IECD 2024 Conference

The 3rd International Electronic Conference on Diversity

15–17 October 2024 | Online

MDPI

Wind-Induced Changes in Zooplankton Diversity in a Temperate Sandy Beach Surf Zone: A preliminary methodology using Neutral red staining

C.A. Baleani1, M.C. Menéndez1, M.C. Piccolo1.

1Instituto Argentino de Oceanografía (CONICET-UNS), Camino a la Carrindanga 7.5 km, Bahía Blanca, B800FWB, Argentina

E-mail addresses: cbaleani@iado-conicet.gob.ar, carlabaleani88@gmail.com (C.A. Baleani).

INTRODUCTION & AIM

Zooplankton quickly responds to environmental changes due to hydrodynamic sensitivity. This study aimed to assess the impact of wind events on zooplankton diversity and abundance in the surf zone of a temperate sandy beach, using neutral red staining to differentiate live from dead organisms.

METHOD

Sampling
- Collected before and after wind events (May 2017 – July 2019).

Staining with neutral red to differentiate live from dead organisms.

Wind data
- High-frequency wind speed.
- Categorized in direction/duration.

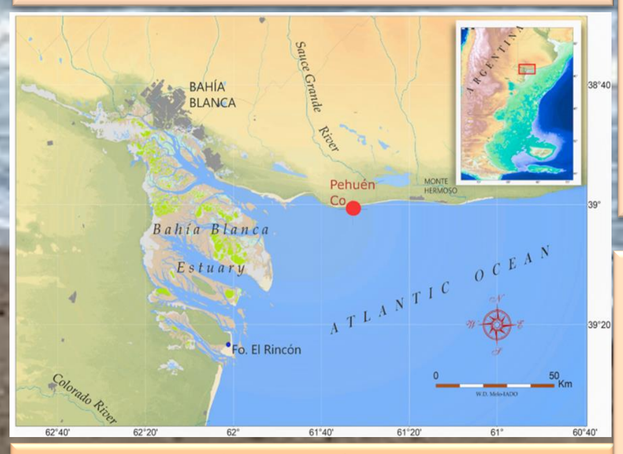

Figure 1. Study Area.

Statistical analysis
- LM and GLM.
- Rate of change Before/after events.

CONCLUSION

Wind events, particularly their direction and duration, are key factors in determining zooplankton abundance and composition in the surf zone of temperate sandy beaches.

