Seasonal occurrence variation of *Acartia* species in Suyeong Bay, Korea

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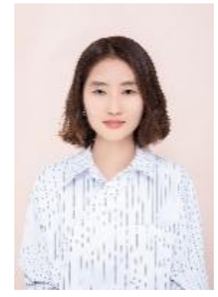

Introduction

Seasonal temperature variation is a key environmental factor influencing the occurrence and population dynamics of zooplankton in coastal ecosystems. In copepods, temperature affects reproductive activity, development, and survival. Because these responses differ among copepod species, seasonal temperature changes can contribute to variation in their occurrence and abundance.

Such species-specific seasonal patterns have been reported in *Acartia*, a common coastal copepod genus in temperate and subtropical waters. Individual species differ in temperature preferences and tolerances. These differences can contribute to seasonal occurrence of *Acartia* species as temperature changes.

This study aims to examine seasonal variation in the occurrence and abundance of *Acartia* species in relation to temperature in Suyeong Bay, Korea.

Materials & Methods

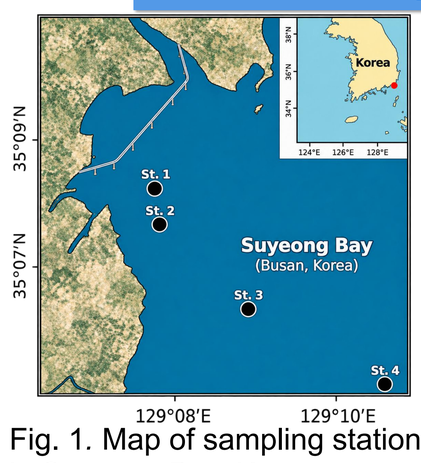

Fig. 1. Map of sampling stations in Suyeong Bay, Korea.

- Sampling
  - Four stations in Suyeong Bay
  - Sampling periods: May–October 2024, and October 2025–September 2026
  - Vertically towed with a conical net (150 μm mesh)
  - Surface water temperature (SST) measured using a CTD
- Statistical analysis
  - SST–adult abundance relationships: Spearman's rank correlation ($p < 0.05$)
  - Species-specific temperature-related trends: Linear regression
  - Software: IBM SPSS Statistics (v30.0), Python (v3.12)

Results

1. Seasonal variation in surface water temperature

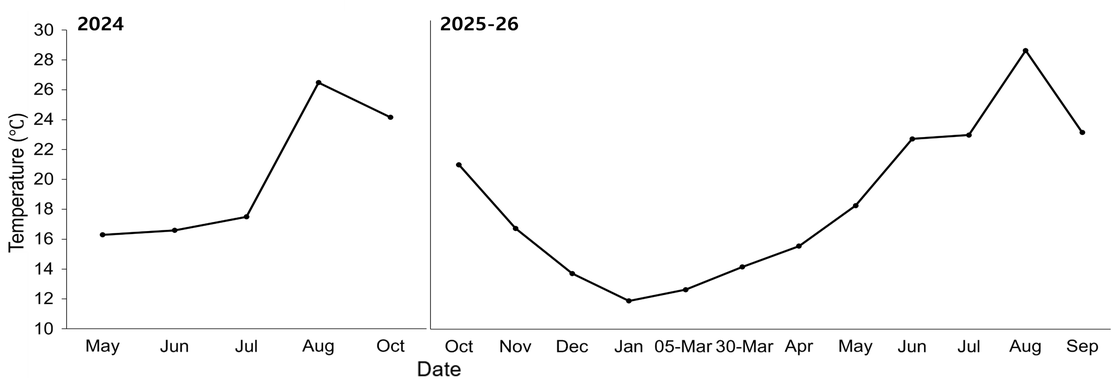

Fig. 2. Seasonal variation in surface water temperature (SST).

SST peaked in August in both periods.
Winter cooling was followed by warming toward August.

