

GENERAL DISTRIBUTION OF CHLOROPHYLL, TEMPERATURE AND SALINITY  
IN THE NORTHWESTERN SECTOR OF THE ALBORAN SEA (AUGUST, 1982)

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ABSTRACT.—The analysis of the distribution of chlorophyll, temperature and salinity, in the northwestern sector of the Alboran Sea evidences the existence of an upwelling area.

RESUME.—L'analyse de la distribution de chlorophylle, température et salinité dans le secteur nordouest de la mer d'Alboran montre l'existence d'un upwelling.

The data presented in the following paper proceed from samples of the oceanographic survey "Chanquete II-82". Sampling materials and methods are described in the first paper of this global study.

The whole survey comprises a total of 26 litoral stations along the coast of the province of Malaga, from the locations of Estepona to Motril. Nine other offshore stations were added with the purpose of delimitating possible upwelling areas (Fig. 1).

With respect to the chlorophyll "a" distribution in the sampled area (Figs. 2 & 3), highest values are localized in a not very extensive area, situated in the most western sector, between Estepona and the Strait of Gibraltar. Stations U-1 and U-2 register chlorophyll "a" values of 3.96 mg/m<sup>3</sup> and 5.27 mg/m<sup>3</sup>, respectively, in the 20 meter level. These same stations register maximum superficial values with 3.23 mg/m<sup>3</sup> (U-1) and 3.11 mg/m<sup>3</sup> (U-2).

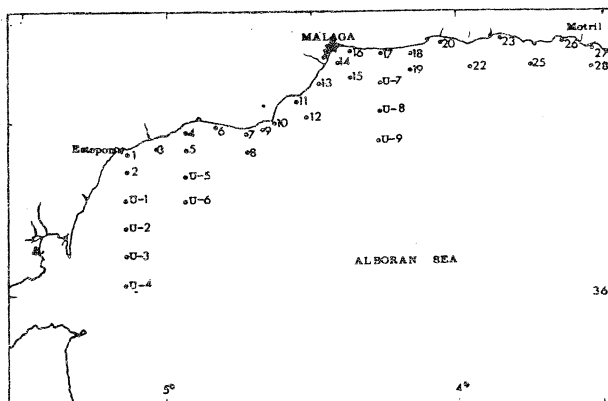


Fig. 1.— Station chart.

The rest of the area studied, east to this nucleus of richer waters, chlorophyll values are considerably lower and show a more homogeneous distribution. These values, at the superficial level, fluctuate between a minimum of 0.22 mg/m<sup>3</sup> (U-8) and a maximum of 0.97 mg/m<sup>3</sup> (St. 7), excepting stations 14 and 13, where chlorophyll registers 7.79 mg/m<sup>3</sup> and 2.69 mg/m<sup>3</sup>, respectively. These abnormally high values could be due to the fact that these two coastal stations are situated in front of direct sewage drain areas corresponding to the city of Malaga and its nearby localities, aggravated by the summer season in which there is an increase in the population due to tourism, and the Guadalhorce river outlet that crosses extensive agricultural areas.

Surface temperature distribution (Fig. 4), shows an exceptional cold water zone for the time of the year in which the survey was done, with values below 17.5° C.

This area which coincides with the maximum chlorophyll content, is limited in its southern border by the Atlantic water current that enters into the Alboran Sea through the Strait of Gibraltar.

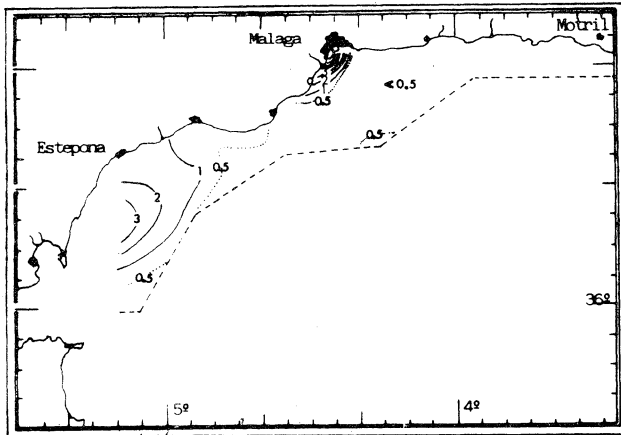


Fig. 2.- Chlorophyll "a" distribution at 1 meter.

