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TITLE: Decadal-scale changes in shallow-infaunal foraminiferal assemblages at the Porcupine Abyssal Plain, NE Atlantic

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ABSTRACT:

Trends in the abundance, diversity and taxonomic composition of 'live' (rose Bengal stained) foraminiferal assemblages (0-1 cm layer, >63- μ m fraction) were analysed in replicate multiple corer samples collected at the Porcupine Abyssal Plain (48° 50' N, 16° 30' W, 4850 m water depth) over a 13-yr period (1989-2002). Total densities were significantly higher in 1996-2002 compared to 1989-1994, a change coincident with a spectacular rise in the density of the holothurian *Amperima*. However, total densities exhibited no significant relation to seasons or any significant correlation with modelled organic matter flux, the North Atlantic Oscillation (NAO) index, *Amperima* densities, or megafaunal assemblage composition. Over the same period, species richness and diversity measures decreased and dominance increased, although not significantly. Multivariate analyses revealed three assemblages represented by samples collected in 1989-1994, 1996-July 1997 and October 1997-October 2002. These reflected temporal changes in the densities of higher taxa and species. Trochamminaceans, notably a small undescribed species, increased from 5-9% (1989-1994) to 29-40% (1996-2002) of the assemblage with a corresponding rise in absolute abundance. Species of Hormosinacea and Lagenammina also tended to increase in density from 1996/1997 onwards. Rotaliids, dominated by *Alabaminella weddellensis* and *Epistominella exigua*, showed a bimodal distribution over time with peak densities in May 1991 (32%) and September 1998 (28%) and lowest densities in 1996-1997. Responses by these species to seasonal phytodetritus inputs probably explain the relative abundance of *E. exigua*, and to a lesser extent *A. weddellensis*, in 1989 and 1991 when phytodetritus was present. A qualitative change in the phytodetrital food, repackaging of food by megafauna, increased megafaunal disturbance of the surficial sediment, or a combination of these factors, are possible explanations for the dominance of trochamminaceans from 1996 onwards. The miliolid *Quinqueloculina* sp. was virtually absent in multicore samples (0-1 cm, >63- μ m fraction) from 1989-1994, peaked in September 1996 (22%) when degraded phytodetritus was present on core surfaces, was less common in March 1997, and thereafter was relatively uncommon. However, horizontally sliced box-core samples (0-5 cm, >250- μ m fraction) revealed that large specimens were more abundant in March 1997, and also were concentrated in deeper sediment layers, than in September 1996. We suggest that *Quinqueloculina* sp. migrated to the sediment surface in response to a 1996 flux event, grew and reproduced, before migrating back into deeper layers as the phytodetrital food became exhausted. Overall, the abyssal time-series revealed decadal-scale changes among shallow-infaunal foraminifera, more or less coincident with changes in the megafauna, as well as indications of shorter-term events related to seasonally-pulsed phytodetrital inputs.

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