

CPUES, BODY LENGTH AND GREENNESS OF ANTARCTIC KRILL DURING 1987/88 SEASON IN THE FISHING GROUND NORTH OF LIVINGSTON ISLAND

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Abstract

In order to identify whether or not there was a marked change in two kinds of CPUEs, body length and greenness of krill during the fishing season, these parameters were examined for each 10-day period of the Japanese krill fishery in the northern waters of Livingston Island in the 1987/88 season. It appears that Japanese trawlers have not fished krill concentrations to the extent that a decrease in krill biomass in this area can be detected from these data. The percentages of "Egui" as an indicator of greenness of krill were too variable among trawlers to be an objective indicator at present.

Résumé

Deux sortes de CPUE, la longueur du corps et la teinte verte du krill ont été examinées pour chaque période de 10 jours, pendant la saison 1987/88, pour la pêcherie japonaise de krill dans les eaux au nord de l'île Livingston, afin de démontrer si elles dénotent un changement significatif pendant la saison de pêche. Les CPUE et la longueur du corps du krill n'ont pas changé pendant la saison de pêche. Par conséquent, il semblerait que les chalutiers japonais n'ont pas pêché les concentrations de krill à un point tel que la diminution de la biomasse du krill dans cette région puisse être décelée de ces données. Les pourcentages d'"Egui", comme indicateur de la teinte verte du krill, étaient trop variables d'un chalutier à l'autre pour qu'il soit à l'heure actuelle un indicateur objectif.

Резюме

Два вида CPUE, данные по длине и степени зелености криля, полученные по каждому десятидневному периоду ведения промысла Японией в водах к северу от о-ва Ливингстон в течение 1987/88 г., были рассмотрены для того, чтобы обнаружить, изменялись ли эти элементы в значительной мере в течение промыслового сезона. Изменения CPUE и длины криля в течение промыслового сезона отсутствовали. Полученные данные указывают на то, что промысел криля Японией в этом районе не привел к сокращению его биомассы. Величины "Egui" слишком варьировались от траулера к траулеру и в настоящее время не могут служить надежным показателем зелености криля.

Resumen

Para determinar definitivamente si hubo un cambio notable en dos tipos de CPUE, longitud del cuerpo y verdor del krill durante la temporada de pesca, se examinaron estos parámetros para cada período de 10 días de pesca de krill japonesa en las aguas nortinas de la Isla Livingston en la temporada 1987/88. Parece que los buques de arrastre japoneses no han capturado concentraciones de krill hasta el punto de que una disminución en la biomasa de krill en esta área se pueda detectar en estos datos. Los porcentajes de "Egui" como un indicador del verdor del krill, fueron muy variados entre los buques de arrastre para dar una indicación objetiva al momento.

1. INTRODUCTION

The northern waters of Livingston Island were amongst the largest fishing grounds for the Japanese krill fishery in the 1987/88 season. Fishing operations in this area were conducted from early January to late March 1988. It was in this area that RV *Kaiyo Maru* conducted a co-operative survey with a Japanese trawler on the target strength of krill. Additionally, after the co-operative survey, krill biomass on this fishing ground was estimated by an echo integrator.

Two kinds of CPUEs, body length and greenness of krill were examined for each 10-day period from early January to late March as a case study to identify whether or not they show a marked change during the fishing season.

2. MATERIALS AND METHODS

We defined the fishing ground north of Livingston Island as the area between 59°30'W and 61°30'W and between 61°30'S and 62°30'S (Figure 1). Two kinds of CPUEs, catch/tow and catch/towing time (minute), were computed from the data recorded on log books of Japanese trawlers. A CPUE incorporating searching time was not collected and there were no essential searching activities (primary searching time of Butterworth, 1988), at least during the co-operative study. Trawlers sail against the wind, trawl on the wind and spend time searching while waiting to finish processing (secondary searching time).

Each ship was required to measure body lengths, from the tip of rostrum to the posterior end of telson, of 50 animals from one haul per day.

Condition of "Egui" or greenness of krill has become an item to be recorded routinely since the 1987/88 season. Only those catches in which animals showed greenness to the extent that they are not suitable even for production of boiled and frozen products were checked.

Data on the above items, coming from trawls made in the area between 59°30'W and 61°30'W and between 61°30'S and 62°30'S, were examined.

3. RESULTS AND DISCUSSION

Trawling positions in January were distributed from the waters about 30 n miles north of Livingston Island to the waters north of Elephant Island (Figure 2). From early February to mid-March, fishing efforts were concentrated in the waters northwest of Livingston Island. In late March, the major fishing ground moved to the waters west of Elephant Island.

There was no significant difference in both catch/tow and catch/towing time among 10-day periods from early January to late March for each of seven trawlers which participated in krill fishing in this season (ANOVA, Figures 3 and 4). Catch/tow values showed little change during the fishing season. Trawlers which mainly produce peeled krill tended to show larger catch/tow values. Catch/towing time values, however, showed a somewhat irregular pattern compared with catch/tow values. Three trawlers recorded a maximum value in February, but one trawler in late March.

Length frequency distribution of krill from all the trawlers is shown in Figure 5 for each 10-day period. Although mean body length in early January was rather small, 41.8 mm, compared with those in later seasons, 45.1 to 46.7 mm, there was no significant difference in mean body length between each 10-day period during the 1987/88 season (ANOVA).

Percentages of "Egui" catches were highly variable among trawlers. No "Egui" was recorded in any 10-day period in three out of seven trawlers. One trawler, however, scored 100% "Egui" for three 10-day periods in January. Higher percentages tended to occur in January. "Egui" percentage does not seem to be an objective indicator of greenness at present. The last trawler did not leave the fishing ground but stayed there. Therefore, although Butterworth (1988) recommended collection of data on the greenness of krill to improve the abundance indices, we do not think routine collection of the data is useful.

