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ON THE CHARACTERISTICS OF HORIZONTAL DISTRIBUTION OF THE ANTARCTIC KRILL (EXTENDED ABSTRACT)

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The horizontal scale dependence of the Antarctic krill distribution was examined by power spectral analysis. Data used were collected by a scientific fish finder (SIMRAD EK-S120) in the area between 61°–65°S and 116°–112°E (Leg I) and in the area between 63°–66°S and 145°–150°E (Leg II) during the SIBEX cruise of T/V UMITAKA-MARU (Jan. to Feb. 1984).

The mean volume of back-scattering strength was calculated between 10 m and 100 m of depth, and the values of krill density were estimated at intervals of 1 mile in Leg I and 0.1 mile in Leg II. For details on these technique, see INAGAKE *et al.* (1985).

Figure 1 shows continuous profiles of krill density for Leg I (upper) and for Leg II (below). Night-time estimates of krill density were 56% for Leg I and 40% for Leg II of daytime (between 0700 and 1900 local ship time) values. Therefore, only daytime profiles of krill density were used.

As the data averaged over 1 mile intervals in Leg I were too wide to have significant result, the spectral density function for the krill resembled a white noise spectrum which was nearly horizontal and had no significant peak.

Composite plots of the spectral density functions of the krill from 6 Feb. (206) and 10 Feb. (210) are given in Figs. 2 and 3, respectively. We can see a significant peak of 0.34 mile (=630 m) in Fig. 2 and of 0.91 mile (=1685 m) in Fig. 3. These length scales do not indicate characteristic patch sizes but characteristic distances between patches. Table 1 presents the dominant wave length of each data set in Leg II with average wind direction and velocity. The cruise tracks used the analysis are shown in Fig. 4. Tracks on 6 and 7 Feb. were in the east-west direction and these on 8 and 9 Feb. were in the north-south direction. The mean wind directions and velocities are not much different between 6 Feb. (206) and 8 Feb. (208), or between 7 Feb. (207) and 10 Feb. (210). It should be noticed that the distance between patches in the north-south direction is about 2-fold longer than that in the east-west direction. These results may suggest that there are some relationships between characteristic distance between patches and marine environmental factors especially such as current meanders and eddies.

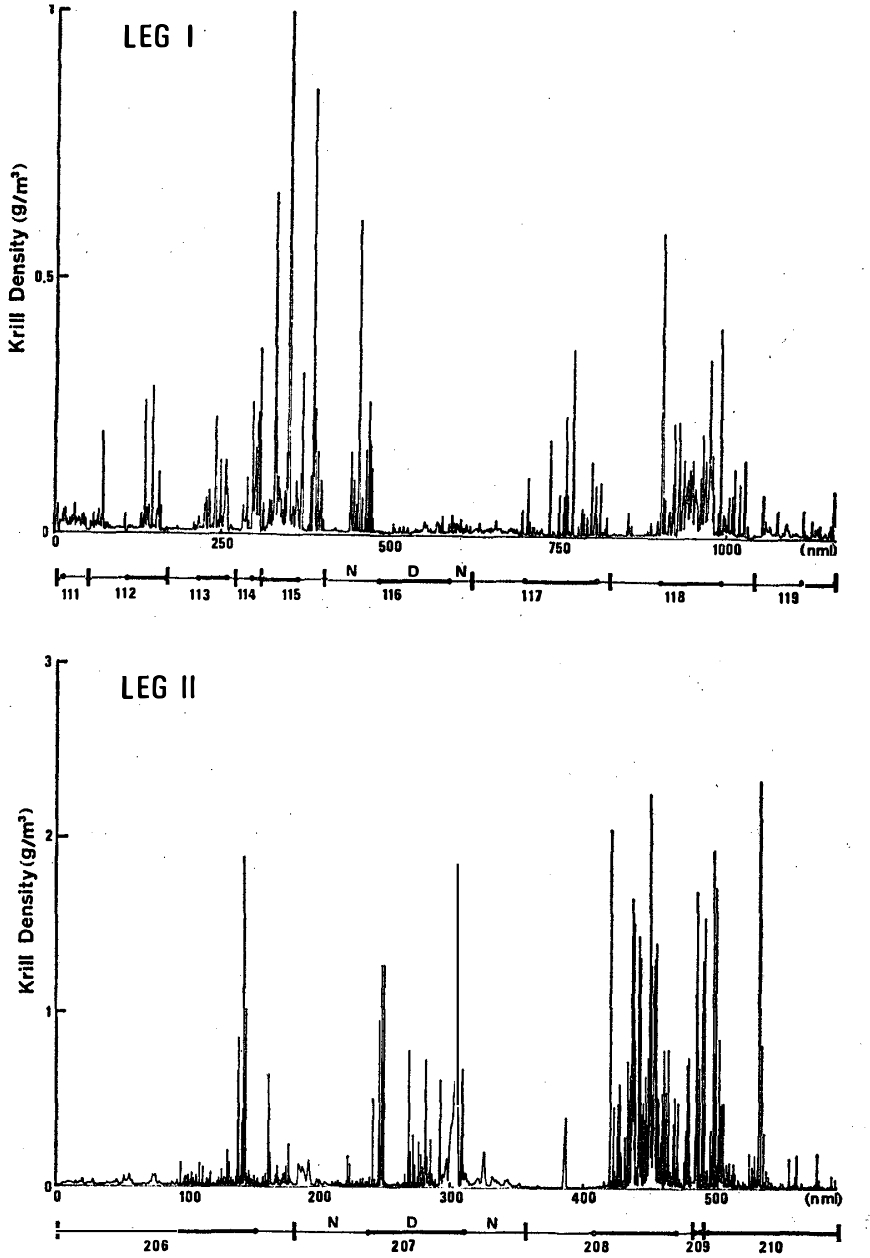

Fig. 1. *Continuous profiles of estimated krill density for Leg I (11–19 January 1984, above) and Leg II (6–10 February 1984, below). The periods of daytime (thick line) and night-time (narrow line) are shown along the bottom.*

