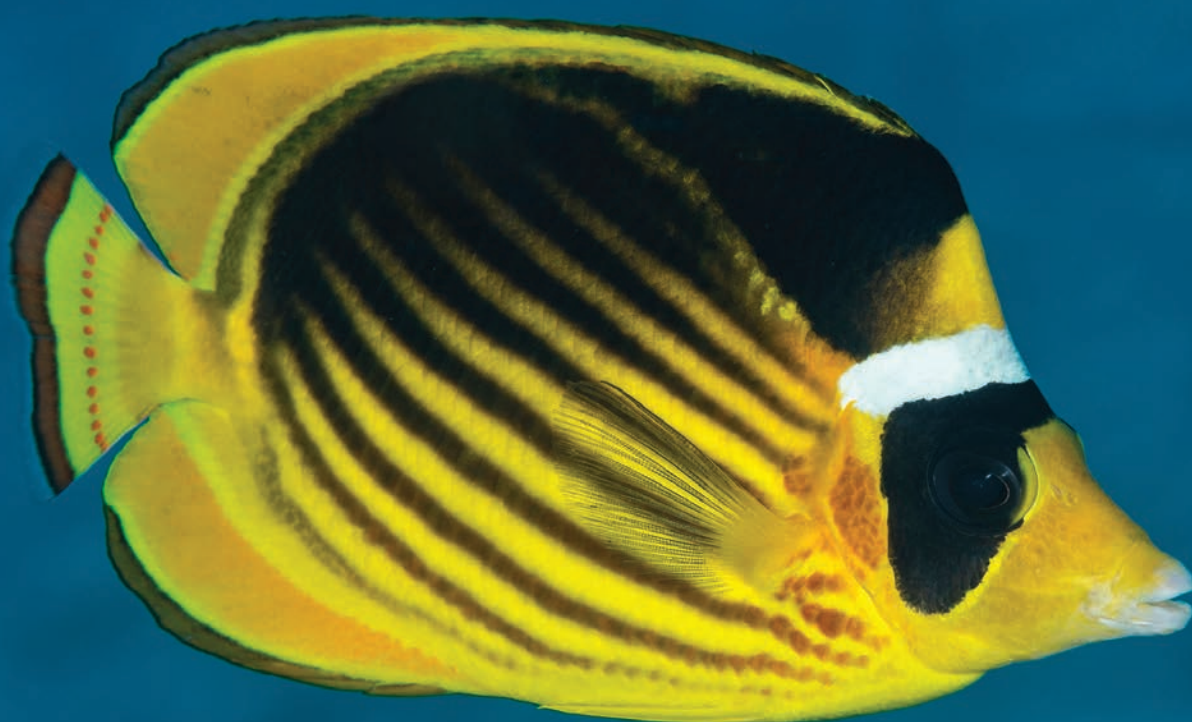


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PHYSALIA PHYSALIS IN THE CENTRAL MEDITERRANEAN SEA: RECENT OBSERVATIONS IN RELATION TO MASS STRANDINGS OF VELELLA VELELLA AND SURFACE CIRCULATION DYNAMICS

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ABSTRACT

The Portuguese man-of-war, Physalia physalis (Linnaeus, 1758), is a pleustonic siphonophore distributed throughout tropical and subtropical oceans. Although the species is occasionally recorded in the Mediterranean Sea, its occurrence is generally linked to episodic advection driven by winds and surface currents. Here, we report observations of P. physalis in the central Mediterranean between 6 February and 6 March 2026, coinciding with massive strandings of the pleustonic hydrozoan Velella velella. A negative North Atlantic Oscillation (NAO) phase likely facilitated Atlantic water inflow and eastward transport into the Mediterranean. A drifter trajectory from the southern Tyrrhenian Sea indicated temporary retention near the Lipari coast. These records likely indicate a transient influx of P. physalis, rather than a stable Mediterranean population.

Key words: Portuguese man-of-war, pleuston, jellyfish strandings, wind-driven circulation, multiplatform approach, teleconnection pattern

PHYSALIA PHYSALIS NEL MAR MEDITERRANEO CENTRALE: RECENTI OSSERVAZIONI ASSOCIATE A SPIAGGIAMENTI MASSIVI DI VELELLA VELELLA E ALLE DINAMICHE DELLA CIRCOLAZIONE SUPERFICIALE

SINTESI

La caravella portoghese, Physalia physalis (Linnaeus, 1758), è un sifonoforo pleustonico degli oceani tropicali e subtropicali, occasionalmente segnalato nel Mediterraneo in seguito a eventi episodici di avvezione da venti e correnti superficiali. In questo lavoro riportiamo osservazioni nel Mediterraneo centrale tra il 6 febbraio e il 6 marzo 2026, associate a spiaggiamenti massivi dell'idrozoo pleustonico Velella velella. L'evento è stato probabilmente favorito da una fase negativa della North Atlantic Oscillation (NAO), che ha promosso l'ingresso di acque superficiali atlantiche e il trasporto verso est, come supportato dalla traiettoria di un drifter nel Tirreno meridionale con temporanea ritenzione presso la costa di Lipari. Queste segnalazioni riflettono verosimilmente un evento transitorio di avvezione piuttosto che l'instaurarsi di una popolazione stabile nel Mediterraneo.

