In a near-term climate prediction covering the period up to 2030, we require knowledge of the future state of internal variations in the climate system as well as the global warming signal (i.e., response to external forcing). Recently, we performed ensemble decadal hindcast experiments with initialization, and explored predictability of internal variations such as the Pacific Decadal Oscillation (PDO) (Mochizuki et al. 2010 in PNAS). Here, we build on our earlier experiences by employing ensemble hindcast experiments using a higher-resolution climate model.

Using a coupled atmosphere-ocean climate model (MIROC4 composed of T213L56 AGCM and 1/6-1/4deg. 48levs. OGCM), we perform 10-sets of 10-year-long 3-ensemble hindcasts with initialization, every five years after 1961 (i.e., Jan1961-Dec1970, Jan1966-Dec1975, Jan1971-Dec1980,...). Our initialization is based on anomaly data assimilation approach using an objective analysis dataset of upper ocean temperature and salinity. Overall, preliminary results of the initialized hindcasts represent a similar level of performance in decadal climate hindcast, when compared to 10-ensemble hindcast experiments using a medium-resolution climate model. Our initialization works to reduce the root-mean-squared errors of upper ocean temperature in 5-year hindcasts, while it may not be easy to hold fully significant discussions due to the small number of ensembles (i.e., three). In particular, large impacts of initialization are found over the mid- and high-latitudes of the North Pacific and the high-latitude of the North Atlantic, where the signals of the PDO and the Atlantic Meridional Overturning Circulation are observed strongest.