Table 1. *Dominant wave length (n mi) of each data set in Leg II with mean wind direction and velocity.*

Data	Dominant wave length (n mi) (m)	Wind direction Wind velocity (m/s)
Feb. 6 (206)	0.34 (630)	144° (8.8)
Feb. 7 (207)	0.33 (611)	47° (5.4)
Feb. 8 (208)	0.63 (1167)	126° (7.7)
Feb. 10 (210)	0.91 (1685)	64° (6.3)

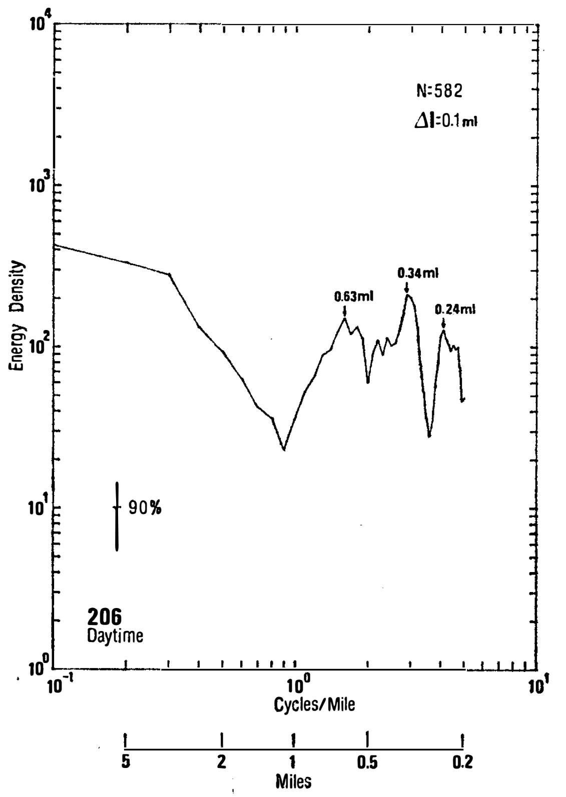

Fig. 2. Spectral plot for the krill on daytime data set of 6 February.

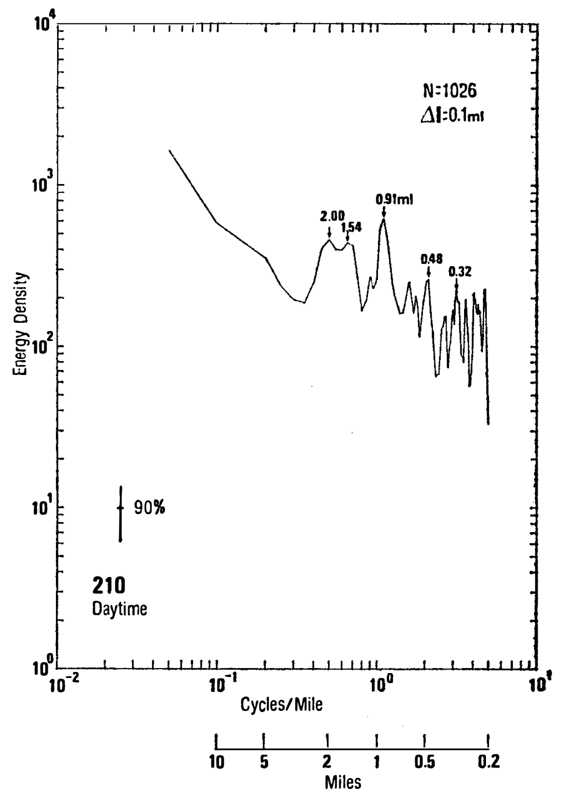

Fig. 3. Spectral plot for the krill on daytime data set of 10 February.

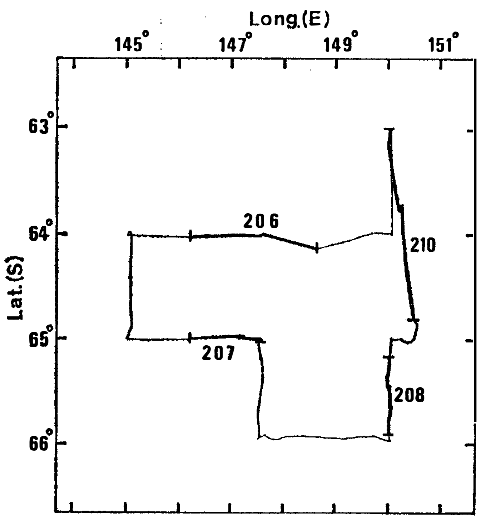

Fig. 4. Cruise track of Leg II (207 means 7 February).

Reference

INAGAKE, D., MATSUURA, N. and KURITA, Y. (1985): Stock and quantitative distribution of the Antarctic krill (*Euphausia superba* DANA) in the Antarctic Ocean, south of Australia in January and February 1984. Trans. Tokyo Univ. Fish., 6, 139–147.

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