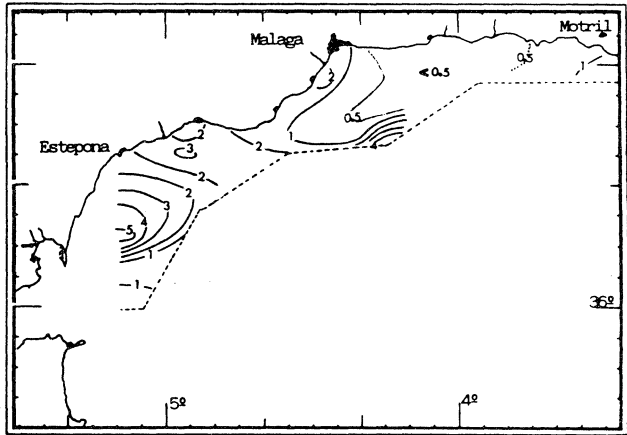


Fig. 3.- Chlorophyll "a" distribution at 20 meters.

In Fig. 5, where surface sea water salinities are represented, shows the correspondance of the zone of cold surface waters and of high chlorophyll values, with the area of relative maximum salinities. Only another station of similar salinity was found, station 1, close to the coast, as a consequence of a greater turbulent mixing with deeper and saltier waters.

Salinity values close to 36.7 ‰ seem to indicate that upwelling waters do not proceed from very deep waters, in consonance with the dynamic topography data, as well as the depth of the 37.5 ‰ isohaline, indicating that upwelling waters come from layers not deeper than 80 meters. Deducing from the study of the dynamic topography of the zone, the upwelling area coincides with the center of a cyclonic gyre whose divergent effects could be the cause of these phenomenons.

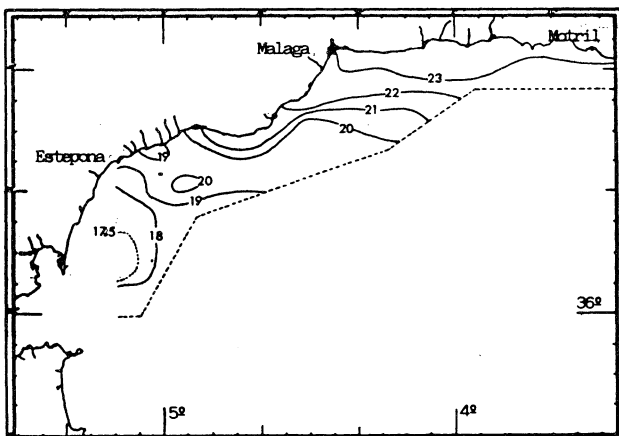


Fig. 4.- Temperature distribution at 1 mt.

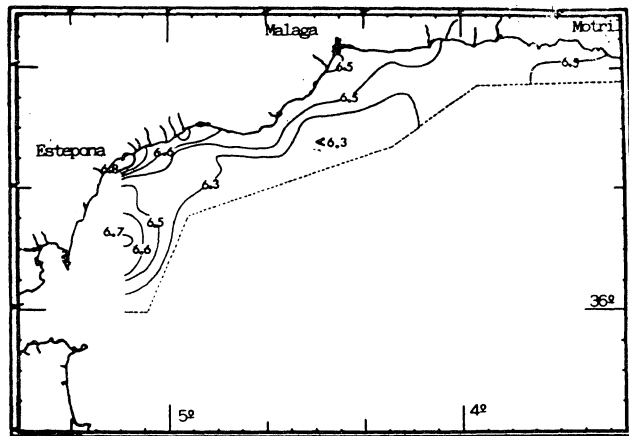


Fig. 5.- Salinity distribution at 1 mt. (30 ‰).