Forecast Skill Assessment of Surface Currents Using Drifter Trajectories in the Korean Strait

This study evaluates the predictive accuracy of inflowing currents at the boundaries of a numerical model domain using drifters. From 2020 to 2023, drifters were deployed quarterly at five points in the 32°N southern region of Jeju Island, South Korea, to collect data. The MOHID model simulated currents and compared them with observed drifter paths and velocities. Evaluation metrics, including RMSE, complex correlation, and Lagrangian separation, were computed to assess similarity, analyzing seasonal and regional variations in current fields. Drifter observations passing through fixed current meter buoys around Korea were also compared. Results indicate that the MOHID model generally reproduced observed drifter paths well. Variations in model performance across regions (East China Sea and East/Japan Sea) were influenced by their respective characteristics, with significant seasonal fluctuations noted. During winter, dominated by northerly winds, drifters tended to move southward within deployment areas, while in summer, they predominantly followed major currents through the Korea Strait into the East/Japan Sea. Longer model simulations showed increasing tendencies toward errors and path deviations. The MOHID model's surface layer depth is 75 cm, leading to discrepancies between predicted and observed values due to differences in representative depths affecting wind impacts on the surface. When utilizing numerical model velocity fields as inputs for particle tracking models, optimizing parameters, particularly considering wind effects, is essential. Continuous acquisition of observational data will contribute to validating boundary conditions in open seas, thereby enhancing the production of more accurate prediction data.

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