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CSI-POM 1 & 2: An Integrated System for Monitoring and Predicting Coastal Dynamics in the Southern Baltic Sea

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The Digital Information System for Polish Maritime Areas (CSI-POM) project is an advanced initiative aimed at monitoring and forecasting the environmental conditions of the Southern Baltic Sea, focusing on hydrodynamic, physical, chemical, and biological processes. Physical and hydrodynamic processes were implemented during the first stage of the project (CSI-POM 1), while biochemical processes are analyzed within the currently ongoing stage two (CSI-POM 2). This presentation will showcase the functionalities of this extended system on the marine environment, emphasizing its relevance to the dynamic coastal processes and human-climate interactions.

The project employs high-resolution 3D ecohydrodynamic model (CEMBS-PolSea) with a horizontal resolution of 575 m, incorporating satellite data assimilation for SST and chlorophyll-a concentration. This capability enables precise spatiotemporal analyses of key processes, such as nutrient distribution, primary production, and cyanobacterial blooms. The system features a dedicated tool for the automated detection of cyanobacterial blooms, combining satellite and model data to predict their spatial distribution and forecasted evolution. This tool is crucial for addressing the ecological and societal impacts of harmful algal blooms in coastal waters.

The CSI-POM system's tools provide vital insights into the ecological and physical interactions across coastal interfaces, aiding in understanding the variability of biochemical parameters like nitrate, phosphate, and silicate concentrations, dissolved oxygen levels, and chlorophyll-a distributions. Such tools not only enhance the predictive capacity for ecosystem management but also support decision-making in maritime economy sectors, such as fisheries, environmental protection, and coastal hazard mitigation.

The presentation will highlight the integration of advanced modeling techniques and observational data to create a holistic framework for monitoring coastal dynamics in the face of changing climate and human activities. By fostering interdisciplinary collaboration, the CSI-POM project aligns with the session's focus on sustainable coastal zone management and resilience-building.

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