Development of a physical-biogeochemical-fish coupled model for the western North Pacific

*Takaaki Yokoi[1], Shin-ichi Ito[1], Raphael Dussin[2], Enrique Curchitser[2]

1. Atmosphere and Ocean Research Institute University of Tokyo, 2. Rutgers University

Japanese food culture is highly depends on seafood and marine capture fishery is one of the important food supply for Japanese. However, the catch of many fish species in Japan showed multi-decadal fluctuations. Species alternation of sardine, anchovy, and chub mackerel is one of the distinctive phenomena. Until now, the mechanisms of fish stock fluctuations are still unclear, although many studies have been conducted. The authors are focusing on a 18.6-years tidal oscillation. Tides generate strong mixing interacting with bottom topography. Therefore, we focused on the Kuril Islands, Izu Ridge, and Nasei Islands as tidal mixing hotspots. As fish species live in tidal mixing hotspot areas in the western North Pacific, the authors are focusing on Jack mackerel, chub mackerel, and Pacific cod. To investigate the influence of the 18.6-years tidal oscillation on those species, we are planning to apply the Regional Ocean Modeling System (ROMS) coupled with North Pacific Ecosystem Model for Understanding Regional Oceanography For Including Saury and Herring (NEMURO.FISH) for chub mackerel in the western North Pacific (hereafter: this model is referred as the ROMS-NEMURO.FISH). The ROMS-NEMURO.FISH was driven by the atmospheric forcing of Common Ocean Reference Experiment version 2 (CORE2). Also, the Simple Ocean Data Assimilation (SODA) was used as the initial and the boundary conditions for the ROMS-NEMURO.FISH. In this presentation, as a first step, we briefly report the climatology and interannual fluctuation of physical fields and will discuss the model reproducibility to evaluate the model physical field from the point that the model can be applied for the fish stock fluctuations.

Keywords: physical-biogeochemical-fish coupled model, ROMS, NEMURO.FISH, chub mackerel

