{rokbox title=| Remotely sensed image of sea surface temperature during the DESAFIO I cruise from the 31st January to the 2nd March 2023 :: Image: Authors| thumb=|images/stories/ieo/imagenespublicaciones/centro-oceanografico-baleares-ieo-csic-active-carbon-flux-bernal-2025-thumb-et-al.jpg|}images/stories/ieo/imagenespublicaciones/centro-oceanografico-baleares-ieo-csic-active-carbon-flux-bernal-2025-et-al.jpg{/rokbox}

Airam N. Sarmiento-Lezcano, María Couret, Javier Díaz-Pérez, **Ainhoa Bernal**, Vanesa Raya, Martín Pla, Nicolás Larrumbide-Zúñiga, Arturo Castellón, Santiago Hernández-León, 2025. **Active carbon flux by *Pyrosoma atlanticum* in the Northwest African upwelling transition zone (North-Central Eastern Atlantic Ocean)**. Progress in Oceanography. Volume 241. January 2026. 103632. https://doi.org/10.1016/j.pocean.2025.103632

Abstract:Pyrosomes are colonial tunicates that inhabit diverse environments and perform diel vertical migrations, contributing to the downward carbon flux primarily through large fecal pellet production and carcass depositions. *Pyrosoma atlanticum* is the most widespread pelagic colonial tunicate worldwide, yet its role in the carbon cycle remains poorly understood. Here, we investigated the abundance, biomass, and contribution of *P. atlanticum* colonies to the biological carbon pump using MOCNESS and Mesopelagos nets in the subtropical waters off the Northwest African upwelling transition zone. We found two different areas within the studied zone: a highly productive area off the African coast and an oligotrophic area. We only found *P. atlanticum* near and in the productive area. Organisms sampled with the MOCNESS showed a narrower size distribution (colony length of 23.1 ± 12.4 mm) associated with the lower productivity area. By contrast, the Mesopelagos captured a wider size community (colony length of 106.5 ± 74.5 mm). Off the African coast, migrant biomass of small-sized organisms exhibited values almost 2-fold higher compared to the large-sized organisms (121 vs 77.1 mgC·m–2). In oligotrophic waters, where only small-sized organisms were captured, their migrant biomass reached values four times higher (493 mgC·m–2). Two approaches were used to estimate large-sized pyrosomes active flux: (1) the enzymatic activity of the electron transfer system (ETS) and (2) a specific respiration equation (RC) for *P. atlanticum*. In the productive area, both methods yielded similar values for large-sized organisms (ETS: 2.02 mgC·m–2·d–1 and RC: 1.93 mgC·m–2·d–1). Small-sized organisms were quite abundant in the oligotrophic station showing a RC of 3.03 mgC·m–2·d–1. Active flux by

P. atlanticum
ranged between 1.93 near the upwelling zone and 12.36 mgC·m–2·d–1 in oligotrophic waters due to their quite high biomass there. Our finding highlights the functional role of this large zooplanktonic and micronektonic fauna in the biological carbon export according to the productivity of the area.

Keywords: Pelagic tunicates, Biological Carbon Pump, Electron Transfer System, Migrant biomass, Gelatinous zooplankton