Parole chiave: caravella portoghese, pleuston, spiaggiamenti di meduse, circolazione guidata dal vento, approccio multiplatforma, teleconnection patterns

INTRODUCTION

The Mediterranean Sea is recognized as one of the world's major marine biodiversity hotspots, hosting an exceptionally rich fauna with more than 17,000 recorded marine species (Coll *et al.*, 2010; Kokkinos *et al.*, 2025). Despite this remarkable diversity, Mediterranean ecosystems are undergoing rapid ecological change driven by multiple anthropogenic and climatic factors, including biological invasions, expansion of nonnative species, ocean warming, and alterations in circulation patterns (Katsanevakis *et al.*, 2014; Giangrande *et al.*, 2020; Tiralongo *et al.*, 2020; Darmaraki *et al.*, 2024; Martellucci *et al.*, 2025).

Among gelatinous zooplankton, pleustonic organisms living at the sea surface represent a peculiar ecological component of pelagic ecosystems. These species, which include hydrozoans such as *Physalia physalis* (Linnaeus, 1758) and *Velella velella* (Linnaeus, 1758), depend largely on wind-driven transport and surface currents for their dispersal and distribution (Iosilevskii & Weihs, 2009; Lee *et al.*, 2021; Carvalho *et al.*, 2026). Consequently, their occurrence in coastal areas is often episodic and

strongly influenced by meteorological conditions, which can lead to large-scale accumulations and strandings along shorelines (Prieto *et al.*, 2015; Macías *et al.*, 2021).

The Portuguese man-of-war, *P. physalis*, is a cosmopolitan siphonophore distributed in tropical and subtropical waters, characterized by a gas-filled float (pneumatophore) that enables it to drift at the sea surface while trailing long tentacles armed with powerful nematocysts (Mapstone, 2014; Munro *et al.*, 2019). Although often mistaken for a true jellyfish (Scyphozoa), the Portuguese man-of-war is a highly specialized colonial organism (Hydrozoa), composed of multiple functionally differentiated zooids. Due to the highly potent venom contained in the nematocysts, contact with the tentacles can cause severe, painful stings and dermatological reactions in humans. As a result, the nearshore occurrence of *P. physalis* colonies represents a potential hazard for swimmers and coastal recreational activities (Toubarro *et al.*, 2023).

In the Mediterranean Sea, *P. physalis* is generally regarded as an occasional visitor rather than a resident species. Its occurrence is usually associated with episodic advection events involving Atlantic

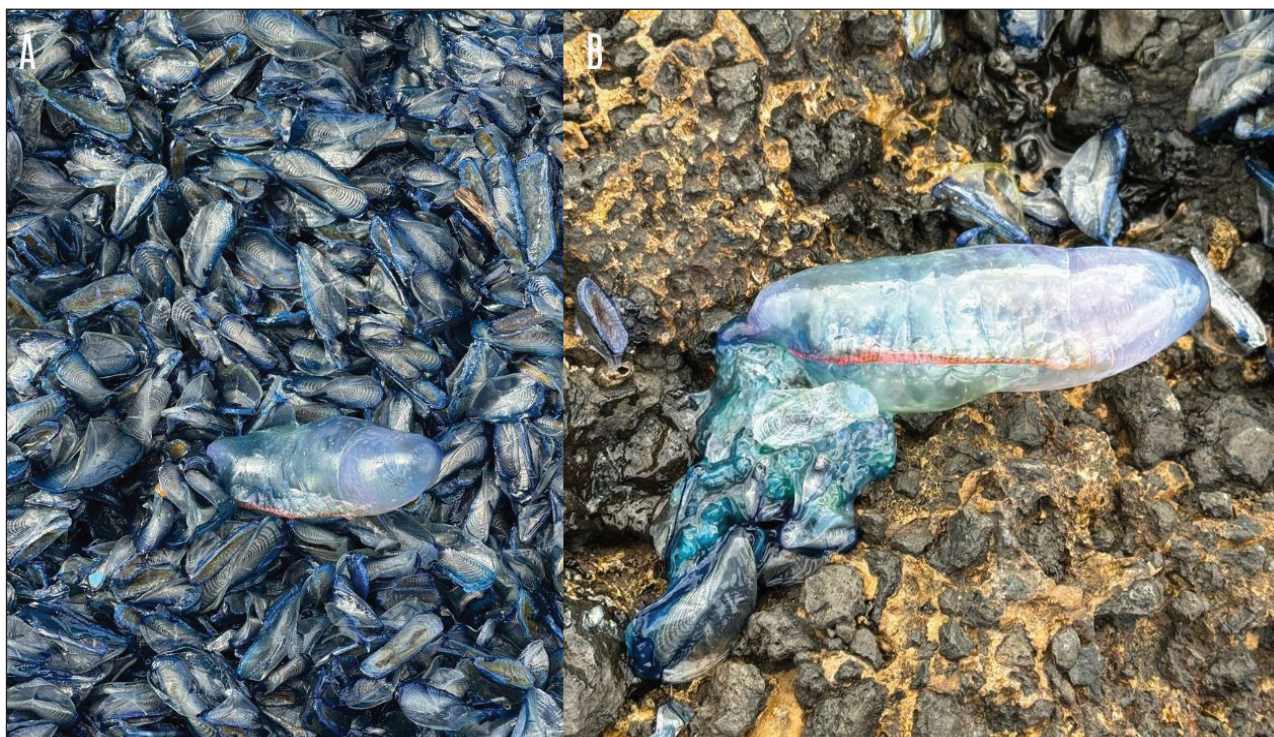


Fig. 1: (A) Colony of *Physalia physalis* among numerous individuals of *Velella velella* observed at Ustica Island on 24 February 2026; (B) The colony of *P. physalis* was subsequently collected and preserved by Tatiana Geloso (author of the photos).

