

Fig. S1. Concentrations of ammonium (●) and nitrite (□) in the preculture of *Nitrosopumilus maritimus*.

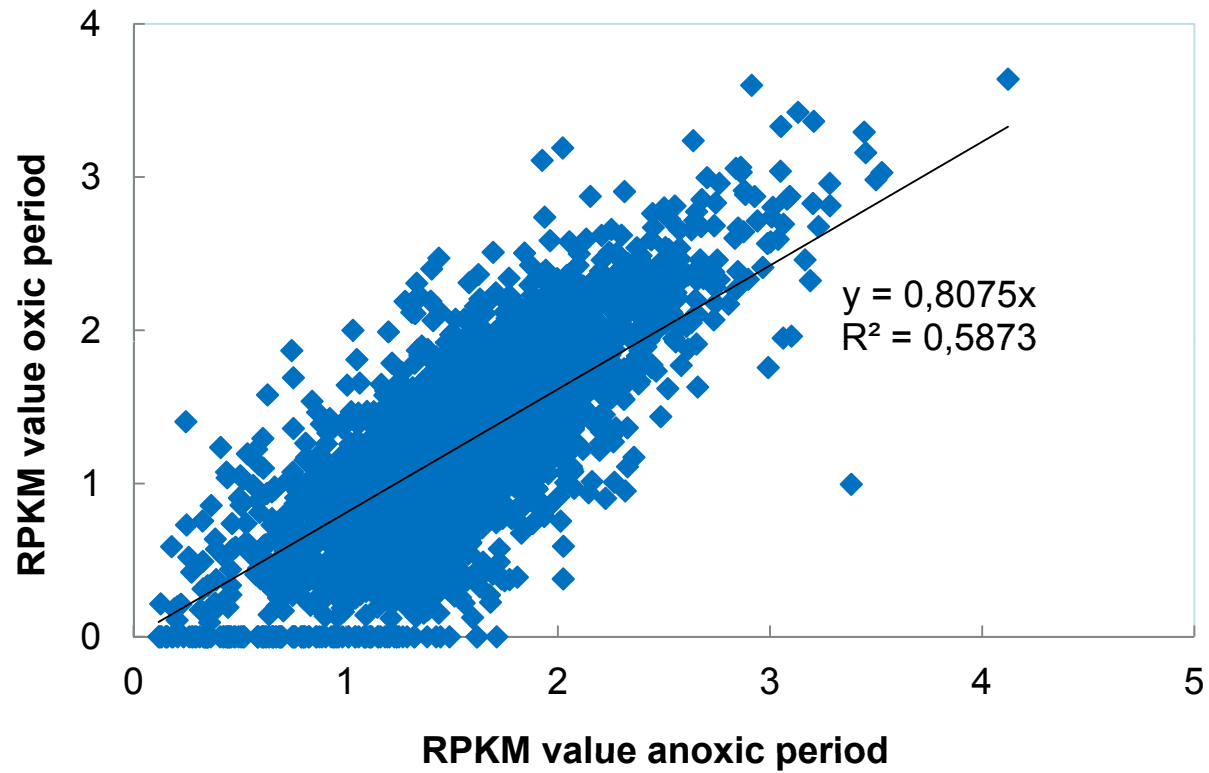


Fig. S2. Gene expression of “*Ca. Scalindua profunda*” anammox bacteria under anoxic versus oxic condition. RPKM = number of reads per kb of transcript per million mapped reads.