A total of 41 905 tonnes of krill was caught in this area, which equals 57% of the total Japanese catch in the 1987/88 season. The estimated biomass of krill by the echo integrator on board RV *Kaiyo Maru* was 601 297 tonnes in the upper 200 m in the s-shaped co-operative survey area (Figure 1). After the co-operative survey between RV *Kaiyo Maru* and a trawler in late January, the fishing ground shifted southward to the continental shelf just north of Livingston Island. If we assume that the krill concentration in the co-operative survey area moved as a whole and assume no advection from adjacent areas, approximately 7% of the biomass was fished by Japanese trawlers. If krill advected from adjacent areas, the percentage would be lower.

Considering that CPUEs and the mean body length of krill did not change during the fishing season, two options are possible: Japanese trawlers do not appear to have fished krill concentrations to the extent that a decrease in krill biomass can be detected from CPUE data in the area north of Livingston Island, or krill with similar body length were advected from adjacent areas.

REFERENCE

- BUTTERWORTH, D.S. 1988. A simulation study of krill fishing by an individual Japanese trawler. *Selected Scientific Papers, 1988 - Part 1. SC-CAMLR-SSP/5*: Hobart, Australia. pp. 1-108.

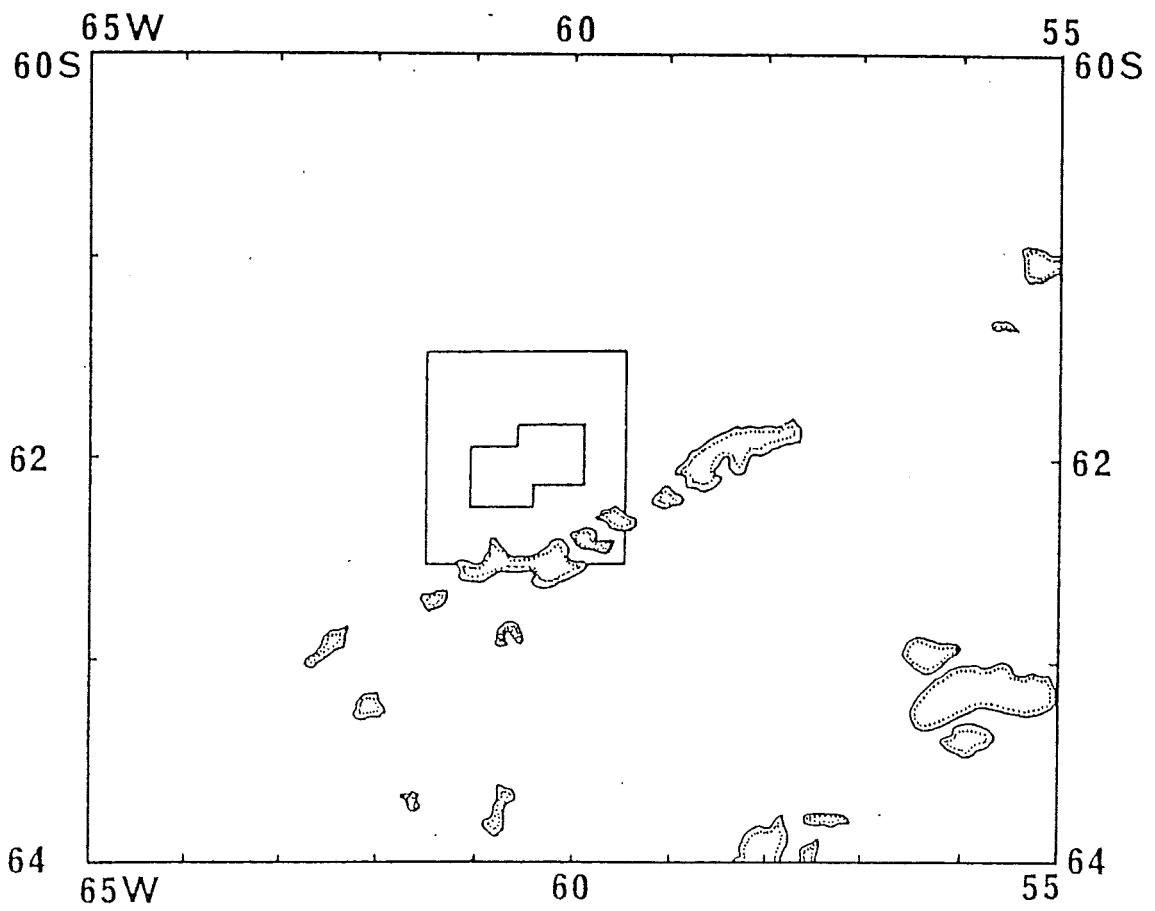


Figure 1: The fishing ground north of Livingston Island (square) and the area surveyed by RV *Kaiyo Maru* and a Japanese trawler (s-shaped area in the square).