Sl. 1: (A) Kolonija vrste *Physalia physalis* med številnimi osebki vrste *Velella velella*, opažena na otoku Ustica 24. februarja 2026; (B) Kolonijo *P. physalis* je pozneje prevzela in konzervirala Tatiana Geloso (avtorica fotografij).

populations entering through the Strait of Gibraltar, with frequent strandings reported along the Spanish and North African coasts of the Alboran Sea (Tiralongo et al., 2022). A key driver of this inflow is the negative phase of the North Atlantic Oscillation (NAO), which favors westerly wind conditions that enhance the entry of Atlantic surface waters into the Mediterranean (Prieto et al., 2015; Macías et al., 2025). More generally, recent studies have highlighted the importance of basin-scale surface circulation and wind-driven transport in shaping the dispersal and coastal occurrence of this pleustonic species within the western Mediterranean (Macías et al., 2021; Macías et al., 2025). In addition, the complex surface circulation of the Alboran Sea, including cyclonic and anticyclonic structures and the Almería–Oran front (Tintore et al., 1988; Macías et al., 2016; Capó et al., 2021; Martellucci et al., 2025), may increase the residence time of floating organisms in the area, thereby favoring coastal accumulation and stranding (Prieto et al., 2015). For this reason, records from across the Mediterranean remain relatively rare and are often linked to short-lived stranding events (Tiralongo et al., 2022; Macías et al., 2025).

A pleustonic hydrozoan frequently involved in mass stranding events in the Mediterranean is *V. veleva*, commonly known as the “by-the-wind sailor”. This species forms large pelagic aggregations that may be transported toward the coast by persistent winds, resulting in spectacular accumulations along beaches. Such events are relatively common in the Mediterranean basin and may involve millions of individuals. Because both *P. physalis* and *V. veleva* inhabit the sea–air interface and

rely heavily on wind-driven transport, their occurrences are often linked to the same oceanographic and meteorological conditions. Consequently, episodes of massive *Veleva* strandings may occasionally coincide with the presence of other pleustonic organisms drifting in the same surface water masses.

In this study, we report a series of recent observations of *P. physalis* consistently associated with massive strandings of the pleustonic hydrozoan *V. veleva* along the Italian and Maltese coasts, mainly localized between Sicily and Calabria during a short period in winter 2026. Using a multiplatform approach that integrates citizen science with atmospheric and oceanographic data, we investigate the mechanisms underlying these pleustonic transport events from Gibraltar Straits toward the central Mediterranean coasts.

MATERIAL AND METHODS

Between 6 February and 6 March 2026, several colonies of *Physalia physalis* were observed and photographed by coastal observers along coastal sectors of southern Italy, between Sardinia, Sicily, and Calabria (central Mediterranean Sea).

The first observation occurred on 24 February 2026 on Ustica Island (38.70551 °N, 13.15842 °E), when several colonies were photographed near the shoreline during a period characterized by extensive beach accumulations of *Veleva veleva* (Fig. 1). A second observation was recorded on 27 February 2026 in Villa San Giovanni (38.23886 °N, 15.66730 °E), again in association with massive strandings of *V. veleva*. A later observation was documented on 3 March 2026 in

Tab. 1. Documented observations of *Physalia physalis* colonies recorded between 6 February and 6 March 2026, including the main details and sources of each record. A single colony was observed per location and date.

Tab. 1. Dokumentirana opažanja kolonij vrste *Physalia physalis*, zabeležena med 6. februarjem in 6. marcem 2026, vključujejo glavne podrobnosti in vire za vsak zapis o pojavljanju, pri čemer je bila na posamezno lokacijo in datum opažena po ena sama kolonija.

Date	Location	Country	Coordinates	Source
6 February 2026	Granitola Torretta	Italy	37.57269° N, 12.65768° E	iNaturalist
14 February 2026	Buggerru	Italy	39.42762° N, 8.41308° E	iNaturalist
20 February 2026	Lamezia Terme	Italy	38.91625° N, 16.21929° E	online magazine
24 February 2026	Ustica	Italy	38.70551° N, 13.15842° E	observer
27 February 2026	Villa San Giovanni	Italy	38.23886° N, 15.66730° E	observer
1 March 2026	Lipari	Italy	38.49229° N, 14.88063° E	Facebook
3 March 2026	Pizzo Calabro	Italy	38.79915° N, 16.20872° E	observer
6 March 2026	Sliema	Malta	35.91798° E, 14.49985° E	iNaturalist

Pizzo Calabro (38.79915 °N, 16.20872 °E), confirming the persistence of the event over several consecutive days. Moreover, during the same period, additional observations were publicly reported by local online news outlets. For instance, a record dated 20 February 2026 from Lamezia Terme (Tyrrhenian Sea - 38.91625 °N, 16.21929 °E) was reported by *Corriere della Calabria* (2026). In this case as well, colonies of *P. physalis* were observed in association with a massive stranding of *V. velella* on the shoreline, forming dense beach wrack lines. Another observation was reported on 1 March 2026 from Lipari, Aeolian Islands (Tyrrhenian Sea – 38.49229 °N, 14.88063 °E) and documented through photographic evidence shared on Facebook (2026). Additional observations from the same period were retrieved from the online platform iNaturalist (2026) (Fig. 2, Tab. 1). Species identification relied on the characteristic morphology of *P. physalis*, including a bluish-violet gas-filled float and long trailing tentacles, which were clearly visible in the examined photographs.

