

## Estimation of the Japanese sardine stock in relation to the future Kuroshio variability

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Stock of the Japanese sardine (*Sardinops melanostictus*) shows a drastic variation. The principal driver of the stock variation is the Kuroshio velocity, and the second important driver is sea surface cooling. The Japanese sardine spawn in the Kuroshio water of south of Japan during winter and the larvae grow during the transportation by the Kuroshio. Lower the temperature of the Kuroshio water, the nursery ground, more favorable the condition is for feeding and growth of the larvae and consequently the sardine stock becomes higher. Thus the Japanese sardine stock level is strongly affected by the Kuroshio variation. The Kuroshio water temperature in winter tends to be lower during the year of low Kuroshio velocity. This is because, the Kuroshio water from subtropical region can have enough cooling by the time its arrival to near Japan. The Kuroshio velocity has a decadal to multi-decadal scale variation. The past sardine stock variation tended to be higher in the low Kuroshio velocity regime. Since the Japanese sardine is an important commercial fish in Japan, the future sardine stock, especially under the influence of the climate change, is one of the social concerns. The nursery grounds of the Japanese sardines are distributed in the very narrow area along the Kuroshio path and its analysis requires high resolution data. However, the spatial resolutions of the current climate projection products, CMIP5, are generally too coarse to reproduce the narrow Kuroshio path. Recently, we have succeeded at dynamical downscaling of multiple CMIP5 ocean products to 0.1° horizontal resolution products. In this study, we first develop a sardine stock estimation model that reproduce the past stock fluctuation based on the temperature in the nursery grounds. Then we input the future temperature from the downscaled simulation into the sardine stock model to project its future stock. We'll discuss how the sardine stocks fluctuate in future especially in relation to the Kuroshio variability.

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