2. Seasonal variation in *Acartia* species abundance

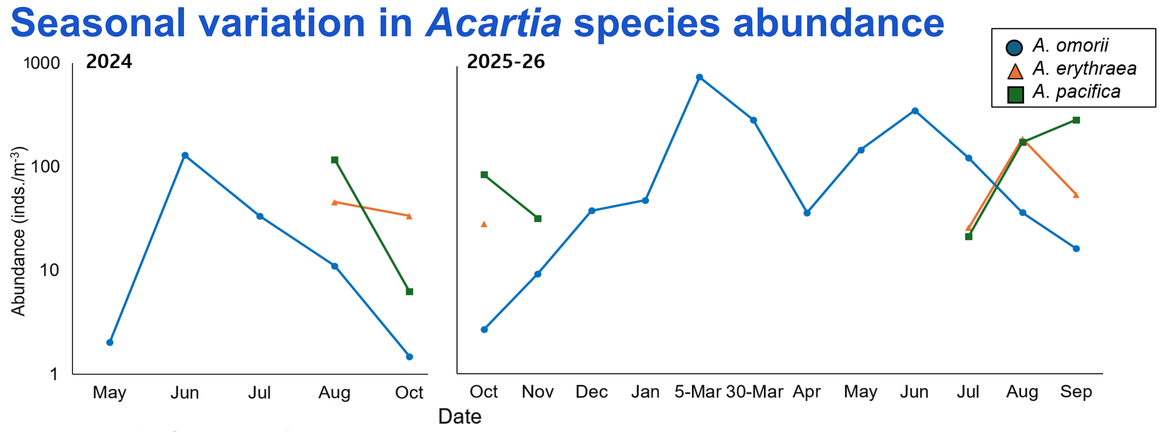

Fig. 3. Seasonal variation in *Acartia* species abundance.

A. omorii: dominant from December to July; peak in early March
A. erythraea & *A. pacifica*: reappeared in July; dominated from August to November

3. Seasonal variation in *Acartia* copepodite abundance and stage composition

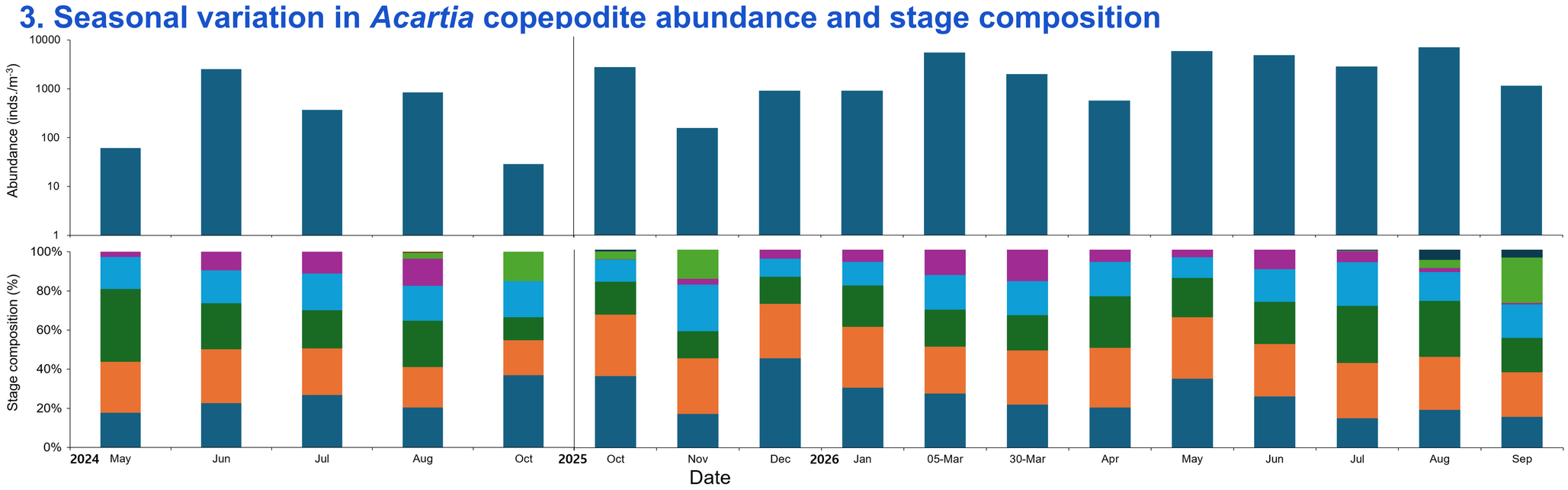

Fig. 4. Seasonal variation in *Acartia* copepodite abundance and stage composition.

- *Acartia* spp. CI
- *Acartia* spp. CII
- *Acartia* spp. CIII
- *Acartia* spp. CIV
- *A. omorii* CV
- *A. pacifica* CV
- *A. erythraea* CV

Abundance of *Acartia* spp. CI–CIV and *A. omorii* CV increased in early March, coinciding with the peak abundance of adult *A. omorii*.
Total copepodite abundance peaked in August, and CV dominance shifted from *A. erythraea* to *A. pacifica* in September.

