Niche specificity of *Bathyarchaeota* in the surface sediment of Pearl River Estuary, China

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Estuaries represent an important link between the land and the ocean, with a typically high amount of terrestrial organic carbon being transported through them. *Bathyarchaeota* have been reported to occur in estuarine sediments, perform unique metabolic functions in carbon metabolism. To-date, these organisms have resisted cultivation and their ecology and physiological capacities are thus not well-understood. In this study, the temporal and spatial distributions of *Bathyarchaeota* within the surface sediments of the Pearl River estuary (China) were investigated. Subgroups *Bathy-6*, *Bathy-8*, *Bathy-15* and *Bathy-17* were found to dominate all sediment samples, though they were differentially distributed along a salinity gradient. Phototroph abundance showed a positive correlation with bacteria in general, suggesting that the bacteria may be at a competitive advantage for fresh and labile organic matter after phototroph degradation. On the other hand, the abundance of *Bathyarchaeota*, represented by *Bathy-8*, correlated significantly with the $\delta^{13}C$ values of terrestrially-derived total organic carbon, suggesting that these *Bathyarchaeota* may instead be adapted to the utilization of recalcitrant organic matter in the sediments. These results shed light on the possible biochemical pathways of carbon metabolism by this diverse group of archaea that have eluded cultivation.