To investigate the causes of these events along the Tyrrhenian coasts of southern Italy, and given the pleustonic nature of the species, we adopted a multi-platform approach to identify the main forcing factors that may have favored its arrival in the Tyrrhenian Sea. We examined atmospheric and oceanographic conditions using a combination of large-scale climatic indices, regional oceanic and atmospheric models, and in situ observations from various data portals.

Surface circulation fields were obtained using the Copernicus Marine Service Mediterranean Sea Physics Analysis/Forecast product MEDSEA_MULTIYEAR_PHY_006_004 (DOI: 10.25423/CMCC/MEDSEA_MULTIYEAR_PHY_006_004_E3R1), which is based on the Mediterranean Forecasting System and provided on a regular 1/24° horizontal grid (approximately 4–5 km resolution). For our analysis, we used the hourly two-dimensional sea-surface current fields, specifically the eastward and northward velocity components (u_0 , v_0 , $m\ s^{-1}$). Surface current anomalies were computed by subtracting the monthly climatological mean from the January–February 2026 fields, then averaged over the same period. The zonal component is shown in Fig. 2.

Wind data were retrieved from the ERA5 hourly dataset at individual atmospheric levels, provided by the Copernicus Climate Change Service (DOI: 10.24381/cds.adbb2d47). To characterize the large-scale atmospheric forcing over the northeastern Atlantic, the monthly mean zonal wind component was averaged over the 30–50° N and 20–10° W domain for September 2025–February 2026. This quantified the seasonal evolution of westerly winds affecting the Atlantic sector adjacent to the southwestern Iberian margin.

The North Atlantic Oscillation (NAO) index values were obtained from the NOAA Climate Prediction Center (CPC) teleconnection archive and used as a large-scale climatic indicator for atmospheric circulation patterns over the North Atlantic–Mediterranean region.

Wave conditions in the central Mediterranean were analyzed using data from the Italian National Wave Network (www.mareografico.it), based on observations from the Palermo wave buoy. Significant wave height and wave direction were examined to describe the dominant wave regime and identify energetic wave events occurring in the weeks preceding the coastal observations.

Direct current observations were provided by the SVP (Surface Velocity Program) drifters drogued at 15 m (Niiler, 2001; Centurioni, 2018). SVP drifters follow sub-surface currents within 1 $cm\ s^{-1}$ in winds up to 10 $m\ s^{-1}$ (Niiler et al., 1995). Drifter positions were quality-controlled using standard methods (Menna et al., 2017). Water mass acronyms used in this paper follow Schroeder et al. (2024).

Since the dataset consisted of only eight opportunistic presence-only records concentrated within a short temporal window, the observations were not treated as independent statistical replicates. Therefore, no formal correlation analysis was performed between *P. physalis* sightings and environmental variables. Instead, the environmental analysis was conducted at the event scale, using wind fields, surface current anomalies, wave conditions, and drifter trajectories to assess whether the physical conditions were consistent with episodic eastward advection and subsequent coastal accumulation.

RESULTS AND DISCUSSION

The colonies observed during the investigation period displayed the typical morphological features of *Physalia physalis*, including an elongated bluish pneumatophore and trailing tentacles extending beneath the float (Fig. 1). Although the number of individuals observed was relatively limited (Fig. 2a, Tab. 1), their repeated occurrence within a short temporal window suggests the passage and/or coastal accumulation of a surface-drifting pleustonic aggregation advected along the Atlantic Water surface pathway, with wind drift and wave forcing likely modulating its final coastal displacement.

All observations occurred simultaneously with massive strandings of *Velella velella*, which formed extensive accumulations along beaches. Such events are relatively common in the Mediterranean and are generally associated with persistent winds that push surface-drifting organisms toward coastal sectors (Betti et al., 2019). The co-occurrence of *P. physalis* and *V. velella* strongly suggests that

