Occurrence and Composition of Ammonia-Oxidizing Archaea in the Sea Surface Microlayer and Underlying Water of a Semi-Enclosed Marine Inlet

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The sea surface microlayer (SML) is defined as the uppermost first millimeter of the surface water. Being at the air-sea interface, the SML serves as a critical boundary for different chemical, biological and physical processes. The distribution, abundance, and diversity of archaeal ammonia monooxygenase subunit A (*amoA*) genes in the coastal SML were lacking despite previous reports of high abundance of *Thaumarchaeota* in the SML of estuaries and freshwater lakes. In this study, we examined the archaeal community composition and Thaumarchaeota marine group I (MG-I) gene abundance as well as *amoA* gene abundance and composition in the SML and corresponding underlying water (UW, 20cm) of a semi-enclosed marine inlet. The *amoA* gene and MG-I 16S rRNA gene abundance were significantly negatively correlated with chlorophyll-a and transparent exopolymer particle concentrations in the SML. Archaeal and ammonia-oxidizing archaea (AOA) communities in the SML collected during low wind conditions were the most different from UW samples while SML samples collected during high wind conditions were similar to the UW community. Lower ratio of *amoA*: MG-I 16S rRNA genes were observed in the SML, implying that most of the SML *Thaumarchaeota* may lack *amoA* gene. Our results provide the first insight into the abundance and diversity of AOA in the SML compared with those in the UW from coastal water.

Keywords: ammonia-oxidizing archaea, sea surface microlayer

