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Regional difference in Performance between EnKF and EnOI in the North Pacific

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The North Pacific is a crucial region in decadal climate changes like the El-Ninõ Southern Oscillation (ENSO) and the Pacific decadal oscillation (PDO), which influence critically not only oceans but also atmosphere. Despite of the importance of ocean data in the North Pacific, available data have been rare due to limitation of accessibility. Data assimilation have been used to produce more reliable ocean data. The North Pacific is comprised of several distinctive areas, including the equatorial and tropical regions, subtropical regions, and the boreal Bering Sea region. Each region demonstrates various ocean current characteristics. Appropriate assimilation method considering the characteristics of the sea area might be selected. In this study, we compared the performance of Ensemble Optimal Interpolation (EnOI), a simplified version of Ensemble Kalman Filter (EnKF), according to ensemble composition and assimilation time interval and compared the regional performance difference between EnOI and EnKF in each region. Ocean circulation model in the North Pacific was conducted using ROMS from 2006 to 2015. Assimilation of sea surface temperature for 2015 using EnKF and EnOI methods with satellite data from the Operational Sea Surface Temperature and Sea Ice Analysis (OSTIA) was applied respectively. The RMSE of the Sea Surface Temperature of EnKF was lower than that of EnOI in the Northwest Pacific where the spatial SST correlation structure was complex. But, the RMSE of EnOI was lower than EnKF in the Equator area with simple SST correlation structure in SST. The efficiency of each method in terms of accuracy, resources and time was also compared. EnOI was faster by about 7 times than EnKF.