Targeted observations based on identified sensitive areas by CNOP to improve the thermal structures prediction in the summer Yellow Sea: preparatory work for the campaign in the field

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Targeted observation is an appealing procedure to improve oceanic model predictions by taking additional assimilation of collected measurements. However, studies on targeted observation in the oceanic field have been largely based on modeling efforts, and there is a need for field validating observations. Here, we report the preparatory work of a field campaign, which is designed based on the identified sensitive area by the Conditional Nonlinear Optimal Perturbation (CNOP) approach, to improve the short-range summer thermal structures prediction in the Yellow Sea (YS). We firstly simulated the hindcasting (2016-2018) temperature structures in the summertime, and found that the locations of the sensitive areas are generally consistent in space for each hindcast year. Then, we introduced the technique of multiple-assimilation and the definition of time-varying sensitive area, and designed observing strategies for the YS summer campaign. Observing System Simulation Experiments (OSSEs) were conducted prior to address the plan on field campaign in the Yellow Sea in August 2019. Results show that, reducing the initial errors in the sensitive area can lead to more improvement on thermal structures prediction than that in other area.