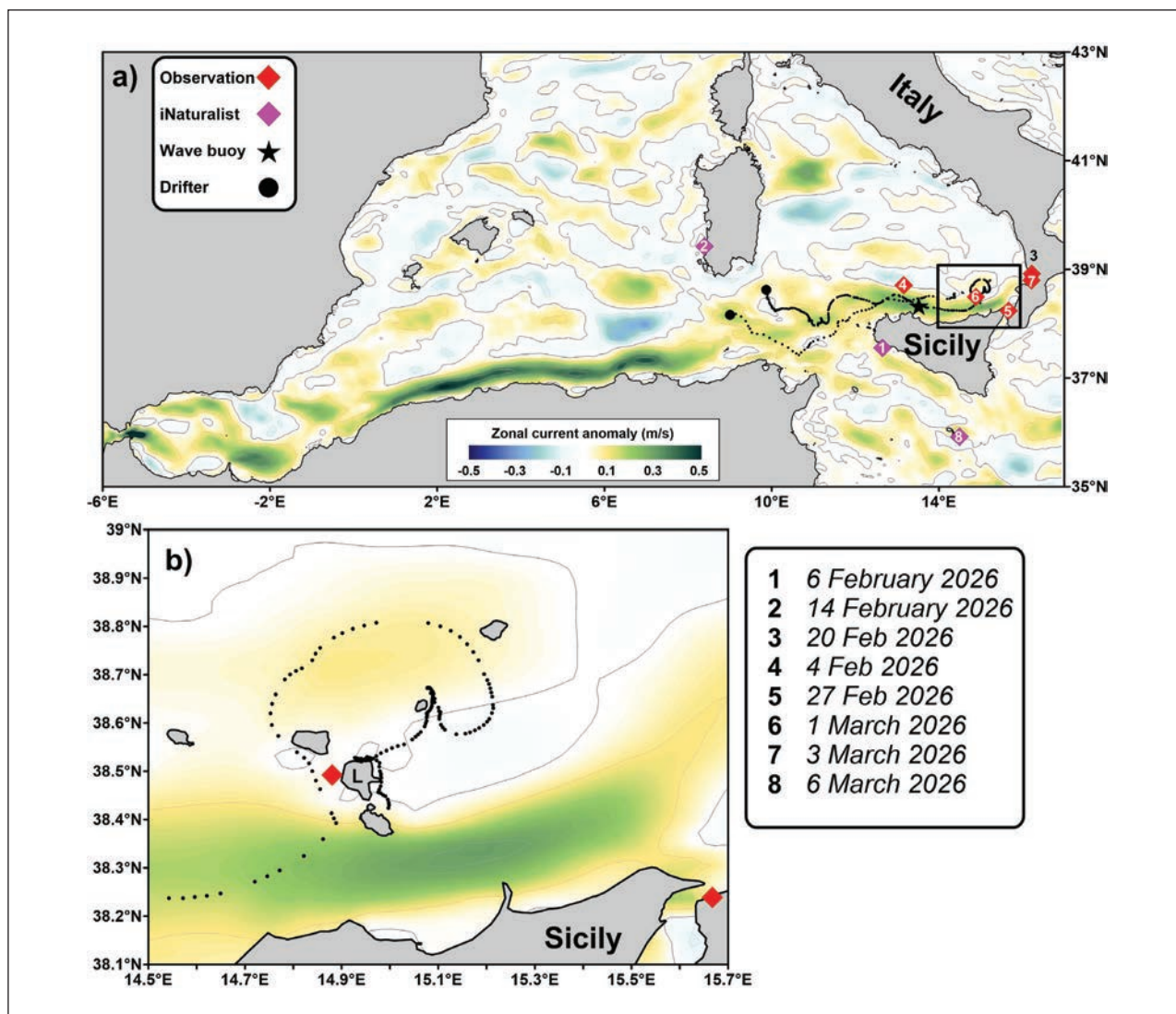


Fig. 2: (a) Map of the anomaly of the zonal component of the current field for January and February 2026; zoom on the Lipari island. (b) Diamonds indicate *Physalia* observations, the star marks the location of the wave buoy of the National Tide Gauge Network. Black dots represent the trajectory of the SVP drifter from 10 February 2026 to 10 March 2026 (IMEI: a300534065360410; a300534065378310).

Sl. 2: (a) Zemljevid anomalije zonalne komponente tokovnega polja za januar in februar 2026; povečava (zoom) na otok Lipari. (b) Diamanti označujejo opažanja vrste *Physalia*, zvezdica označuje lokacijo valomernega plovka nacionalne mreže mareografskih postaj. Črne pike predstavljajo tirnico SVP oceanskega plovka (drifterja) od 10. februarja 2026 do 10. marca 2026 (IMEI: a300534065360410; a300534065378310).

both species were transported by the same surface currents and wind systems. As pleustonic organisms are largely passive drifters, their distribution is highly dependent on meteorological forcing, particularly wind direction and intensity (Headlam et al., 2020). Under favorable conditions, offshore aggregations may therefore be transported toward coastal areas over relatively short time scales. In this context, mass strandings of *V. velilla* may serve as a useful biological proxy for the arrival of larger

oceanic pleustonic organisms, including *P. physalis*, particularly during periods of persistent onshore winds, enhanced surface circulation, and storm-related transport events. Similar associations between meteorological forcing, pleuston accumulation, and coastal strandings have been documented in previous studies on *V. velilla* and other neustonic organisms (Karunaratne & de Croos, 2022; Roca et al., 2025). Given the limited number of observations and their temporal clustering, the sightings were

interpreted as manifestations of a single advection event rather than as independent records suitable for point-by-point statistical correlation. Accordingly, the environmental analysis was performed at the event scale.

The atmospheric–oceanographic context preceding February–March 2026 provides a coherent framework for interpreting these events. The cold season of 2025–2026 was characterized by a predominantly negative NAO phase (Fig. 3). During the same period, the monthly mean zonal wind component over the northeastern Atlantic sector (30–50° N, 20–10° W) remained persistently positive, increasing progressively from autumn to winter and reaching maximum values in January–February 2026. This pattern indicates strengthened westerly winds over the Atlantic sector adjacent to the southwestern Iberian margin, favoring the entry of pleustonic organisms into the Mediterranean Sea. Such conditions have previously been associated with the eastward displacement of *P. physalis* toward the southwestern Iberian margin and the western Mediterranean (Prieto et al., 2015), and are consistent with the basin-scale transport framework

proposed by Macías et al. (2021) as well as with more recent observations reported by Macías et al. (2025). This interpretation is also coherent with the well-known wind-driven drift of this pleustonic organism (Iosilevskii & Weihs, 2009; Lee et al., 2021). The intensification of westerlies during autumn–winter 2025–2026 has favored the initial transport of offshore colonies from the northeastern Atlantic toward the entrance to the Mediterranean Basin.

