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Temporal Assemblage Turnovers of Foraminiferal Communities from the Caribbean, United Kingdom and Mediterranean regions

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Temporal assemblage turnovers of intertidal foraminiferal communities were quantitatively determined using the assemblage turnover index (ATI), and contributing species were identified using the conditioned on-boundary index (CoBI). The live foraminiferal communities were examined as metacommunities (all stations) and assemblages (groups of stations defined by cluster analysis) over one and two year periods at Caroni Swamp, Claxton Bay (E Trinidad), Cowpen Marsh (NE England) and Bay of Cádiz (SW Spain). Major assemblage turnovers (when ATI > x + σ) of the Caroni Swamp metacommunity and assemblages coincided with seasonal changes from dry to wet conditions in 2011 and 2012. The abundant species (Ammonia tepida, Ammotium salsum, Arenoparella mexicana, Trochammina advena, Trochammina laevigata and Trochammina inflata) contributed the most to assemblage turnovers but showed no preference to either dry or wet conditions. At Claxton Bay major assemblage turnovers of the metacommunity and mid assemblage coincided with seasonal change and calcareous species (A. tepida and Triloculina oblonga) increased during wet conditions and decreased during dry conditions, while agglutinated species (T. advena and A. salsum) fluctuated oppositely. At Cowpen Marsh major assemblage turnovers of the metacommunity coincided with the start of summer and winter. Assemblages at higher elevations (mainly Jadammina macrescens and Haplophragmoides spp.) were responsible for the summer turnover, while the winter turnover was led by the assemblage at lower elevations (mainly Haynesina germanica, Elphidium earlandi, Elphidium williamsoni, Elphidium excavatum and Quinqueloculina spp.). At Bay of Cádiz, the foraminiferal assemblage at a tidal height of 1.5 to 1.7 m above the hydrographic zero was examined within three separate plots, and the seasonal occurrence of assemblage turnovers differed between plots. Thus, replicate samples and multiple plots may be necessary to overcome spatial variability in foraminiferal population dynamics. The three plots were examined together and two major assemblage turnovers coincided with the end of summer and start of winter. When using foraminifera for monitoring environmental disturbances, seasonal assemblage turnovers should be differentiated from regime shifts, abrupt and persistent changes, which signify alteration of the environment. The ATI and CoBI prove useful in objectively defining major assemblage turnovers and contributing species through quantitative methods.

Keywords: assemblage turnover, seasonal population dynamics, foraminifera, intertidal