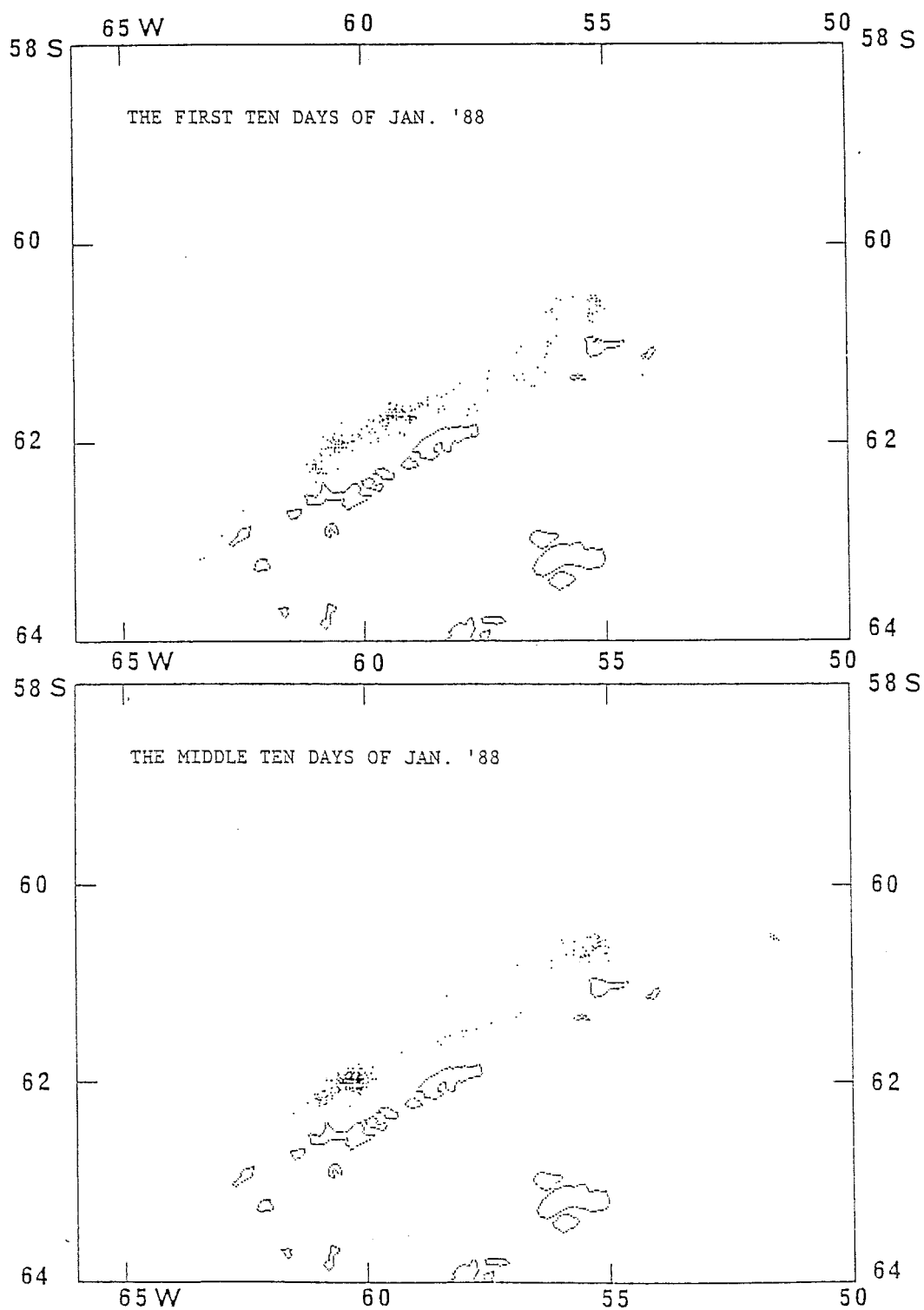


Figure 2a: Trawling positions of Japanese trawlers in the first and middle 10 days of January in the 1987/88 season.

