

A simulation model for the neon flying squid (*Ommastrephes bartramii*) distribution in the Kuroshio-Oyashio transition region

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The neon flying squid (*Ommastrephes bartramii*) migrate between their spawning grounds in the subtropical waters and feeding grounds in the subarctic waters. The Kuroshio-Oyashio region is a part of its migration route and also an important fishing grounds for Japanese fishing fleet. In the Kuroshio-Oyashio transition region, there is sometimes an anticyclonic eddy, which is detached from the Kuroshio. Fishermen empirically know that the squid aggregate along with the edge of the eddy.

However, they do not know whether the eddy always attracts the squid or not, and whether the eddy is always the best fishing grounds in the Kuroshio-Oyashio region or not. This is because, fishermen operate only near the eddy as long as the eddy exists.

If we get more knowledge about the squid distribution in the Kuroshio-Oyashio transition region, it is helpful to find the best fishing grounds.

We developed an individual based model for the neon flying squid to simulate its distribution in the Kuroshio-Oyashio transition region. The individual based model used an Eulerian-Lagrangian approach. The squid movements are governed by a passive transport process and the active swimming process based on a search for a local optimal habitat, which was estimated by the spatial distribution of growth rate of a bioenergetics sub-model.

In the simulation, squid do a diurnal vertical migration between surface layer and subsurface layer, which is an important ecological characteristic.

We'll report the impacts of horizontal and vertical movements of squid on the growth, and the distribution patterns in the Kuroshio-Oyashio transition region.

Keywords: Neon flying squid, Individual based model, Kuroshio-Oyashio transition region