

Migration history of sardine reconstructed from carbon-14 as a tracer

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Radiocarbon concentration of DIC in seawater can be varied depending on the location due to the global ocean circulation. Since it takes around 1,000 years to travel around the world the area that is influenced from upwelling water is depleted in radiocarbon owing to the decay since the last contact with the atmosphere. Oyashio water is such location thus the large difference between Kuroshio water is existed. Fish captures these signals during their lifetime via the marine food web hence it is possible to identify their ecological information including migration histories.

We applied this concept using improved radiocarbon techniques using Single Stage Accelerator Mass Spectrometry installed at the Atmosphere and Ocean Research Institute, University of Tokyo (Yokoyama et al., 2016 PNAS). Groups of sardine captured off Japan were used and clearly identified two different types namely the one that was born in Kuroshio region from winter to spring and traveled to the north where Oyashio water is dominant, whereas the other group remained entire time before captured by fisherman. This is the first time to distinguish individual life history of sardine in quantitative manner and shows strong promise of radiocarbon based ecological studies of fish migration.

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