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Decrease in shell volume of large benthic foraminifers with progressing ocean warming

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It is commonly thought that recent progress of ocean warming effect on ocean ecosystems. Especially on calcifying organisms, it is concerned negatively such as coral blanching. Larger benthic foraminifers (LBFs) are one of important calcifying organisms in coral reef area, their carbonate productivity is the third highest rate in there. Therefore, it is important to elucidate the relationship between seawater temperature and the response of LBFs for estimating future ocean environment particularly in coral reef area. It has been reported that LBFs shell growth would decline when they growth higher temperature, while the physical characteristics of their shell growth remain unknown since their small and complex structures make it difficult to quantify shell growth in three dimensions. In this study, to determine how their shell volume would be affected by growth temperature, we cultured two species of LBFs which calcifying systems are different (porcelaneous LBF *Sorites orbiculus* and hyaline LBF *Calcarina gaudichaudii*) under six different temperature situations (19°C−29°C). After three months culturing, their shells were scanned by micro X-ray computed tomography (MicroCT). Here we found that their shell volume growths were optimal at 24.4 to 24.6°C (*S. orbiculus*) and at 26.2 to 26.4°C (*C. gaudichaudii*), and declining at lower and higher temperatures than optimum temperatures. On the other hand, the intensity of the response to water temperature varies in different species. If the shell of *S. orbiculus* would be grown in temperature that is ±3°C different from the optimum temperature, the shell volume would be reduced by about 15%. Meanwhile, the shell of *C. gaudichaudii* would be showed only 7% decreasing at the same degree of temperature change. *C. gaudichaudii* lives at relatively shallower site than *S. orbiculus* with larger diurnal variation in water temperature, this difference of water temperature tolerance may have influenced their abundance. In any case, these findings demonstrate that LBF growth is already suppressed in summer and might be exacerbated in the future by ocean warming.