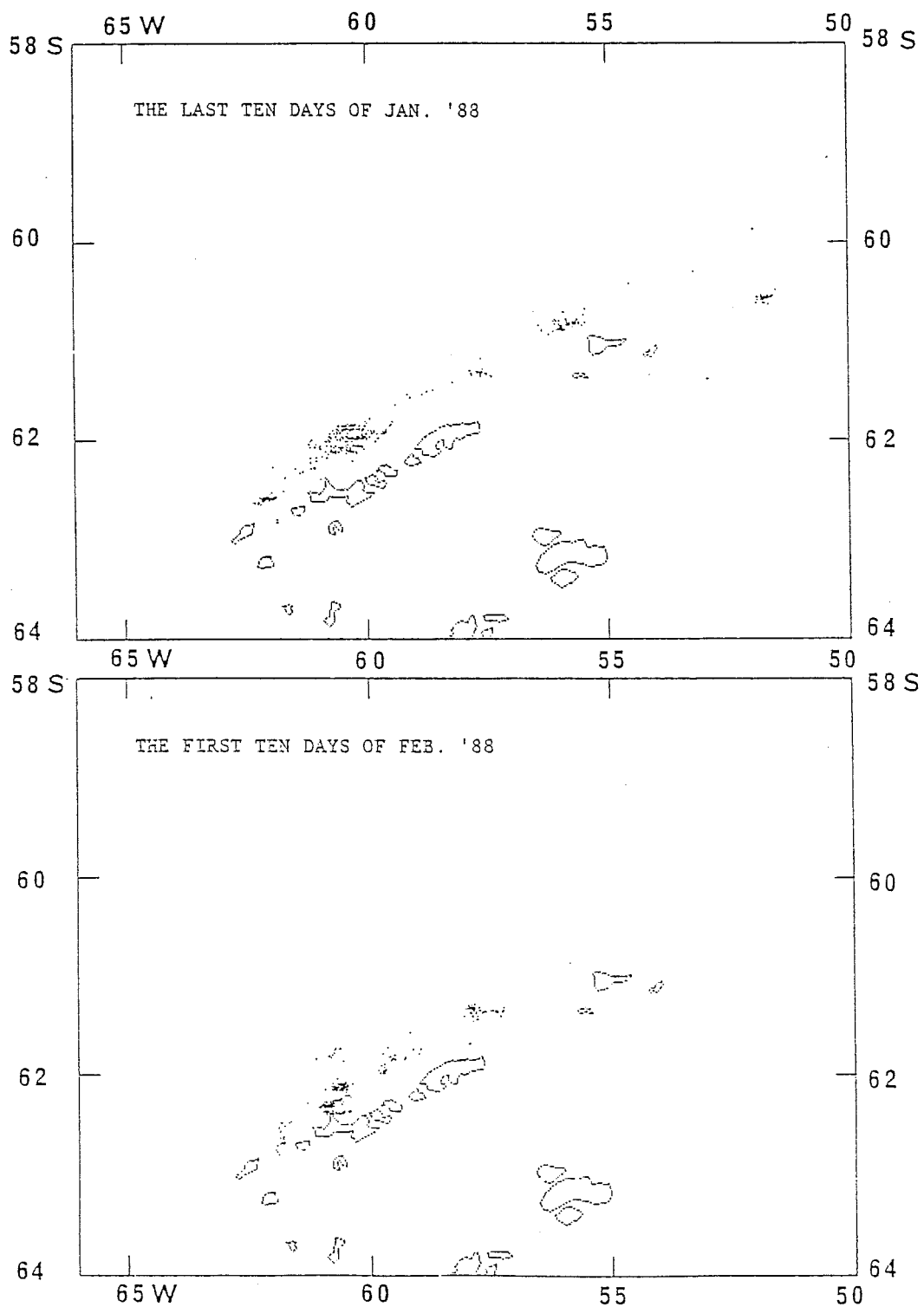


Figure 2b: Trawling positions of Japanese trawlers in the last 10 days of January and the first 10 days of February in the 1987/88 season.

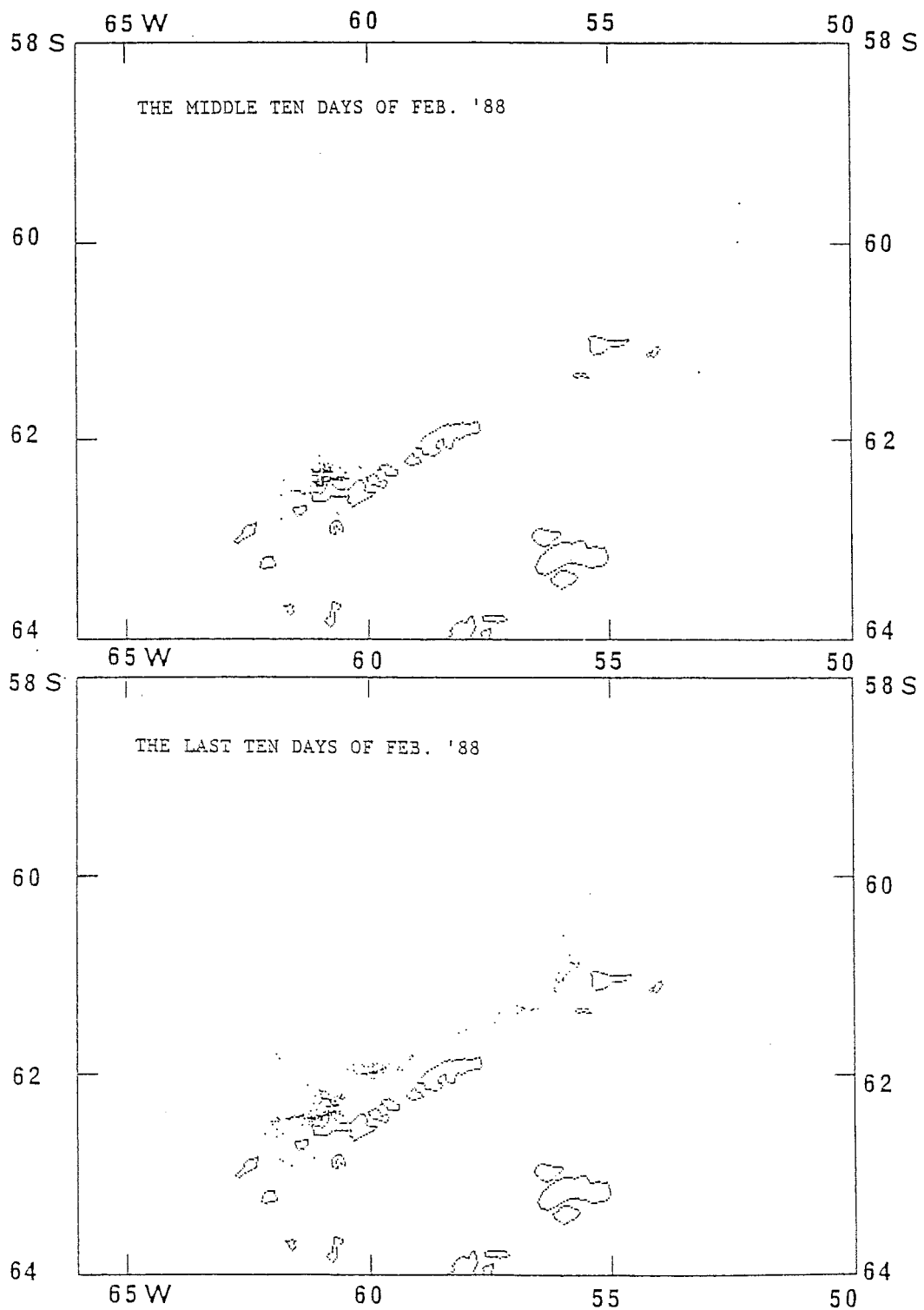


Figure 2c: Trawling positions of Japanese trawlers in the middle and last 10 days of February in the 1987/88 season.

