Future Projection of the North Pacific Ocean State with Ensemble Cmip5 Forcing for Coastal Applications

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The North Pacific Ocean (NPO) state is about to experience significant transition by the end of this century under the current trend of the global climate change. NPO coastal communities are now facing a challenge to establish adaptation plans to mitigate impacts of the climate change to their socio-economical environment. The best resource to provide the future projection of an ocean state available today is CMIP5 data and they have been used substantially for evaluating future coastal marine environment. However, this approach has drawbacks to meet with current demands in the coastal applications. Since CMIP5 data are produced by a coupled earth system model, its resolution is kept relatively coarse and additional downscaling efforts are required for the coastal applications. Further, not all key variables are available to be assessed due to limited storage space. Under the SI-CAT project, we are aiming at providing a set of near-future NPO state for assisting stakeholders develop an adaptation plan along Japan coast. Our approach is unique in the following points: 1) ensemble ocean state is re-generated by driving the eddy-resolving NPO model with ensemble CMIP5 atmospheric forcing, 2) Base ocean state forced by reanalysis atmospheric forcing is provided for model evaluation and is validated against high-resolution ocean state reanalysis, 3) Comprehensive model state variables are saved so that of o(2km) ocean state along Japan coast can be generated by dynamical downscaling, 4) A set of CMIP5 models is selected based on availability of 3 hourly data in the historical, rcp2.6 and rcp8.5 experiments and the separation latitude of Kuroshio being at reasonable range in its historical experiment. The data production has started in 2017 and is planned to be completed by 2019. We will report on the preliminary examination of the ensemble ocean state and challenges towards the final data production.

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