

A challenge to evaluate effect of climate change on Japanese anchovy (*Engraulis japonicus*) in the East China Sea.

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To evaluate climate change (global warming) effects on Japanese anchovy in the East China Sea, we conducted numerical simulations including two dimensional horizontal migration of Japanese anchovy. Sea surface temperature, velocity and prey plankton fields were obtained by simulations with CHOPE-eNEMURO (Max-Planck-Institute Ocean Model coupled with a marine ecosystem model extended NEMURO (eNEMURO) , an extended version of a marine ecosystem model NEMURO (North Pacific Ecosystem Model for Understanding Regional Oceanography), using current and future climate forcing. The environmental conditions were used to integrate a bioenergetics model (CHOPE-eNEMURO.FISH) and the growth of Japanese anchovy was calculated from the difference between energy intake by consumption and other dissipation terms including respiration, egestion, excretion, specific dynamic action, etc. Although NEMURO.FISH was originally developed for Pacific saury and herring, it is rather easily possible to apply to other planktivorous fish species. The initial spawning grounds were assumed in the area which depth is less than 1000 m and the sea surface temperature is between 15.6 and 27.8 degC. The fish growth and migration was integrated for one year since the spawning. Under the contemporary condition, 78 % of the total anchovy larvae, which advected to the western side of Kyushu, entered to the southern part of Kyushu. However, under the future climate, larvae advected to the southern part of Kyushu decreased by 50 % while those to the northern part increased by 170%. As a result the ratio entering to the southern part became 40 %. The total number of larvae advected to the western coast of Kyushu was not changed. It was suggested that the northward shift of the spawning ground caused the modification of the location where larvae were advected. The body length of advected larvae increased in the northern part of Kyushu, while those in the southern part did not change.

Keywords: ecosystem model, fish growth-migration model, Japanese anchovy, climate change