4. Species-specific relationships with SST

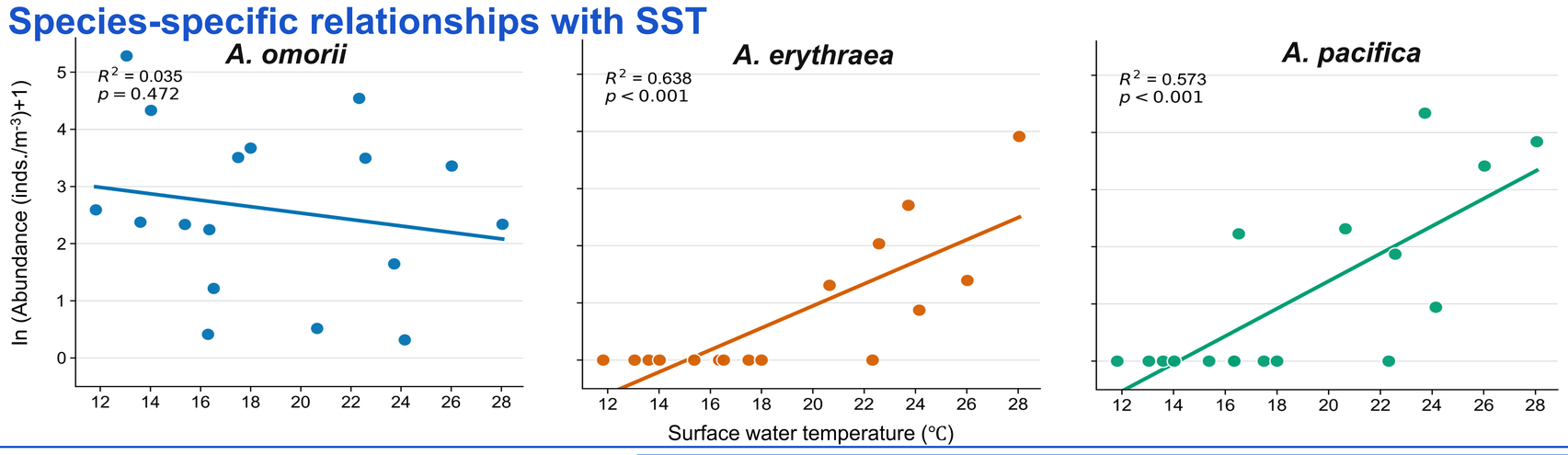

Fig. 5. Relationship between SST and the abundance of three *Acartia* species.

Positive abundance–SST relationships were consistent with the warm-season increases of *A. erythraea* and *A. pacifica*.

A. omorii occurred at every sampling event, and its abundance showed no significant relationship with SST.

Summary

Acartia species showed distinct seasonal patterns of occurrence and abundance in Suyeong Bay, Korea. *A. omorii* occurred at every sampling event and dominated from December 2025 to July 2026. Its adult abundance peaked in early March 2026 and showed no significant relationship with surface water temperature (SST). Year-round occurrence of *A. omorii* was also reported in nearby Ilkwang Bay (Kang et al., 2007). In contrast, *A. erythraea* and *A. pacifica* reappeared in July 2026 and became dominant in August and September 2026, respectively. Their seasonal occurrence was consistent with previous observations in Korean ports (Kang, 2011). The abundances of both species showed significant positive relationships with SST.

The abundance of *Acartia* copepodites also varied seasonally. The abundance of copepodite stages I–IV (CI–CIV) decreased in November 2025 and increased in December 2025 and early March 2026. The abundance of *A. omorii* stage V copepodites (CV) also increased in early March 2026, coinciding with the peak in adult *A. omorii* abundance. The dominant CV species changed from *A. erythraea* in August 2026 to *A. pacifica* in September 2026, broadly paralleling the seasonal shifts in adult dominance.

These seasonal succession patterns in adults and CV copepodites, together with the species-specific relationships between SST and adult abundance, suggest that seasonal temperature variation is associated with species-specific occurrence and abundance patterns of *Acartia* in Suyeong Bay.

References

Kang, H. K., Kang, Y. J., & Park, C. (2007). Production of *Acartia omorii* (Copepoda: Calanoida) in Ilkwang Bay, southeastern coast of Korea. *J. Mar. Syst.*, 67(3–4), 236–244.

Kang, J.-H. (2011). The occurrence of *Acartia* species and their environmental characteristics at three ports in Korea. *Ocean Science Journal*, 46(4), 219–237.

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