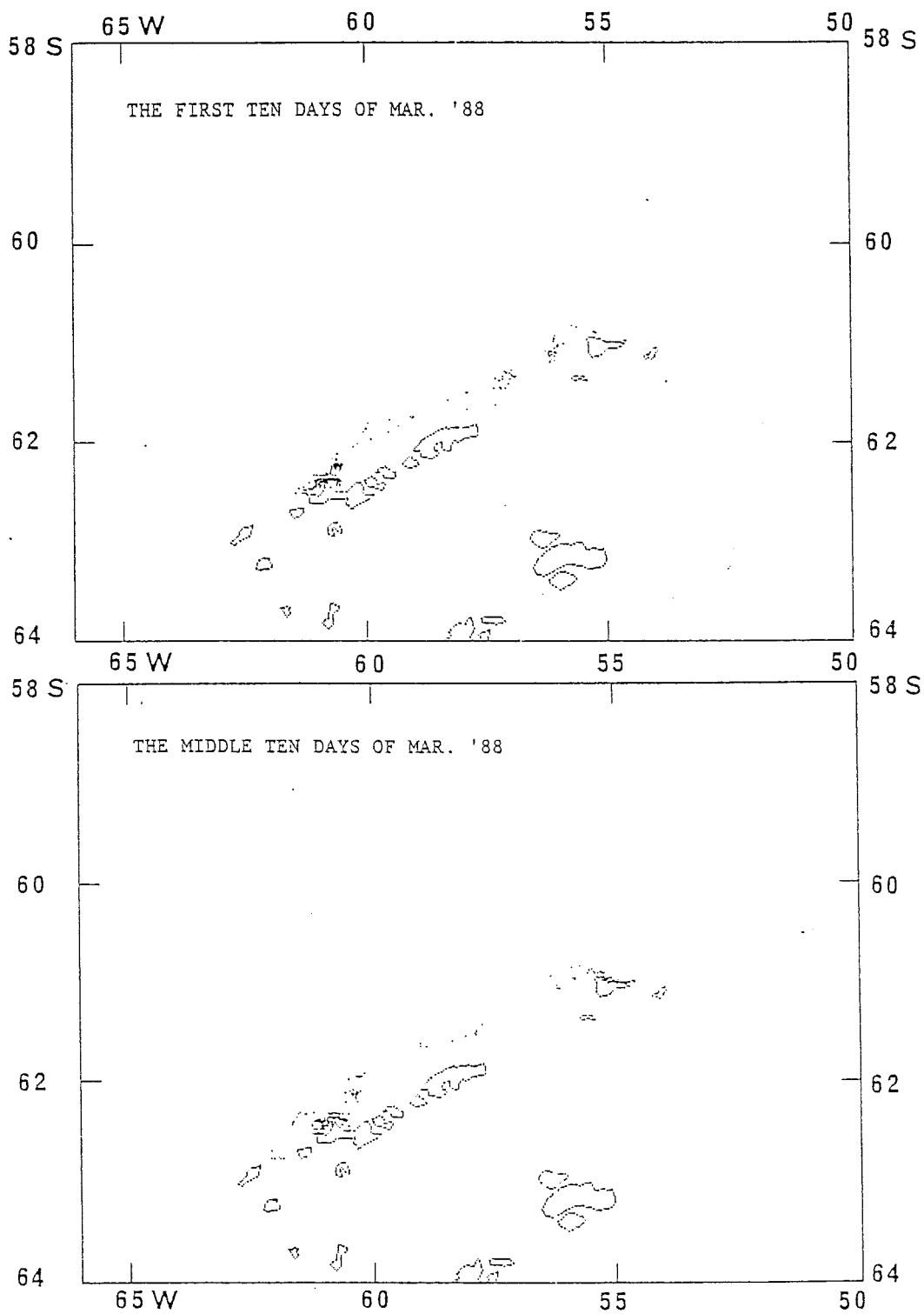


Figure 2d: Trawling positions of Japanese trawlers in the first and middle 10 days of March in the 1987/88 season.

