

Beaching of calyphoran siphonophores (Hydrozoa, Cnidaria) in the areas of Algeciras Bay and Tarifa, Gibraltar Strait



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INTRODUCTION

Two mass stranding events of the calyphoran siphonophore *Abylopsis tetragona* (Otto, 1823) were detected in two different areas of the Strait of Gibraltar during the cold season (Fig. 1 and 2).

The Strait of Gibraltar is a particular and a dynamic system where important oceanographic processes take place. Among them, vertical mixing processes (upwelling) that make the region highly productive.

A. tetragona is an epipelagic siphonophore inhabitant of temperate and warm waters of the three oceans. In the Mediterranean, it is known to live all year around with a main breeding period during spring. Regards its vertical distribution it is mainly concentrated in the first 50 m but also spread down to 400 m.



Figure 1. Geographical location of the two beaching events of the siphonophore *A. tetragona* in Gibraltar Strait.



Figure 2. (A) First beaching of the siphonophore, November 21st, 2014, Getares Beach, Algeciras. (B) Specimen of *A. tetragona* dyed with methylene blue. (C) Second beaching, January 11th, 2015, Paloma Baja Beach, Cape Paloma, Tarifa. (D) Specimen ~3 cm long. (E) Wind rose with data from Algeciras buoy (Entity of Spanish Harbours). It shows wind speed (m/s), direction and frequency, from 14th to 22nd November 2014. (F) Wind rose with data from Tarifa buoy, from 4th to 11th January 2015. (G, H) Sea Surface Temperature (C°) satellite images (AVHRR sensor, 1km² spatial resolution).

SURVEYS

From October 2014 through February 2015, students of 1st bachelor of the school María Auxiliadora (Algeciras) carried out daily beach surveys in order to monitor jellyfish strandings. These surveys were part of their school research project focused on gelatinous plankton, led by their biology teacher (Ana Villaescusa). During these surveys the 1st stranding was found.

The second one was discovered fortuitously by students of the same school during a geology field trip. Only during the 1st beaching the student collected samples, some of them preserved in formalin and sent to the ICM-CSIC for its taxonomical identification.

BEACHINGS

November 21st, 2014

- An estimated of over 700 colonies were found deposited along the tideline for about 400 m of the Getares beach (Fig. 2 A, B).
- Only the polygastric stage (anterior and posterior nectophores) was found, none eudoxid (sexual stage).
- The event occurred after two days of a strong easterly winds storm.

January 11th, 2015

- An estimated average density of 170 individuals m⁻² was found extended for about 550 m along the coastline of Paloma Baja beach (Fig. 2 C, D).
- Only polygastric stages were observed.
- The event was detected after two days of strong easterly winds.

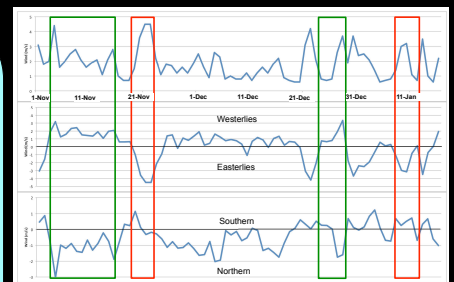


Figure 3. (a) Time series of local wind speed (m s⁻¹), (b) zonal component show positive (westerlies) and negative (easterlies) values, (c) meridional component show positive (southern) and negative (northern) values. Red boxes indicating the data with strong easterlies and the strandings events. Green boxes indicating strong easterlies episodes.

CONCLUSIONS

- These events are the first reported mass stranding of an epipelagic calyphoran siphonophore.
- Easterly strong winds seemed to promote the siphonophore stranding events in the region.
- Strong westerly winds during the preceding days led to upwelling processes that could have concentrated high densities of the siphonophore in superficial layers and later swept along by the strong easterlies to the coast.
- This is a good example of citizen science and the importance of jellyfish scientific knowledge outreach in schools, thanks to that we received the warning of the events and collaborate with them in obtaining the events' data and samples.

METEOROLOGICAL CONDITIONS

Both beaching events were detected during or after the course of 2-3 days of strong easterly winds with velocities up to 14 and 20 m s⁻¹ (see Fig. 2 E, F and 3). Previously to both periods, prevailing westerlies (Fig. 3) induced upwelling episodes (see Fig 2 G,H).

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The students (up-left corner picture) have won two first prizes (April and June, 2015) in two different young researchers competitions for their research project.