Surface circulation in the Mediterranean Sea is primarily driven by the inflow of Atlantic Water (AW) through the Strait of Gibraltar (Poulain et al., 2013). After entering the basin, AW spreads eastward across the western Mediterranean, generating meanders, mesoscale eddies, and dynamical instabilities along its trajectory (Bergamasco & Malanotte-Rizzoli, 2010). The current then follows the North African margin up to Sicily, where the flow bifurcates (Millot & Taupier-Letage, 2005; Iacono et al., 2013). One main branch continues eastward toward the eastern Mediterranean, while the other turns northward and enters the Tyrrhenian Sea. Within the Tyrrhenian basin, this surface circulation pathway flows northwestward along the Italian coastline (Martellucci et al., 2018), transporting

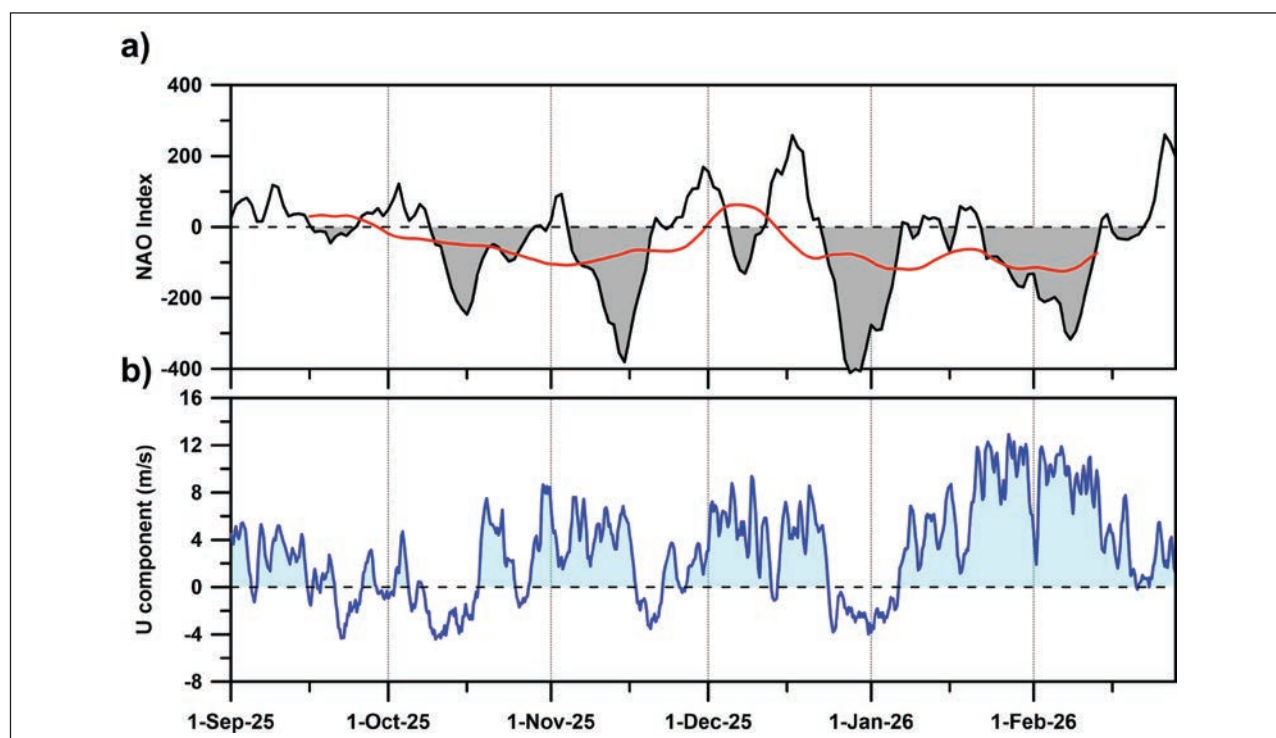


Fig. 3. (a) NAO index (black line) and its 13-month running mean; the grey shaded area highlights periods with negative values; (b) zonal wind component averaged over the region 30–50° N, 20–10° W (blue line); the cyan shaded area indicates positive values, corresponding to eastward-blowing winds.

Sl. 3. (a) Indeks NAO (črna črta) in njegova 13-mesečna drseča sredina; sivo osenčeno območje poudarja obdobja z negativnimi vrednostmi; (b) zonalna komponenta vetra, povprečena čez regijo 30–50° S, 20–10° Z (modra črta); sinje modro osenčeno območje označuje pozitivne vrednosti, ki ustrezajo vetrovom, ki pihajo proti vzhodu.

