Keynote

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

Keynotes A1

Chair: Marina Tonani, Fei Chai

2:35 PM - 2:50 PM JST | 5:35 AM - 5:50 AM UTC

## [_yrsOa95-03] Digital-Twin of 3D Immersive Ocean Diagnostic and Prognostic System in the Western Pacific Marginal Sea

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The western Pacific marginal sea (WPMS), spanning from tropical to high latitude region, is the transition zone between the Southeast Asia continent and open Pacific Ocean. WPMS is one of largest marginal seas in the world, surrounded by more than 15 countries with active socioeconomical development. WPMS covers bays, estuaries, shelf seas and interlinked semi-closed seas from the south to north that actively exchanges with the open western Pacific Ocean. WPMS is undergoing changes physically and biogeochemically in responses to changing climate and human activities. These changes exhibit spatiotemporally heterogenous in the multi-scale system. Diagnoses and prognoses of the status, health, resilience and future trend of WPMS are largely determined by the sustainability of the ocean in the interlinked spheric system that composes the lithosphere (land), the hydrosphere (oceans and rivers), the atmosphere, and the biosphere (living things). It is also controlled by the multi-scale processes of unique marginal sea characteristics internally and sea-ocean exchange externally. Based on complex integration of all streaming data from observation, earth simulator, analytics, visualization, machine learning and fundamental ocean and earth science, we have developed a comprehensive digital twin system, WavyOcean (http://wavyocean.hkust.edu.hk/), to resolve multi-scale processes from coastal oceans, seas to open ocean in the WPMS. WavyOcean innovatively developed an architecture of integrated land-ocean-atmosphere earth system; high-fidelity 3D immersive, GIS-BIM integrated visualization and diagnosis, comprehensive interactive analysis toolkit, high-performance rending for large-scale data and flexible cross-platform accessibility. The system let you see the unseen ocean, provides an innovative technology to make ocean transparent, and upgrade our holistic capability for understanding, prediction and management to the ocean.

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