Data, Observation & Modelling

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

Oral A4 Ocean Observing Systems and Data Quality

Chair: Sigmund Kluckner, Takeshi Doi

9:45 AM - 10:00 AM JST | 12:45 AM - 1:00 AM UTC

[MBtCkkTq-04] Design of High-Resolution Physical Oceanographic Observing System and Numerical Simulation for Coastal Seas

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Coastal seas, such as bays, estuaries, and nearshore areas within roughly 100 km of the coast, are expected to become increasingly important in oceanography. However, neither satellite observations nor autonomous observing platforms (e.g., Argo floats and gliders) are effective in these areas, where observations are required at spatial scales of 100–1000 m and temporal scales of hours to days.

To address this observational challenge, we have so far pursued three key approaches. The first approach involves establishing a continuous or high-frequency observation system in collaboration with local stakeholders, such as fishers. It is generally difficult to make high-resolution observations among many marine facilities, such as aquaculture facilities, using conventional research vessels (equipped with advanced instruments such ADCPs and CTDs). Therefore, we have established a sustainable observation and monitoring framework using fishing boats that can easily navigate among the facilities.

The second approach is to advance numerical modeling that includes not only an ocean circulation model but also an atmospheric circulation model, which compensates for the coarse resolution of observational data and also provides insights and forecasts to address societal problems in coastal seas. In the simulation of coastal circulation, one of the most difficult data to observe is, other than lateral boundary conditions, high-resolution wind stress data over the sea surface (surface boundary condition). This problem may be solved by driving an atmospheric circulation model. In general, coastal sea circulation is crucially influenced by small-scale, short-term wind variations, which are induced by steep mountains and complex coastlines.

The third approach is to conduct atmospheric observations simultaneously. Proper validation of the simulated atmospheric circulation fields is essential. It should be noted that meteorological observations are usually not conducted on mountains or at sea, where we have been carrying out such observations.

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