

Development of high-resolution ocean future projection dataset around Japan using CMIP5 atmospheric forcing

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One of the subthemes in the SI-CAT project (Social Implementation of Climate Adaptation Technology, funded by MEXT, Japan) is development of the near future ocean projection database which contributes to the adaptation plan for climate change in local governments in Japan. For this purpose, we have developed North Pacific model with 10km horizontal resolution (SICAT10 model) and regional ocean model around Japan with 2km horizontal resolution (SICAT02 model). We have adopted several CMIP5 models and scenarios (historical, RCP8.5, and RCP2.6) to compose the surface atmospheric forcings for ocean future projection simulation. Using the CMIP5 atmospheric forcings and the SICAT10 model, we have performed ocean future projection experiments from 1980 to 2100 with several cases and scenarios, and produced the ensemble dataset (about 800 years). We have also performed downscaling experiments using this dataset and the SICAT02 model to produce higher horizontal resolution dataset of ocean future projection around Japan, where the cases and scenarios are chosen based on the needs in the SI-CAT project. The basic spec of the SICAT10 model is similar to the ocean reanalysis dataset FORA, and we have also prepared some reference datasets including the realistic historical simulation using the atmospheric reanalysis data JRA55 and the downscaling products using JRA55 and FORA. The practicability of cross validation with these realistic products is one important feature of the above ocean future projection products. We have confirmed some basically reasonable reproducibility of historical simulation fields and climate change responses (e.g., SST, SSH, and transports around Japan) and found some differences between the CMIP5 cases through the validations. Details of the datasets and validations will be shown in the presentation.

Keywords: Ocean future projection simulation, Downscaling, CMIP5, SI-CAT