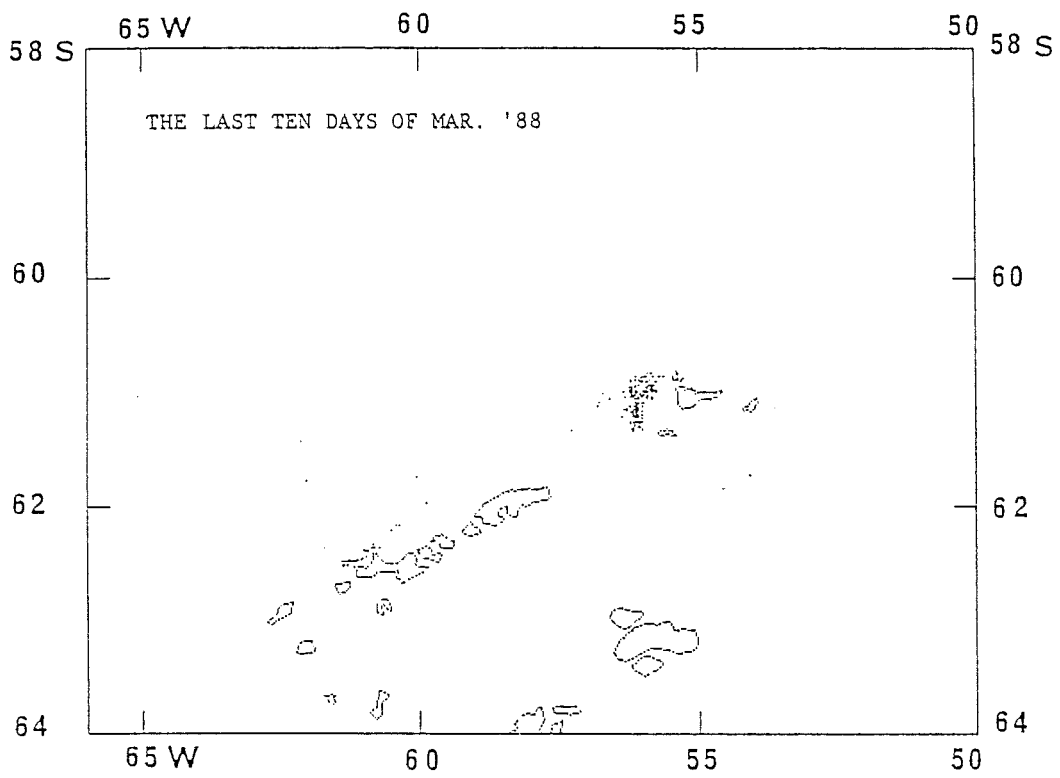


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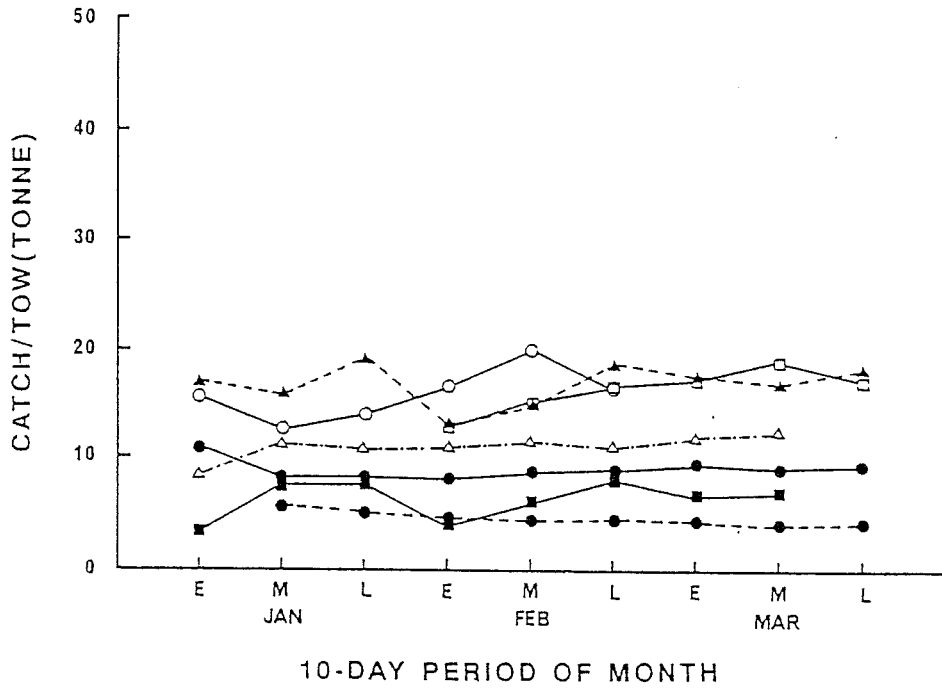


Figure 3: Mean catch/tow values of each trawler for each 10-day period from January to March 1988.

