RECENT DISTRIBUTION OF GELATINOUS ORGANISMS IN THE SOUTHERN BLACK SEA

Erhan Mutlu
Graduate School of Marine Sciences, POB 28, Erdemli, 33731, Mersin, Turkey - mutlu@ims.metu.edu.tr

Abstract

Since introduction of *Beroe ovata* in 1999 into Black Sea, two cruises in June and October 2006 have determined the distributions of both invading *Mnemiopsis leidyi* and *Beroe ovata*, and the resident *Aurelia aurita* and *Pleurobrachia pileus* in the southern Black Sea. Total biomass of *M. leidyi* in the entire Black Sea was 22.00 and 11.00 million tons, 35.96 and 14. 81 for *P. pileus*, 169.20 and 33.84 for *A. aurita* in June and October 2006, respectively and 3.81 million tons for *B. ovata* in October 2006. As compared to the biomasses in June when no individual of *B. ovata* was caught by the net, the biomasses and abundances of the former species decreased in October when individuals of *B. ovata* were observed.

Keywords : Zooplankton, Biomass, Black Sea.

Spatial distributions of gelatinous organisms (*A. aurita*, *P. pileus*, *M. leidyi* and new exotic species, *B. ovata*) in the southern Black Sea (the Turkish EEZ) were studied in June and October 2006. All species were collected using the Hensen plankton net (0.7 m mouth opening and 300 μm mesh size). Samples were obtained by vertical hauls from a depth of H_2S layer at 65 stations in June and 72 stations in October 2006. The gelatinous organisms were sorted out, numerated and weighed with a hand balance on board. In June, individuals of each species found at each station were frozen in a nylon bag for comparison for weight measurements with onboard hand balance and e-balance in the laboratory. Size measurements of the individuals were performed to compare biomasses in the other ways.

Three methods to estimate biomass were used: hand balance, e-balance of frozen specimens and length-weight relationship ([1], [2], [3]). This was purposed for inter-calibration of biomass estimation conducted with different methods. Pairwise of the methods were subjected to the t-student test. No significant differences in the biomasses were found at a level of $p<0.05$.

Spatial distributions of *M. leidyi* were followed by hydrographic features of the Black Sea. High biomasses (150 >g m^{-2} in June and >50 g m^{-2} in October) were found on the rime current between the coastal cyclonic eddies. The maximum abundance and biomass of *M. leidyi* were 13 ind m^{-2} and 390 g m^{-2} with averages of 1.7 ind m^{-2} and 52 g m^{-2} in June, and 23 ind m^{-2} and 130 g m^{-2} with 7 ind m^{-2} and 26 g m^{-2} in October. Mean biomass and abundance of *M. leidyi* were not however significantly different in the eastern area (51 g m^{-2} and 1.5 ind m^{-2}, n= 32 stations) than in the western area (53 g m^{-2} and 1.9 ind m^{-2}, n= 33) of the Turkish Black Sea in June they were significantly higher in the east (27 g m^{-2} and 10 ind m^{-2}, n=31) than in the west (22 g m^{-2} and 5 ind m^{-2}, n=36) in October (U test, $p<0.05$). No significant differences in the biomass and abundance were found between inshore (bottom depth<200m) and offshore (>200 m) waters in June (39 g m^{-2} with 1.2 ind m^{-2}, n=13 and 55.4 g m^{-2} with 1.8 ind m^{-2}, n=52) and in October (25 g m^{-2} with 6 ind m^{-2}, n=18 and 26 g m^{-2} with 7 ind m^{-2}, n= 54).

Main concentrations of *P. pileus* were found at the northern peripheries of the anticyclonic eddies. The mean wet weight of *P. pileus* never exceeded 100 g m^{-2} (84 g m^{-2} in June and 35 g m-2 in October) while the maximum wet weights were recorded to be 234 g m^{-2} in June and 91 g m^{-2} in October. In contrast to the summer distribution, the mean and abundance were significantly higher in the southeastern (40 g m^{-2} and 154 ind m^{-2}) than southwestern (30 g m^{-2} and 21 ind m^{-2}) Black Sea in autumn. A significant difference between inshore (19 g m^{-2} with 100 ind m^{-2}) and offshore (40 g m^{-2} with 151 ind m^{-2}) areas was found only in October.

In June 2006 *A. aurita* was found to be mainly distributed in the southwestern Black Sea. The locations of dense patches (>600 g m^{-2}) were well correlated with peripheries of the western main gyre. Patches of *Aurelia* occurred in Kizilirmak and Batumi eddies. The density in the central Black Sea was virtually low. Overall, the distribution of individuals and biomass did not differ significantly between the western (498 g with 19 ind m^{-2}) and eastern (298 g with 11 ind m^{-2}) areas, and between inshore (383 g with 19 ind m^{-2} and offshore (404 g with 15 ind m^{-2}) waters. Maximum abundance and biomass were 91 ind m^{-2} and 3380 g m^{-2} with averages values of 16 ind m^{-2} and 400 g m^{-2} in the southern Black Sea. In October, mean abundance and biomass were 2.5 and 5 times lower than those in June. No statistical differences in abundance and biomass were found either between the western 6.2 ind m^{-2} with 106 g m^{-2}) and eastern (5.2 ind m^{-2} with 55 g m^{-2}) areas or between inshore (6.2 ind m^{-2} with 113 g m^{-2}) and offshore (5.6 ind m^{-2} with 69 g m^{-2}) areas. *B. ovata* was not found in the entire southern Black Sea during a cruise in June 2006. Mean biomass and abundance of *Beroe* was 8.9 g m^{-2} and 1.4 ind m^{-2} in October 2006. Individuals of *Beroe* were generally observed in area where *Mnemiopsis* and *Pleurobrachia* were not found, except in the Batumi eddy. Maximum abundance and biomass were recorded to be 16 ind m^{-2} and 57 g m^{-2}. There was no significant difference in biomass and abundance between the areas. The coastal water yielded little higher biomass (12 g m^{-2}) than open waters (8 g m^{-2}) with the similar abundance (1.7 and 1.3 ind m^{-2}, respectively). The western and eastern areas shared equal abundance (1.4 ind m^{-2}) while the biomass was little higher (11 g m^{-2}) than that in the eastern area (7 g m^{-2}).

On the board, an experiment was performed to observe visually food choice of *B. ovata*. Specimens in various sizes of *Mnemiopsis* and *Pleurobrachia* and small-sized *Aurelia* were served to *Beroe* in 20 l jar. *Beroe* investigated the food at the surface in order presumably to seek existence of *Mnemiopsis*. If there is no *Mnemiopsis* at the surface, *Beroe* dived down to the bottom to catch *Pleurobrachia*. *Beroe* however did not feed on *Aurelia*. *Beroe* swallowed more than one individuals of *Pleurobrachia* at once and the zipped the mouth to start digestion. A few individuals of *Calanus* were observed inside *Beroe*.

References

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