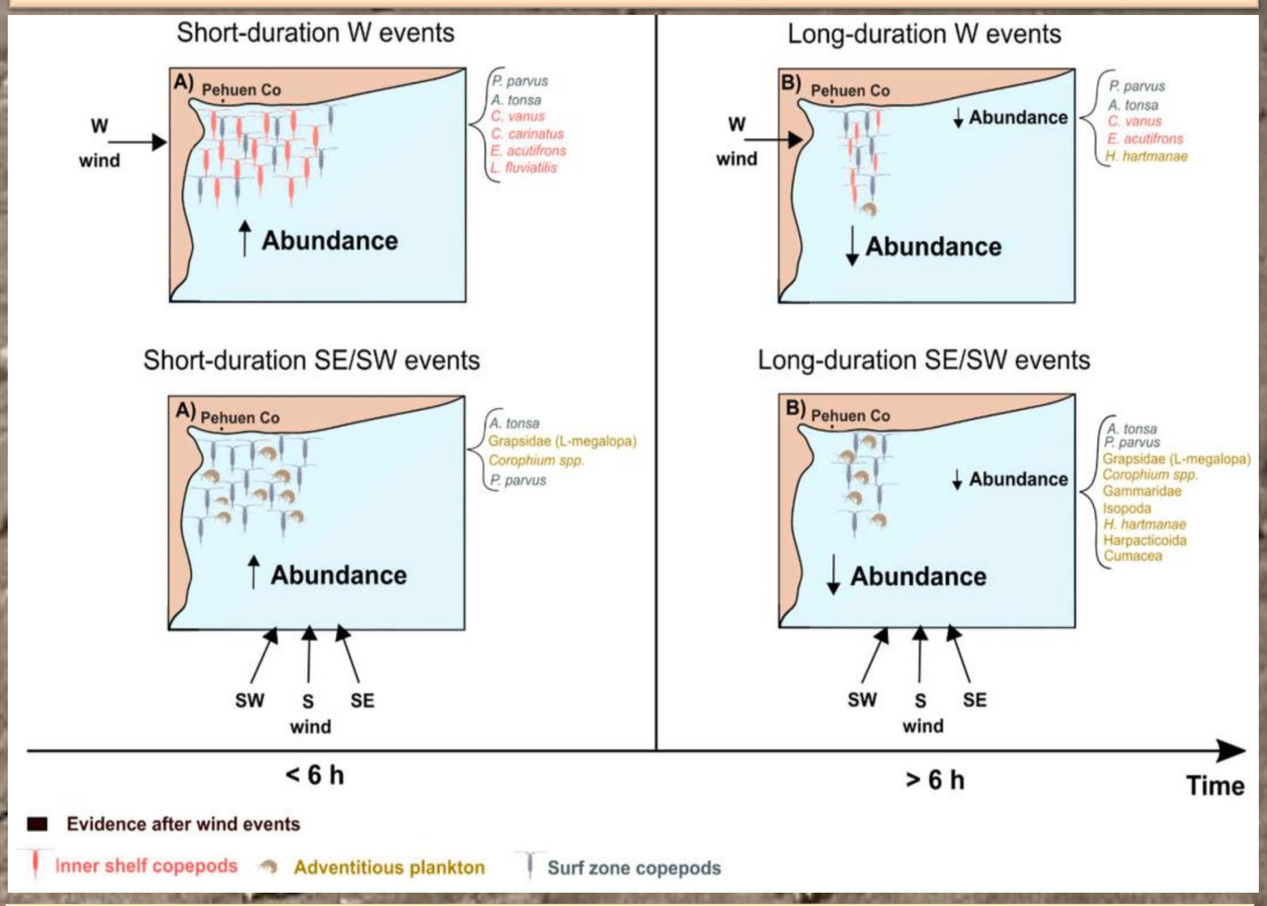

Figure 5. Evidence visualized after the wind events. The diagram shows the short- and long-duration W events (A, B top) and short- and long-duration SE-SW events (A, B bottom). The taxonomic composition of the zooplankton after the events was classified into inner shelf copepods, surf zone copepods, and adventitious plankton.

These findings emphasize the role of wind patterns in managing and conserving marine biodiversity. The research enhances our understanding of how abiotic factors, such as wind, impact coastal ecosystems, with implications for biodiversity conservation in the context of climate change.

RESULTS & DISCUSSION

Wind direction and duration significantly affect the zooplankton community.

