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Biding their time – Insights from propagule experiments into the assemblage composition of shallow-water foraminifera under environmental change

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The assemblage composition of shallow-water foraminifera in coastal environments is often strongly influenced by water temperature and salinity. Community structures of foraminifera have long been used as indicators for environmental change. This is – at least partly – due to their ability to respond quickly to changing local conditions, which becomes increasingly important in the wake of ongoing climate change. In this study, we examined the range of assemblage compositions that grow and develop under different combinations of temperature and salinity. We did this by applying the Propagule Method using several coastal sites in Georgia and Florida (United States).

The Propagule Method is an experimental tool for examining the growth of foraminiferal assemblages from suites of tiny juveniles that occur in the "propagule banks" found within the fine fraction of the sediment. We exposed the propagule banks from our study sites to different temperatures (18, 24, and 30°C) and salinities (15 and 35) over a period of 5 weeks, to simulate different shallow-water conditions.

Results show that foraminifera grew abundantly in all experimental treatments, with increased growth and reproduction occurring at higher temperatures (24 and 30°C). Salinity had a strong influence on the species composition of the experimental assemblages. The most successful species were opportunists and known "pioneer" species such as *Ammonia tepida* (Cushman) or *Quinqueloculina seminula* (Linné). However, we also found significant numbers of allochthonous or "exotic" species that occurred only in rare numbers or were even absent from the living *in situ* assemblages of the study sites.

The presence of allochthonous taxa resulted from propagule recruitment from areas beyond our immediate study sites. These propagules – which might be transported even beyond their ecological range – may remain viable within the propagule bank until environmental conditions become favorable. As such, they are "biding their time" in the sediment – ready to become a part of the local assemblage, should environmental conditions change. This provides insights into dispersal and an important tool for examining the effects of warming oceans and changing salinity regimes in coastal environments.