

## Reconstruction of experienced temperature in early stage of chub mackerels *Scomber japonicas* by otolith oxygen isotope measurement

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The growth of chub mackerel is influenced by marine environment such as water temperature. It has been reported that the growth rate of the juvenile has a positive correlation between the sea surface temperatures. However, the water temperature that chub mackerel juvenile actually experiences is not directly observed, and the growth and the experienced environment are not compared. In this study, oxygen stable isotope ( $\delta^{18}\text{O}$ ) of chub mackerel otolith in early stage were analyzed and the experienced temperature was estimated. Larvae and juveniles of chub mackerel *Scomber japonicus* were collected in the western North Pacific. After measuring fork length, radius of otolith, number of daily rings and otolith daily growth rate,  $\delta^{18}\text{O}$  were analyzed with isotope ratio mass spectrometer for whole of otolith samples from 2004 to 2015 (10-20 samples per year, excluding 2006). For the juveniles, the  $\delta^{18}\text{O}$  value was positively correlated with the radius of otolith ( $R=0.73$ ,  $n=130$ ). It shows a high  $\delta^{18}\text{O}$  value as the otolith size increases. On the other hand,  $\delta^{18}\text{O}$  decreases with the growth of otolith during the larval stage ( $R=-0.54$ ,  $n=31$ ). The yearly trend was small and measured values were widely distributed. From the cluster analysis for the initial growth rate, the six clusters (CL\*1 –CL\*6) resulted. CL\*5, 6 (showing high growth) showed higher otoliths  $\delta^{18}\text{O}$  than CL\*1, 2 (showing low growth) and it was suggested that CL\*5, 6 experienced the lower water temperature range. When converting the difference of otolith  $\delta^{18}\text{O}$  to the water temperature, CL\*5, 6 experienced low water temperature as about 1.1 °C. Therefore, it was shown that a positive spiral, in which individuals with high initial growth proactively entered to the low water temperature area and obtained high nutritious diet.