Multiyear climate prediction using 4D-Var coupled data assimilation system

Multiyear climate prediction using 4D-Var coupled data assimilation system

*望月 崇[1]、増田 周平[1]、石川 洋一[1]
*Takashi Mochizuki[1], Shuhei Masuda[1], Yoichi Ishikawa[1]

1. 国立研究開発法人海洋研究開発機構
1. Japan Agency for Marine-Earth Science and Technology

   An initialization relevant to interannual-to-decadal climate prediction has usually used a simple restoring approach for oceanic variables. Here, we demonstrate the potential use of four-dimensional variational (4D-Var) coupled data assimilation on the leading edge of initialization approach particularly in multi-year (5-year-long) climate prediction. We perform full-field initialization rather than anomaly initialization and assimilate the atmosphere states together with the ocean states to an atmosphere-ocean coupled climate model. In particular, it is noteworthy that ensembles of multi-year hindcasts using our assimilation results as initial conditions exhibit an improved skill in hindcasting the multi-year changes of the upper ocean-heat-content (OHC) over the central North Pacific. The 4D-Var approach enables us to directly assimilate a time trajectory of slow changes of the Aleutian Low that are compatible with the sea-surface-height and the OHC. Consequently, we can estimate a coupled climate state suitable for hindcasting dynamical changes over the extratropical North Pacific as observed.

キーワード：十年規模予測、四次元変分法、結合データ同化
Keywords: Decadal prediction, 4D-Var data assimilation, Coupled data assimilation