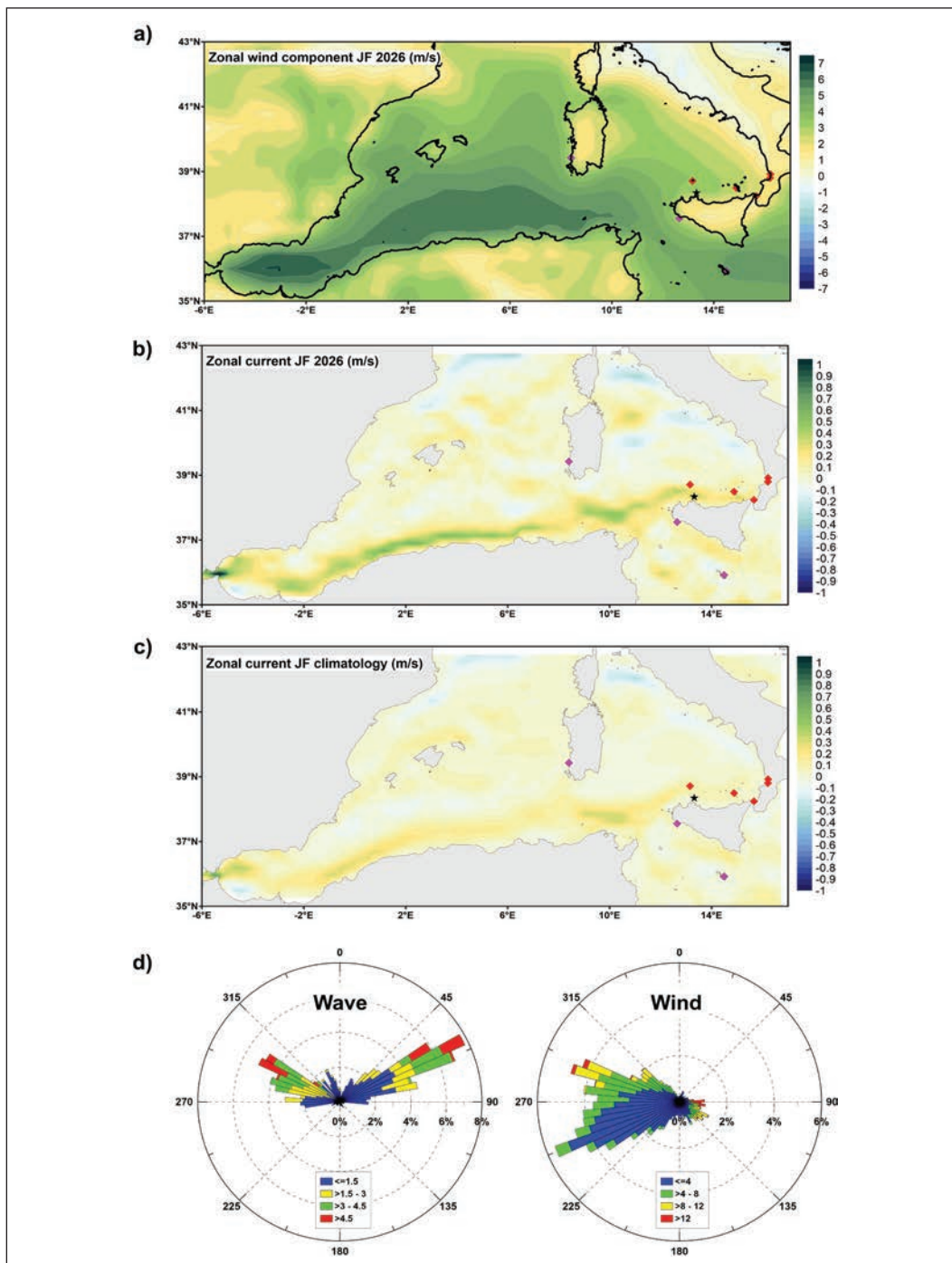


Fig. 4. (a) Zonal component of the wind, (b) current, and (c) current climatology, averaged over January and February 2026; diamonds indicate *P. physalis* observations, the star marks the location of the wave buoy of the National Tide Gauge Network; (d) Wind rose for the Palermo tide gauge station, showing wind and wave data. Note: current direction indicates water movement, wind direction indicates the origin of the wind.

Sl. 4. (a) Zonalna komponenta vetra, (b) morski tok in (c) klimatologija morskih tokov, povprečni čez januar in februar 2026; diamanti označujejo opažanja vrste *P. physalis*, zvezdica označuje lokacijo valomernega plovka nacionalne mreže mareografskih postaj; (d) vetrna roža za mareografsko postajo Palermo, ki prikazuje podatke o vetru in valovih. Opomba: smer toka označuje gibanje vode, smer vetra pa označuje izvor (od kod piha) vetra.

water masses toward the northwestern sector of the basin (Millot & Taupier-Letage, 2005; Iacono *et al.*, 2013). Accordingly, the observations reported here are consistent with the hypothesis that *P. physalis* can be advected within the Mediterranean by the main AW surface pathways after entering from the Atlantic, as previously suggested by basin-scale modelling studies (Macías *et al.*, 2021).

Once within the Mediterranean, oceanographic conditions during January–February 2026 appear to have favored further eastward propagation. The anomaly of the zonal component of the surface current relative to climatology (Fig. 2a) revealed positive values across several key sectors, including the North African margin, the Sardinia and Sicily Channels, and the southern Tyrrhenian Sea. This pattern suggests enhanced eastward surface transport relative to the climatological mean (>60%, Fig. 4b,c), broadly following the main Atlantic Water circulation pathway in the western and central Mediterranean (Poulain *et al.*, 2012; Menna *et al.*, 2022). At the same time, the mean zonal wind field over the western and central Mediterranean basin remained predominantly positive, indicating widespread eastward atmospheric forcing that may have reinforced the surface current system (Fig. 4a).

Importantly, the drifter trajectory recorded between 10 February and 10 March provides independent Lagrangian evidence for the hypothesized surface transport pathway of the Portuguese man-of-war (Fig. 2a). Unlike a point-by-point correlation between a limited number of sightings and environmental variables, the drifter trajectory directly documents the displacement of a surface-following object under the combined action of currents and wind forcing.

A particularly relevant feature is that the drifter (IMEI: a300534065360410) was already located very close to the Lipari coast on 1 March, coinciding with the location and timing of one of the recorded sightings, and remained in the area until 6 March, describing small looping trajectories. This provides further Lagrangian support for the hypothesis on local accumulation and temporary retention of pleustonic organisms near the coast (Fig. 2b).

