Asessing the impact of the global ocean observing system using ocean data assimilation systems

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Ocean and climate prediction systems are one of the important applications of the data observed by the global ocean observing system. In a prediction system, the oceanic field is estimated as accurately as possible through an ocean data assimilation system first, and then forecast integration of a numerical model is started using the estimated field as the oceanic initial condition. Data assimilation systems require ocean observation data for estimating the oceanic field, and the accuracy of the predictions, thus, severely depends on how much oceanic information effective for the predictions are included in the assimilated observation data, as well as the quality of the numerical model and the data assimilation scheme. Therefore, developing observing systems is an important factor of improving the prediction skills. Meanwhile, building up and maintenance of an observing system are conducted by public money or funds by stakeholders, and in order to sustain and to extend the observing system, we need to show that the system brings social benefits that is equivalent to or more than the investigation. Since observation data are exploited in the society mostly through the prediction systems, assessing impact of observation data on the accuracy of analysis and predictions in ocean data assimilation and prediction systems is an effective way to show the value of the observing system in the society.
GODAE OceanView (Its follow-on program “Oceanpredict” will take over the activity from May 2019) has established the Observing System Evaluation Task Team (OS-Eval TT) since the program was started, promotes data-impact assessments and information sharing for that, and builds up international collaboration for the relevant activities. These activities are also supported by CLIVAR Global Synthesis and Observation panel (GSOP). Operational centers, such as JMA and ECMWF, and research institutes, such as JAMSTEC and Scripps Institution of Oceanography, conducted observing system evaluation studies for various observations such as Argo, TAO-TRITON, and satellite altimetry under these supports. Those results are exploited in the evaluation of the TAO-TRIRON array for its reconstruction for example, but they have a limitation due to its system dependency and the importance of multi-system evaluation with common metrics is indicated. Achievements and resent challenges of observing system evaluation studies are summarized in a community white paper for OceanObs’19. This presentation will introduce some achievements of observing system evaluation studies and show a future perspective on this field.

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