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

10:00 AM - 10:20 AM JST | 1:00 AM - 1:20 AM UTC

[s8HxLUFw-04] From Demonstrators to Decisions: Digital Twins Delivering Ocean Intelligence for Shelf Seas

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Shelf seas are where society meets and interacts with the ocean. They sustain productive ecosystems and underpin energy security and global shipping. A growing number of sectors now compete for their space and resources. They are also changing rapidly, driven by climate change and human activity, and increasingly serve as the setting for climate mitigation itself, from offshore wind to marine carbon dioxide removal. This makes them difficult to predict: key processes are short-lived and can occur over fine scales, subsurface processes lie beyond the reach of Earth Observation, and human pressures add further complexity to an already shifting baseline. Meeting this challenge requires observations and models that continuously inform each other, rather than operating in isolation.
The SyncED-Ocean demonstrator, one of the first operational Digital Twins of the Ocean (DTO) implementations, showed that this loop can be closed. During a two-month campaign in a dynamic coastal sea, in-situ and satellite observations informed a coupled physical-biogeochemical model. Machine learning, with human oversight, guided autonomous gliders to collect targeted subsurface observations, assimilated daily to improve forecast skill.
But what changes when a DTO must serve multiple users, sectors, and pressures simultaneously? Mitigation measures are themselves interventions, and their effects must be detected, attributed and verified against natural variability. It will take multiple twins of infrastructure, ecosystems and interventions that work together as a system. This talk explores the case for building the next generation of DTOs around questions, rather than data volume: defining the expected state, detecting departures from it, and knowing when additional sampling adds little value. Partnering with decision-makers will be key to ensuring DTOs inform real decisions.

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