Coastal ocean measurement and prediction improving fishing efficiency

*広瀬 直毅[1]
*Naoki Hirose[1]

1. 九州大学応用力学研究所
1. Research Institute for Applied Mechanics, Kyushu University

We established data communication system between coastal fishermen and ocean scientists with 5-year support of Japan Fisheries Agency. Namely, the fishing efficiency can be improved by the prediction of ocean conditions calculated in a laboratory supercomputer. Since the numerical predictability depends strongly on the amount of in-situ measurement, we distributed more than 100 affordable sensors of small bluetooth CTD to the coastal fishermen over 10 prefectures. At the same time, 30+ fishing vessels keep sending us their velocity measurement data of bottom-mounted ADCP. The number of their mearuement data has been rapidly increasing and thus contributing to the analysis and forecast of our coastal ocean data assimilation system. Recently, we have also introduced three new attempts into the data assimilation procedure. (1) Recycling Green’s functions steadily modify important model parameters such as viscosity or friction coefficient, or boundary conditions (Hirose et al., 2021). (2) Lateral boundary control in the error covariance calculation improves temperature distribution in deep layers compared to the surface boundary control (Liu et al., 2022). (3) Structured and unstructured grid systems are compared for the reduced-order Kalman filtering. The scientific progress has been/will be quickly applied to our demonstration system (https://dreams-d.riam.kyushu-u.ac.jp/vwp/), and the coastal fishermen find the updates timely through an Android app. Since the lightweight fishing gear is easily out of control at strong or sheared current, the collaborating fishermen are happy to save their operation time based on the accurate prediction of coastal current.

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