Keynote

Thu. Nov 12, 2026 9:00 AM - 10:30 AM JST | Thu. Nov 12, 2026 12:00 AM - 1:30 AM UTC | Room B (Kujaku) (2F)

Keynotes B2

Chair: Yasumasa Miyazawa, Bente Lilja Bye

9:00 AM - 9:20 AM JST | 12:00 AM - 12:20 AM UTC

[s8HxLUFw-01] Weather Forecasts Supporting Ship Operation and Design in Maritime DX

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Japan’s maritime transport underpins daily life and economic activity, and sustaining it requires a stable
supply and operation of ships—a matter vital to the nation’s economic security. Since October 2025, an
industry–academia–government collaboration has been carrying out the R&D project “Development of Integrated Simulation Platform for Sustainable and Competitive Maritime Industry,” selected under the
Key and Advanced Technology R&D through Cross Community Collaboration Program (K Program). Over its five-year term, the project establishes an Integrated Simulation Platform that enables simultaneous
consideration of ship lifecycle and supply chain at the initial development and design stages to optimize
ship design and construction plans, thereby promoting the implementation of virtual engineering
concepts and techniques into the maritime industry. In addition, regarding weather and sea condition
predictions that impact safe and stable ship operations, a seasonal prediction technology covering one
to three months in advance, including extreme phenomena such as typhoons, is being developed and
integrated into the platform. This presentation introduces two efforts on using such weather and ocean
data, from the standpoint of the maritime industry as the data user.
The first is the operational use of seasonal predictions. To apply one-to-three-month predictions to
routing decisions, the required accuracy must be clarified and expressed as a quantitative requirement
to forecast developers. For container ship operation in the North Pacific, we apply a cost-loss model,
defining a “hit” as correctly anticipating, about one month in advance, whether weather severe enough
to prevent a vessel from proceeding northward will occur, and derive the hit rate required for net cost
reduction.
The second is estimating future encountered weather and sea conditions. The conditions a vessel meets
over its 20-year-plus lifecycle are key design inputs, informing main-engine sizing and fuel-tank capacity.
To obtain realistic profiles, we simulate operation in which routes follow predictions while encountered
conditions reflect the actual weather and sea state, using a database of past forecast fields.

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Together, these efforts combine seasonal prediction with operational simulation to reproduce realistic
ship–ocean interactions, forming a weather-informed digital twin that supports both the operation and
the design of ships.

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