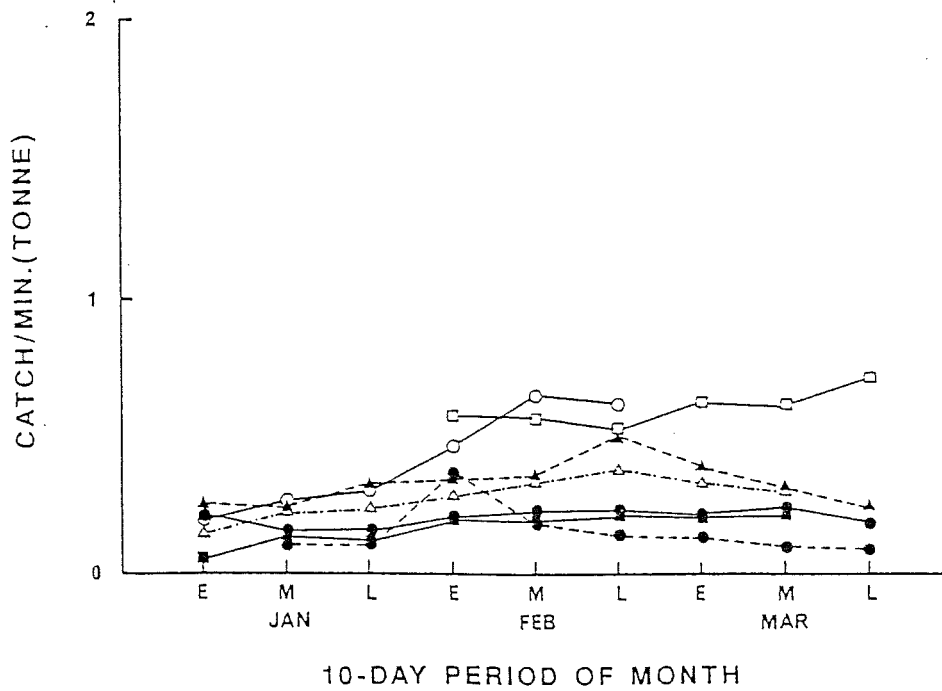


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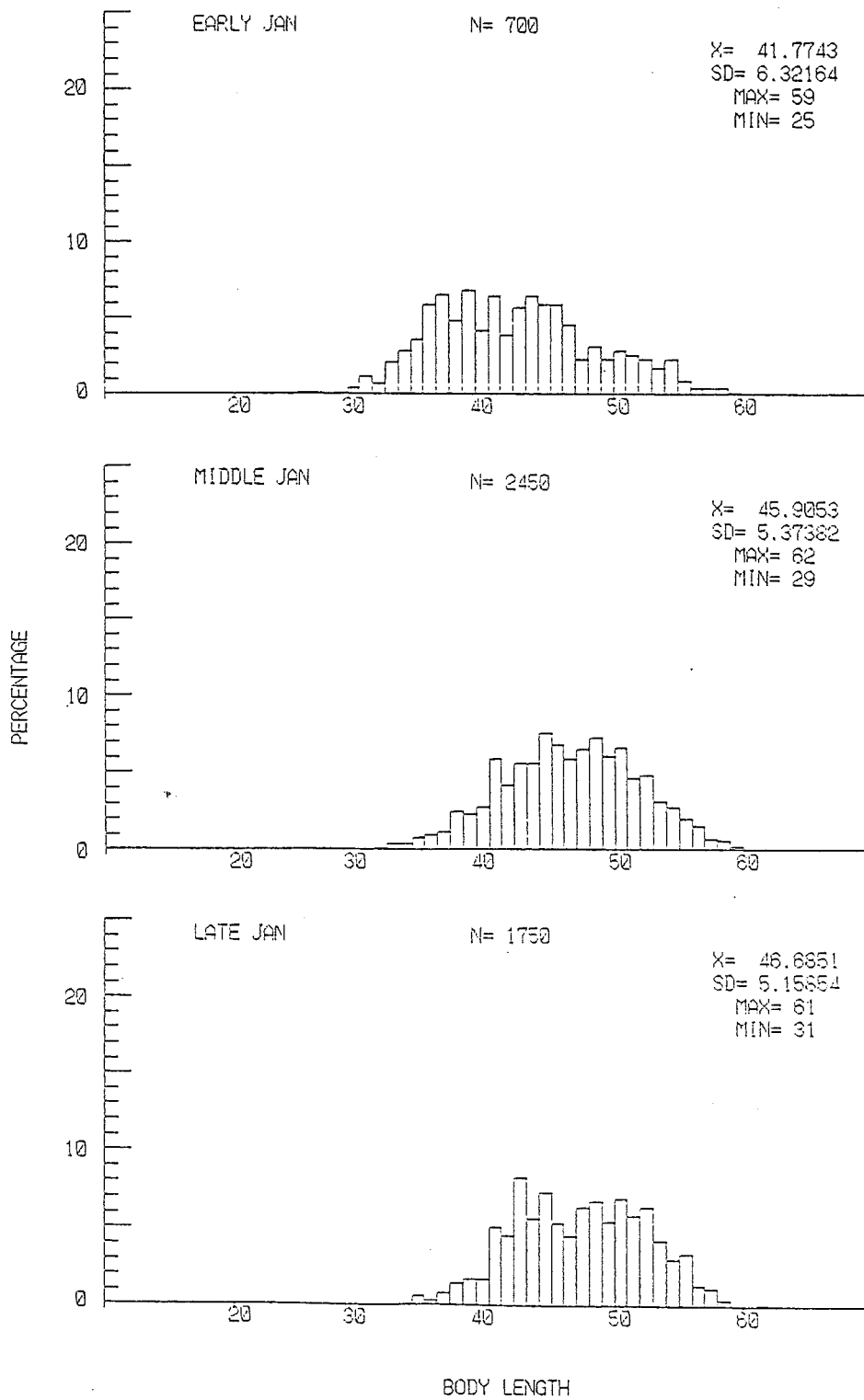


Figure 5a: Length-frequency histograms of krill in January 1988.