In situ wave and wind conditions in the southern Tyrrhenian Sea (Fig. 4d) further support this interpretation. Data from the Palermo wave buoy (Fig. 4d) show that the weeks preceding the coastal observations were characterized by a persistent W–NW/NW wave regime, with peak events exceeding 5 m. Notably, the observations recorded in the Sicily Channel – the first and the last reported here – suggest that the spreading of *P. physalis* was not confined to the western Mediterranean, but extended into the central basin (Fig. 2a). This agrees with previous modelling results indicating that, after entering through the Strait of Gibraltar, *P. physalis* can be advected toward the Sicily Channel (Macías *et al.*, 2021).

Given the pleustonic nature of *P. physalis*, the persistent W–NW/NW wind and wave regime likely played a key role in the final coastal approach and accumulation of colonies along the northern Sicilian margin. More generally, the event is best interpreted as a combined wind–current–wave surface-drift process. At the basin scale, the Atlantic Water circulation and anomalous eastward surface-current patterns observed in January–February 2026 provided a favorable advective framework toward the central Mediterranean and Tyrrhenian sectors. At smaller spatial and temporal scales, persistent westerly winds, energetic wave conditions, windage, and mesoscale circulation features likely modulated the drift, retention, and coastal accumulation of pleustonic colonies. This interpretation is consistent with Prieto *et al.* (2015), who linked Mediterranean occurrences of *P. physalis* to unusual combinations of meteorological and oceanographic conditions, and with Macías *et al.* (2021), who proposed a Lagrangian transport framework for its dispersal within the Mediterranean.

Although *P. physalis* is occasionally reported from the Mediterranean Sea, its occurrences remain sporadic and are generally linked to episodic incursions of Atlantic surface waters (Prieto *et al.*, 2015; Tiralongo *et al.*, 2022; Macías *et al.*, 2025). The observations reported here are therefore most likely a reflection of a transient advection-driven occurrence, rather than of the establishment of a self-sustaining or stable population within the basin. Similar episodic transport events have been documented in the western Mediterranean and are typically associated with specific combinations of atmospheric forcing and regional circulation patterns (Prieto *et al.*, 2015; Macías *et al.*, 2021; Macías *et al.*, 2025).

From an ecological perspective, such events provide valuable insights into surface circulation dynamics and the transport of neustonic communities across the Mediterranean basin. The simultaneous occurrence of different pleustonic taxa, such as *P. physalis* and *V. velella*, may reflect large-scale aggregation processes occurring offshore before wind-driven transport toward coastal areas.

When interpreted together with current anomalies, wind fields, wave conditions, and the drifter trajectory, these episodic strandings may provide qualitative evidence of transient surface-drift routes connecting Atlantic-influenced waters with the central Mediterranean. However, for pleustonic organisms, such transport should not be attributed to currents alone, as wind drift and wave forcing likely play a major role, particularly during the final coastal accumulation phase. In this context, surface drifters represent a particularly valuable tool for

interpreting such episodic events, as the Lagrangian observations they provide represent direct evidence of transport and retention processes that cannot be robustly inferred from sparse presence-only records alone.

Furthermore, the increasing availability of photographic documentation from coastal observers and citizen science networks greatly enhances our ability to detect and document such transient events (Carvalho *et al.*, 2026). Rapid reporting of unusual occurrences contributes to improving our understanding of the dynamics of gelatinous plankton and pleustonic communities in the Mediterranean Sea. Given the episodic nature of these phenomena, continued monitoring of Mediterranean coastlines will be essential to better understand the frequency, drivers, and ecological implications of incursions of Atlantic pleustonic organisms such as *P. physalis* into the basin.

Future studies should complement observational records with dedicated Lagrangian modelling approaches, in which virtual particles representing pleustonic colonies are advected under different combinations of surface currents, windage, and wave-related forcing. Such an approach would allow testing of alternative transport scenarios and estimation of residence times, likely drift pathways, and

potential stranding areas. In addition, considering the potentially dangerous stings of this species for humans, improved knowledge of when and where *P. physalis* occurs near the coast is highly valuable for public awareness and coastal management.

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PORTUGALSKA LADJICA (*PHYSALIA PHYSALIS*) V OSREDNJEM SREDOZEMSKEM MORJU: NEDAVNA OPAŽANJA V POVEZAVI Z MASOVNIMI NASEDANJI MORSKEGA JADRČKA (*VELELLA VELELLA*) IN DINAMIKO POVRŠINSKEGA KROŽENJA VODE

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POVZETEK

Portugalska ladjica, *Physalia physalis* (Linnaeus, 1758), spada med plevstonske vrste cevkašev in je razširjena po vseh tropskih in subtropskih oceanih. Čeprav vrsto v Sredozemskem morju zabeležijo le občasno, je njeno pojavljanje splošno povezano z epizodično advekcijo, ki jo poganjajo vetrovi in površinski tokovi. Avtorji poročajo o opažanjih vrste *P. physalis* v osrednjem Sredozemlju med 6. februarjem in 6. marcem 2026, kar sovpada z masovnimi nasedanji vrste plevstonskega trdoživnjaka *Velella velella*. Negativna faza severnoatlantske oscilacije (NAO) je verjetno olajšala dotok atlantske vode in njen transport proti vzhodu v Sredozemlje. Tirnica oceanskega plovka (drifterja) iz južnega Tirenskega morja je pokazala začasno zadrževanje v bližini obale otoka Lipari. Ta opažanja verjetno kažejo na prehodni pojav vrste *P. physalis* in ne na stabilno populacijo v Sredozemskem morju.

Ključne besede: portugalska ladjica, plevston, nasedanje meduz, vetrno gnano kroženje vode, večplatformni pristop, vzorec telekonekcije

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