Asian Hub (DOM)

Fri. Nov 13, 2026 9:00 AM - 10:30 AM JST | Fri. Nov 13, 2026 12:00 AM - 1:30 AM UTC | Room B (Kujaku) (2F)

Oral B4 - Asian Hub

Chair: Yushi Morioka

9:53 AM - 10:05 AM JST | 12:53 AM - 1:05 AM UTC

[hIaLijy4-06] Ocean Prediction and Services in Southeast Asia: Challenges and a Pathway toward Coastal Digital Twins

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Southeast Asia's marginal seas lie at the crossroads of the Pacific and Indian Oceans and are among the most dynamically complex and hazard-prone coastal environments. Archipelagic geography, shallow shelves, narrow straits, strong currents, monsoon forcing, and climate variability interact across multiple timescales. Yet sustained in-situ ocean observations remain sparse and discontinuous, impeding model evaluation, prediction, and development of reliable ocean services. This presentation provides a Southeast Asian perspective on what is needed for Digital Twins of the Ocean to become genuinely useful. Instead of presenting an existing operational digital twin, we examine the scientific and service gaps that must first be addressed: sustained observations, data integration, realistic representation of regional ocean dynamics, global-to-local prediction, rigorous validation, and translation of forecasts into information that users can readily act on. Singapore, situated in shallow waters connecting the Malacca Strait, South China Sea, and Java Sea, provides a valuable testbed for addressing these challenges. Recent studies in Southeast Asia have demonstrated rapidly increasing marine heatwave frequency, duration, and subsurface extent, together with strong ENSO-driven ocean warming and pronounced regional sea-level variability. These changes emphasize the need for prediction systems capable of connecting large-scale climate drivers with local-scale coastal dynamics. Based on our regional studies of ocean circulation, sea-level variability, marine heatwaves, and ocean warming, we introduce an emerging Japan–Singapore collaboration that brings together complementary strengths in observations, regional process understanding, ocean-climate prediction, digital-twin development, and stakeholder co-design. Our goal is not simply to build another digital platform, but to create a pathway toward trustworthy predictions and decision-ready coastal services. Lessons learned from Singapore could help guide digital-twin development for the complex, data-sparse, and highly exposed marginal seas of Southeast Asia, supporting coastal planning, maritime operations, and climate-risk management. This effort also supports Singapore's Green Plan 2030 by enhancing coastal climate resilience.

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