRAN, CMEMS), py-off-bgc ensures realistic tracer transport without the computational overhead of coupled physics. This offline architecture allows us to focus on refining complex ecological processes and developing targeted data assimilation methods. In this presentation, we showcase preliminary results from regional py-off-bgc simulations and discuss the framework's trajectory toward seasonal prediction.

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

*Asif Kabani (1. SaveOcean.Net (Norway))

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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[7AASr9aS-04] react-earth: Open-Source 3D Globe Visualization for Ocean Data

*Clara Ni[1] (1. JAMSTEC, Seasonal Prediction Center for Shipping digital transformation (SPDX) (Japan))

Developing effective digital twins of the ocean requires accessible web interfaces to explore complex marine data. For scientists without advanced frontend programming skills, translating their results into interactive visualizations for the general public and policymakers remains a challenge, since existing 3D GIS tools are often too heavy or complex for deploying simple, public-facing web interfaces.

To bridge this gap, we present react-earth, an open-source library developed at JAMSTEC. Heavily inspired by the famous open-source cambecc/earth project, it provides a ready-to-use React component designed to display an interactive 3D globe along with geospatial datasets.

Engineered for maximum modularity, react-earth is adaptable to diverse contexts. Its architecture supports side-by-side globe displays, making it effortless to compare different climate states or variables. Scientists and developers retain complete control over data inputs and color palettes, accommodating everything from physical fields to biological metrics. Powered by WebGL and built-in interpolation algorithms, the library guarantees smooth, high-performance rendering.

In this presentation, we demonstrate how react-earth lowers technical barriers, allowing scientists to easily transform raw climate datasets into engaging, interactive 3D visual stories, ultimately fostering collaborative ocean science and data-driven governance.

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