

Distribution of crustacean micronekton across a Mediterranean front

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Fronts are regions of larger-than-average horizontal gradients of water properties such as temperature, salinity and density, and are places of particular biological significance (LE FEVRE, 1986). In the northeastern part of the western Mediterranean, the Ligurian Sea, the water circulation is characterized by a permanent cyclonic flow running southwest along the French Riviera. This cyclonic circulation is marked by a steep salinity and density gradient (frontal zone) separating the inshore current (coastal and peripheral zone) from the offshore water mass of high surface density (central zone) (PRIEUR, 1981). This geostrophic front is a permanent feature of the Ligurian Sea and its position fluctuates only by a few miles (NM).

The present note reports data on the distribution of crustacean macroplankton and micronekton across the front in late summer (September) 1984. Sampling took place along a 123° transect from Cap Ferrat at 11 stations distant of 3 NM each. The hauls were carried out with an Omori net of 2 m² surface opening and 590 µm mesh size. They were double oblique from the surface down to 200 m depth, and were performed at night to minimize the effect of diurnal migration. The location of the frontal area at the time of sampling was obtained from hydrological data collected concomitantly and was situated at 7-15 NM from the shore (PRIEUR, personal communication).

Twelve species of euphausiids and shrimps were fished. The species names and their total captures are reported in table 1. *Meganyctiphanes norvegica* was the most common species and was clearly concentrated in the central waters, well off the frontal area. *Nematoscelis megalops* was the second most common species and presented peaks of abundance in the frontal zone as well as in offshore waters, but was scarce in coastal waters. The other two species well represented had nonrandom distributions: *Stylocheiron longicorne* was concentrated mainly in frontal waters and *Euphausia krohni* was the only species with a clear preference for inshore waters. The respective abundance of *M. norvegica* and *E. krohni* in the Ligurian offshore/inshore gradient is in opposition to previously reported distributions in NW European waters (MAUCLINE, 1984). Shrimps were caught only in small numbers and the data gave little information on their distribution.

Table 1.- Species of crustacean macroplankton and micronekton fished in September 1984 and number of specimens caught.

| Euphausiids | number | Shrimps | number |
|----------------------------------|--------|-------------------------------|--------|
| <i>Euphausia hemiggiba</i> | 2 | <i>Gennadas elegans</i> | 5 |
| <i>Euphausia krohni</i> | 206 | <i>Pasiphaea multidentata</i> | 6 |
| <i>Meganyctiphanes norvegica</i> | 1409 | <i>Pasiphaea sivado</i> | 21 |
| <i>Nematoscelis megalops</i> | 913 | <i>Sergestes arcticus</i> | 2 |
| <i>Stylocheiron longicorne</i> | 137 | <i>Sergestes robustus</i> | 1 |
| <i>Thysanopoda aequalis</i> | 4 | <i>Sergestes sargassi</i> | 1 |

The influence of the front on the distribution of the species was studied by correspondence analysis (CA). The aim of the CA is to describe parsimoniously the total inertia of a multidimensional data set in a sample of few dimensions (or axes). Among the inertia methods, CA is concerned with contingency tables and use a Chi-square metric. Only the 7 most abundant species at the 11 stations were retained for the CA. Figure 1 gives the station coordinates on the two main CA axes against their distance from the coast; these two axes accounted for 62.7 % and 32.3 % of the inertia respectively (interpreted as part of information). Axis 1 reflects the opposition between *E. krohni* (coastal species) and *M. norvegica* (mainly offshore species). As shown in figure 1, this effect is related to the distance of the stations to the coast and is most important at the frontal zone. Axis 2 describes the species spatial distribution after removal of the coast-offshore effect. This axis is linked to an opposition between *M. norvegica* and *N. megalops* / *Stylocheiron longicorne*. The three frontal stations are clearly set apart from the others by their low coordinates on the second axis, which is due to a neat dominance of *N. megalops* and *Stylocheiron longicorne* in these stations (Fig. 1).

The data reported indicates that in the Ligurian Sea the distribution of euphausiids is marked by (1) a gradient between offshore and coastal waters; (2) a concentration of some species in the frontal zone. Species associated with the front are predominantly carnivores (*N. megalops* and *Stylocheiron longicorne*) whereas those involved only in the offshore/inshore gradient most probably feed on smaller particles (*M. norvegica*, *E. krohni*).

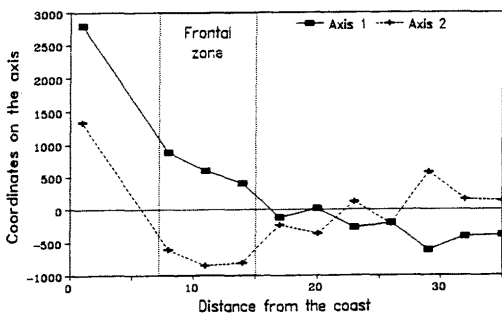


Figure 1. Station coordinates on the two main correspondence analysis axes against their distance from the coast.

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