

A-626 Takashi HORII, Yohei SHIMIZU, Takuma KAWASAKI and Hiroshi YAMAGUCHI

Three populations of the Pacific herring *Clupea pallasii* in Nemuro Strait in 2018

The catch of Pacific herring suddenly increased on the coast north of the Notsuke Peninsula in the Nemuro Strait in 2018, although it had been low since 1959. In this study, we attempted to determine the population of Pacific herring caught on the coast of Betsukai, Shibetsu, and Rausu, by sequencing a 410 base pair segment of the mitochondrial DNA control region, number of vertebrae, and maturity stage of the ovary. It was thought that the Pacific herring caught off Betsukai, Shibetsu, and Rausu coasts belonged to the East Hokkaido Lagoon population, the Ishikari Bay population, and the Hokkaido-Sakhalin populations, respectively. However, the Pacific herring caught off Shibetsu was suggested to be independent as the subpopulation, which was different from the Pacific herring caught in Ishikari Bay, although the Pacific herring caught off Shibetsu belonged to the Ishikari Bay population, similar to the Pacific herring caught in Ishikari Bay.

A-627 RYOUYA NASU, MASAKI AKINO, SHINJI KATOU, HIROYUKI KODAMA AND HIROHUMI TAKEDA

Effect of freezing on the quality of nagakombu (*Saccharina longissima*)

Recently, kombu catch has decreased in Hokkaido, Japan. One of the reasons for this decline is ageing and a decrease in the population of fishery workers. Dried kombu accounts for most of kombu products. However, labor-intensive drying of kombu is a significant problem in terms of efficiency. Herein, we focused on nagakombu (*Saccharina longissima*) caught in Eastern Hokkaido and proposed replacement of the drying process for nagakombu products with freezing. We examined the effect of quality on frozen nagakombu compared with dried nagakombu. The yield and breaking strength of frozen nagakombu were lower than those of the dried nagakombu.

Further, the nutritional content of frozen nagakombu was higher than that of dried nagakombu. Kombumaki (a food item made from nagakombu) was prepared by both frozen and dried nagakombu. The results were compared using a sensory evaluation. The differences between frozen and dried nagakombu were significant ($p < 0.01$). The preference tests were not significantly different between frozen and dried nagakombu; however, sensory panelists showed a tendency to prefer texture-dried nagakombu to frozen nagakombu. These results suggest that frozen nagakombu maintained a high nutritional value and that the texture of the products became soft.

A-628 Yoshinori NISHIDA, Masashi ITO, Akihiko MORIMOTO and Naoki HIROSE

Flow characteristics of surface horizontal circulation in the northern Japan Sea

Using satellite sea-level altimeter data and research vessel observational data, we investigated the flow characteristics of surface horizontal circulation in the northern part of the Japan Sea. The main flow that makes up the circulation was the baroclinic geostrophic flow, which has been reflected seasonal variations in the volume transport passing through the Tsushima Strait. Furthermore, from spring to autumn (winter), when the volume transport through the strait increased (decreased), northward (southward) barotropic flow occurred, making the circulation stronger (weaker). Therefore, the strength of the surface horizontal circulation was maximum in summer and minimum in winter. However, in winter, the baroclinic geostrophic current increased owing to wind stress; therefore, the circulation did not weaken as much as the decrease in volume transport through the strait. Therefore, the volume transport estimated from the inflow and outflow through the strait was not consistent with the baroclinic geostrophic transport estimated in the northern Japan Sea.

A-629 Akifumi NAKATA and Iori TANAKA

Seasonal and interannual changes in the distribution of volume transport

of the Tsushima warm current in the western Japan Sea off Hokkaido, Japan

In order to clarify the seasonal and interannual variability characteristics of the flow path and water temperature distribution of the Tsushima Warm Current in the western Hokkaido Japan Sea, we calculated the average field using our oceanographic observation data from more than 30 years, and described the characteristics of the geostrophic volume transport and water temperature distribution. The long-term annual mean baroclinic volume transport of the Tsushima warm current in the western Hokkaido was approximately 1.0 Sv, which was 0.2 Sv less than that reported before 2000. The seasonal variation in transport became unclear owing to decreasing transport in June, August, and December. The distribution of warm currents was examined, and a stable northward flow off the coast of Iwanai Bay was found, along with a bifurcation flow along the coast of Iwanai Bay. Compared with the long-term mean, the mean temperature in the last decade after decreasing the volume transport showed a wide negative temperature deviation in the middle layer of the Tsushima warm current area, suggesting a decrease in heat transport associated with a decrease in volume transport.

A-630 Akiyoshi SHINADA and Hiroshi KURODA

Short-term risk assessment of the drift of red tide occurrence in the western waters off Erimo, Hokkaido, Japan (Short Paper).

The seasonal risk of short-term drift of red tides from the Tokachi coast to the Funka Bay, Iburi, and Hidaka areas around Hokkaido was calculated using particle tracking experiments with a high-resolution model. Particle tracking was conducted for 15 d each month from January to December during 2003–2021, and the drift rate for each area was estimated monthly. Red tides could not occur from January to April because of low water temperatures. From May to December, the drift rate in Funka Bay was negligible and the risk was low. During May–September the drift rate was high in the Iburi and Hidaka areas, and the risk was high. Particularly, in the Hidaka area, the drift rate peaked in June, and the risk was considered to be the highest.