Dynamics in community composition of MGII and interactions with phototrophs among different particle sizes in the Jiaozhou Bay

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Marine group II (MGII) Euryarchaeota are the most abundant planktonic archaea living in the surface ocean, which are commonly dominated by two subgroups (MGIIa and MGIIb). Metagenomic studies have revealed that MGII are likely photo-heterotrophic organisms, which may partition into different particle sizes and have different physiological properties. In this study, filter samples of three different pore sizes (>2.7 μm, 2.7-0.7 μm, 0.7-0.2 μm) were obtained in two seasons (March and September) from two locations characterized by different eutrophic states (site A being more eutrophic and site D less eutrophic) in the Jiaozhou Bay. MGII from both sites were 1-2 orders of magnitude higher in September than in March, showing strong seasonal preference in growth. At either site, MGIIa and MGIIb are dominated by a single but different OTU, which predominantly occupied the particulate fractions (>0.7 μm). The composition of MGII showed significant differences among the three size fractions between the two sites and between the two seasons. However, the abundance of MGII was significantly correlated to the abundance of phototrophs, regardless site or season, implying reliance of MGII on carbon sources derived from the phototrophs in varying ecological settings. Our results suggest the possible resilient interactions between MGII and phototrophs under dynamic hydrographic, seasonal or eutrophic conditions in coastal oceans