Past achievements and ongoing efforts of observing system evaluation by the OceanPredict community

Several studies have evaluated impacts of in the ocean observation data in the OceanPredict community. In particular, the essential role of the global Argo array, which is composed of more than 3000 Argo floats and a major component of the current ocean observing network, has been demonstrated well through observing system experiments (OSEs) and observing system simulation experiments (OSSEs). They were indispensable to reconstruct vertical structures of oceanic temperature and salinity fields, and supported adequate assimilation of satellite sea surface height data. A recent study confirmed the effects of the quality control done by the Global Argo Data Centers. The severe reduction of observation data reported by the TAO array, the mooring buoy array in the tropical Pacific, between 2012 to 2014 also urged prediction centers to assess in situ ocean observation impact. As a result, considerable impacts of the TAO array on the tropical Pacific analysis fields and ENSO forecasts were identified although its data density was smaller than the Argo array. The impact of nadir-type satellite altimetry and the potential of the new swath-type satellite altimetry, SWOT, have been assessed in several researches. However, past studies have relied on a single or a few ocean prediction systems, and their results may therefore be affected by systematic errors of the systems and not be applicable in general. Insufficient communication between modeling and observational communities was another issue for the evaluation activities. In order to resolve these problems, the Observing System Evaluation Task Team, which has been supporting the evaluations since the late 2000's, has started the Synergistic Observing Network for Ocean Prediction (SynObs) as a project of the United Nations Decade of Ocean Science for Sustainable Development from 2022. SynObs promotes international collaboration to identify the optimal combination of different ocean observation platforms through observing system design/evaluation, and to develop assimilation methods to extract synergistic effects. The ongoing main activity of SynObs is the international multi-system OSEs/OSSEs, in which operational centers and research institutes are conducting OSEs/OSSEs based on a common protocol using various prediction systems to identify observation impacts common to many prediction systems. The OSE/OSSE results will be analyzed under cooperation among volunteer observing groups and prediction centers. This presentation will review the past

achievements of the OceanPredict community to evaluate in ocean observing systems and introduce the SynObs, including the multi-system OSEs/OSSEs.

Yosuke Fujii (JMA/MRI) and Elisabeth Remy (MOi)