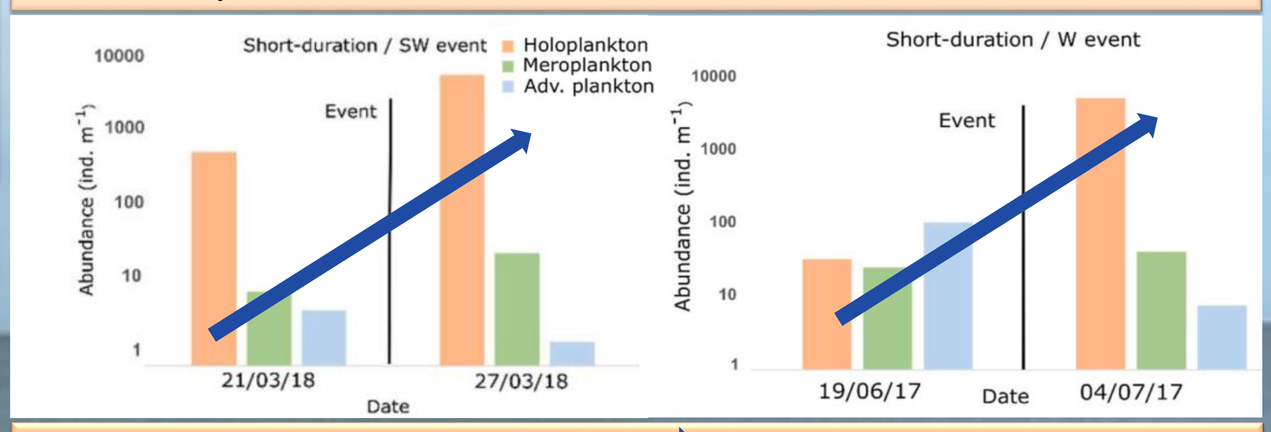

Figure 2. Short-duration winds events → increased zooplankton abundance.

During short-duration winds, the abundance of *A. tonsa* and *P. parvus* was influenced by the wind's duration, showing a negative response to long-duration events (LM, $p<0.05$, $p<0.01$), showing a negative response to long-duration winds events. For inner shelf species (*C. vanus*, E. *acutifrons*), abundance varied significantly with wind direction, with a negative response to SE/SW winds (GLM, $p<0.01$). A likely increase in abundance was observed following W wind events, suggesting an influence of inner shelf waters on the surf zone.

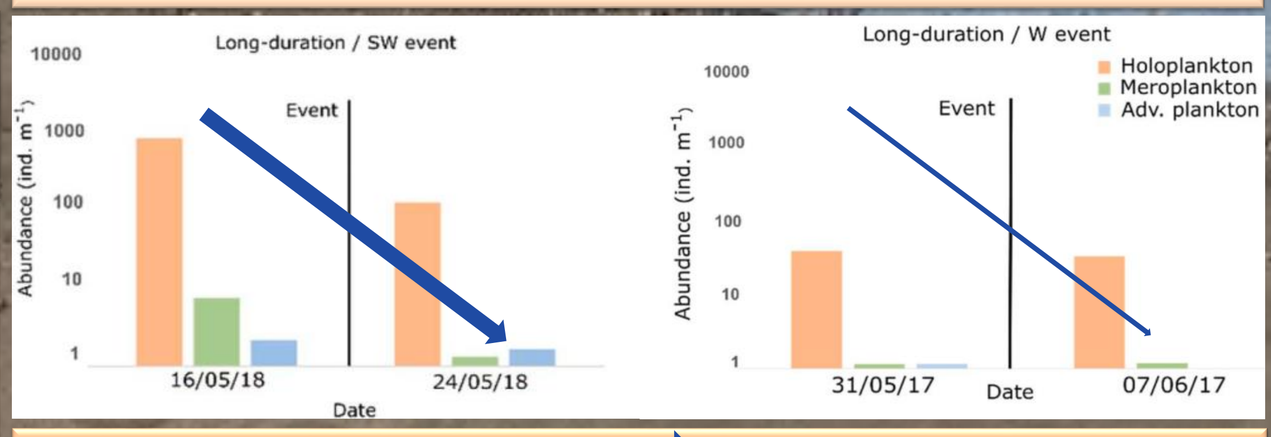

Figure 3. Long-duration wind events → decreased zooplankton abundance.

SE-SW winds linked to adventitious taxa. The probability of increment after long-duration was high (GLM, $p<0.05$).

Before/after storms, mortality varied from 100% to 4% dead organisms respectively. The highest mortality was after short-duration wind events.

Figure 4. Dead/life organisms using neutral red-treated visualization.

FUTURE WORK

Future studies should examine the long-term effects of wind intensity on zooplankton dynamics and coastal food webs, as well as how climate change-induced wind pattern changes may affect surf communities on sandy beaches.