Composition and Function Shift of Microbial Communities in Mangrove Seedlings Inhabited Mudflat During Tidal Cycles

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ABSTRACT

Microbes power biogeochemical processes and play essential ecological roles in the mangrove ecosystem in the tropical and subtropical regions. The mudflat with inhabited grey mangrove seedlings are associated with a high variety of microbial community and change substantially between environments during tidal cycles. In this study, we analyzed microbial community composition, diversity and functional profile along successive mudflat tidal flat and seawater, and then determined the factors that shape marine bacterial and archaeal communities across the mangrove growth mudflat based on 16s rRNA sequence. Results show that the tidal cycles strongly influence the distribution of bacteria and archaea communities. Significant dissimilarity are found between high tidal flat and mid/low tidal flats, as well as seawater by shaping their inhabited environment factors like dissolved oxygen. Discrepancies are as well observed from surface to subsurface layer in specific to the high tidal flat. For example, *Cyanobacteria* and *Thaumarchaeota* are dominant in surface layer than subsurface layer. Meanwhile, by classifying the microorganisms into metabolic functional groups, we are able to determine the biogeochemical pathway that dominant in each zone of the mudflat. The (oxygenic) photoautotrophy and nitrate reduction are enhanced in the mangrove inhabited mid tidal flat. It reveals the ability of xenobiotic metabolism microbes to degrade, transform or accumulate environmental hydrocarbons pollutants in seawater, increasing sulfur related respiration from high tidal to low tidal flat. An opposite distribution is found for major nitrogen cycling processes. The shift of both composition and function of microbial communities are significantly related to light, oxygen availability and total dissolved nitrogen instead of sediments types or salinity. Taken together, this study provides a rather comprehensive and new insights on the characteristics of both bacteria and archaea communities in subtropical mangrove mudflat ecosystem.

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