Keynote

Wed. Nov 11, 2026 2:00 PM - 3:30 PM JST | Wed. Nov 11, 2026 5:00 AM - 6:30 AM UTC | Room B (Kujaku) (2F)

Keynotes B1

Chair: Joanna Staneva, Yoichi Ishikawa

2:00 PM - 2:15 PM JST | 5:00 AM - 5:15 AM UTC

[p9SreT9v-01] OneArgo as a Core Component of GOOS: From Sustained Ocean Observations to Digital Twins for Society

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Over the past quarter-century, the Argo program has fundamentally revolutionized our understanding of the global ocean, serving as a backbone of modern oceanographic and climate science. Achieved through unprecedented international cooperation and continuous technological innovations—such as advanced battery efficiencies, satellite communications, and robust sensor designs—the core Argo array has successfully maintained a fleet of thousands of autonomous profiling floats. This collective global effort has provided a wealth of high-quality, real-time data, completely transforming our ability to monitor ocean heat content, sea-level rise, and shifting salinity patterns. The rich scientific repository built by Argo has enabled thousands of peer-reviewed studies, refined climate projection models, and underpinned critical assessments by the IPCC.

Today, this foundational network is undergoing its most ambitious evolution yet into "OneArgo." Recognizing that the ocean’s challenges extend far beyond the upper two kilometers and physical parameters, the OneArgo design comprehensively expands the traditional array along two major frontiers: deep-ocean profiling down to six thousand meters and the full integration of biogeochemical (BGC) sensors to monitor ocean acidification, deoxygenation, and carbon uptake. As a core component of the Global Ocean Observing System (GOOS), OneArgo represents the ultimate globalization of sustained ocean observing.

However, the true value of this vast, multidimensional data can only be unlocked when it is actively translated into actionable insights for society. In this context, the rapid advancement and implementation of the Digital Twin of the Ocean (DTO) is not merely an optional application, but a primary prerequisite. A functional DTO requires a continuous, high-fidelity stream of real-time physical and biogeochemical data to continuously synchronize its virtual models with the actual state of the ocean through advanced data assimilation, numerical modeling, and AI-driven predictive frameworks. Without the global, robust infrastructure of OneArgo, digital twins would lack the foundational truth needed for high-resolution forecasting. Conversely, without the analytical and predictive frameworks of a DTO, the full societal potential of OneArgo’s multi-parameter data cannot be fully realized.

This presentation will review the historic milestones of the Argo community, outline the current implementation status and future vision of OneArgo, and demonstrate—drawing on emerging institutional frameworks like WPI-AIMEC—why the integration of observations, modeling, and AI through co-designed digital twin technologies is indispensable for addressing pressing societal needs, supporting the blue economy, and building a climate-resilient future.

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