Observation impact on the medium and the long-term range forecast on an eddy-resolving ocean forecast system based on ROMS

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Japan domestic fisheries research institutions constitute a horizontally close-arranged monitoring system around the coastal and the offshore region of Japan in the western North Pacific. Most of these hydrographic data (hereafter FRDATA) have been introduced for an eddy-resolving ocean forecast system, named by the FRA-ROMS (Kuroda et al. 2016, Ishii et al., 2016, Kodama et al. 2015), which developed by Japan Fisheries Research and Education Agency and is based on ROMS (Regional Ocean Modeling System) assimilated with satellite SSH/SST and hydrographic data such as GTSPP and FRDATA. The assimilation scheme, which is founded on the MOVE system developed by the Japan Meteorological Research Institute, is characterized by the following three steps; (1) minimizing the nonlinear cost functions by using a pre-conditioning method, (2) analyzing temperature-salinity profiles by using vertical coupled EOF modes, and (3) assimilating the data analyzed into an ocean model, namely, making reliable reanalysis data by using the Incremental Analysis Updates method. We assessed the relative impact of FRDATA by comparing modeled fields with assimilated and withheld FRDATA. The coastal FRDATA enabled to finely represent hydrographic structures in the coastal region and to remarkably improve the coastal forecast on the medium range forecast (about 1-month). On the other hand, the offshore FRDATA contributed to improve the accuracy not only on the long-term forecast (about 2-months) of some synoptic phenomena (e.g. the Kuroshio) but also of some coastal changes caused by such the phenomena.

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