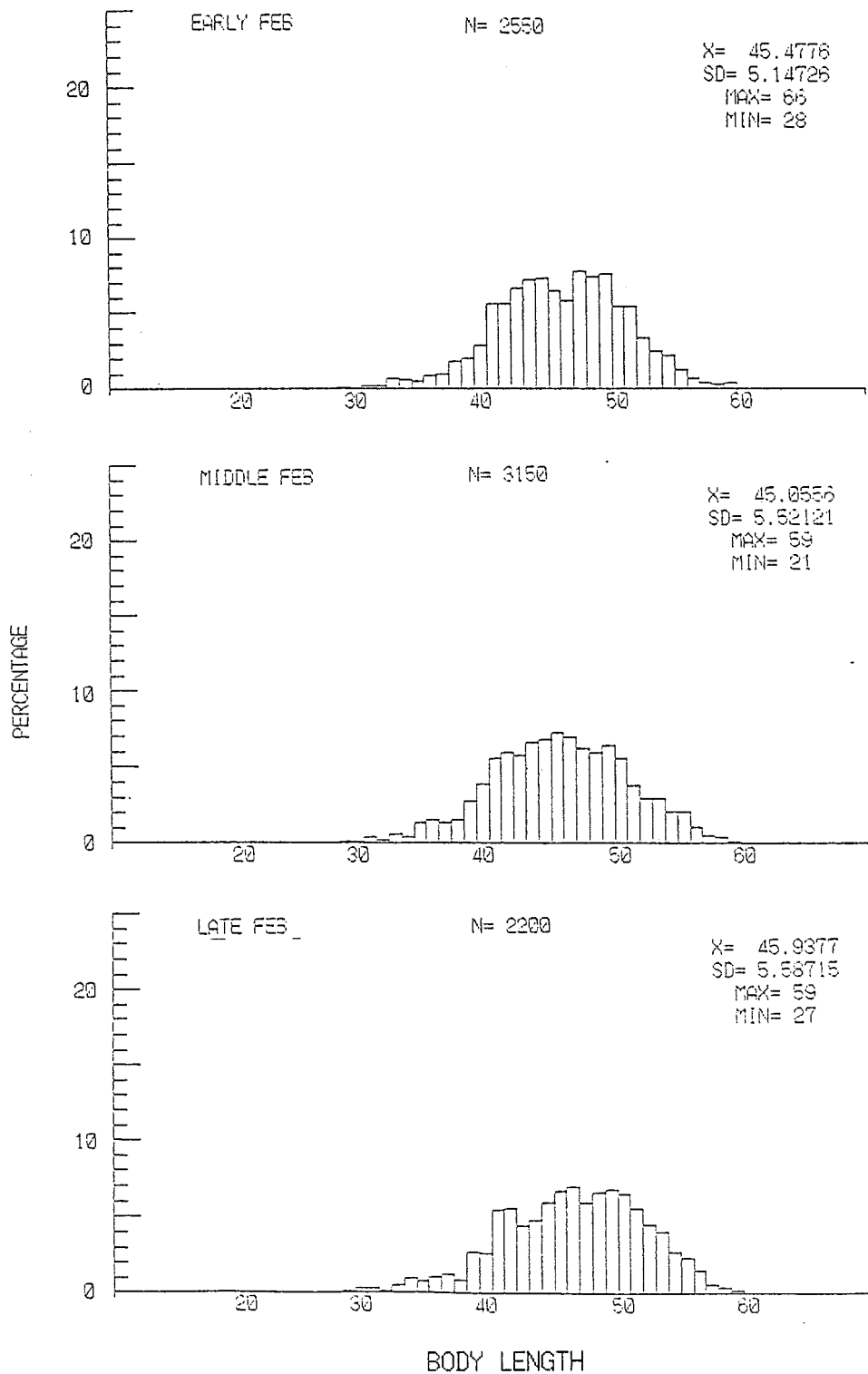


Figure 5b: Length-frequency histograms of krill in February 1988.

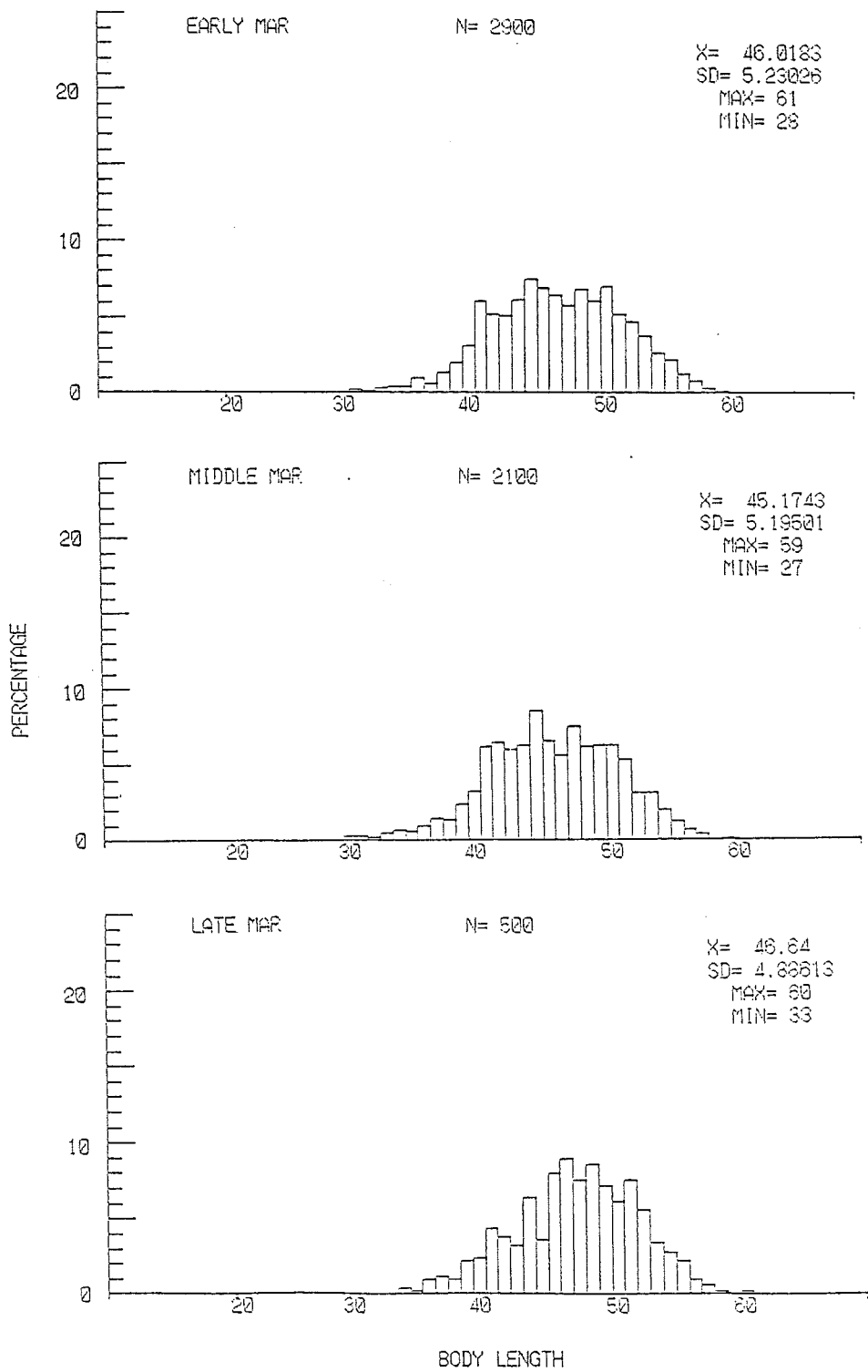


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