

## **Introduction to KIOST Ocean Climate Seasonal Prediction Modeling and Outlook Service**

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Ocean climate, the mean state and trends of essential variables for marine environments and ecosystems, is at risk due to global climate change. For operational monthly analysis and seasonal prediction of ocean climate variables, KIOST launched an Ocean Climate Prediction Center (OCPC) in 2021 and subsequently transformed its upper division into Ocean Climate Solutions Research Division (OCSRDR) in 2023. The OCSRDR's mission is to develop and integrate ocean science-based climate change solutions encompassing ocean climate monitoring, seasonal to long-term projections, risks assessment and development of carbon capture, utilization and storage (CCUS) technologies to cope with the global issues. OCPC currently provides a monthly operational analysis and a 3-month outlook on ocean climate variables, leveraging the results of NOAA/CFS2 seasonal prediction system. Furthermore KIOST is actively developing and testing two pilot operational seasonal prediction systems, based on the KIOST Earth System Model (KOSMOS) and a global ocean system model (KOSM). These efforts include the incorporation of additional techniques, such as bias correction and machine learning, to enhance the predictability of dynamical models. The operational seasonal prediction systems are poised to contribute significantly, predicting the tropical cyclones activities in the northwestern Pacific Ocean and assessing the physio-biogeochemical status of Seychelles-Chagos Thermocline Ridge region in the tropical Indian Ocean. This introduction provides insights into KIOST's current performance in seasonal predictability and outlines its future plans, aiming to address the profound challenges posed by changing ocean climates as well as their impacts on marine ecosystems and coastal regions.