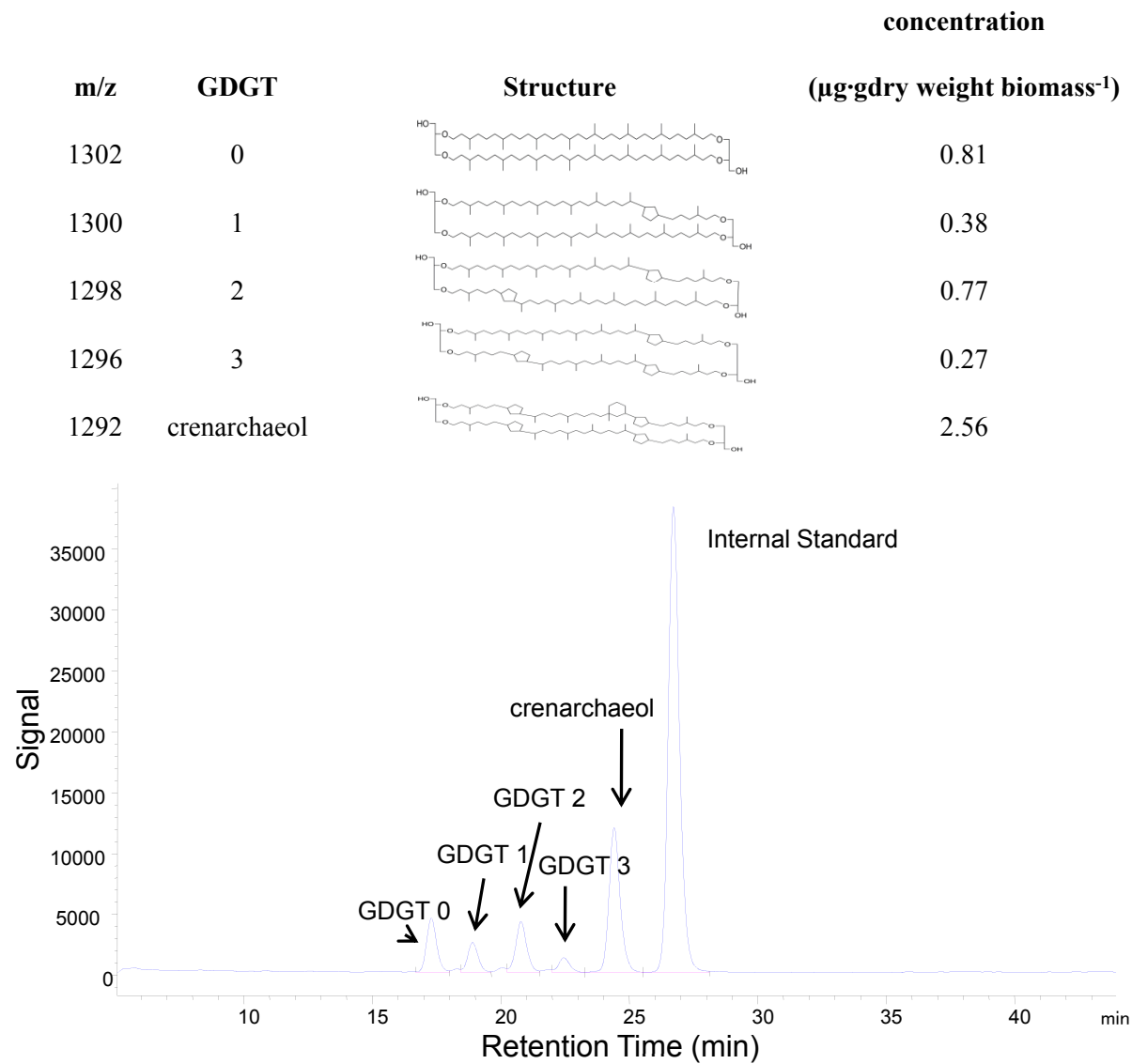


Fig. S3. Base peak chromatogram of LC/MS analysis of GDGTs in the bioreactor. Concentrations of specific GDGTs and their structures are indicated.

| Description | Gene | ID | Reads |
|--|------|-----------|-------|
| NH ₄ ⁺ transport protein | amtB | Nmar_1698 | 12 |
| Nitrogen regulator protein PII | glnK | Nmar_1523 | 9 |
| Cytochrome c oxidase | ccoI | Nmar_0184 | 7 |
| Ammonia monooxygenase | amoA | Nmar_1500 | 14 |
| Ammonia monooxygenase | amoB | Nmar_1500 | 27 |
| Ammonia monooxygenase | amoC | Nmar_1500 | 8 |
| Multicopper oxidase | mco3 | Nmar_1354 | 5 |
| Hypothetical protein | ompA | Nmar_1528 | 5 |
| NH ₄ ⁺ transport protein | amtB | Nmar_0588 | 2 |

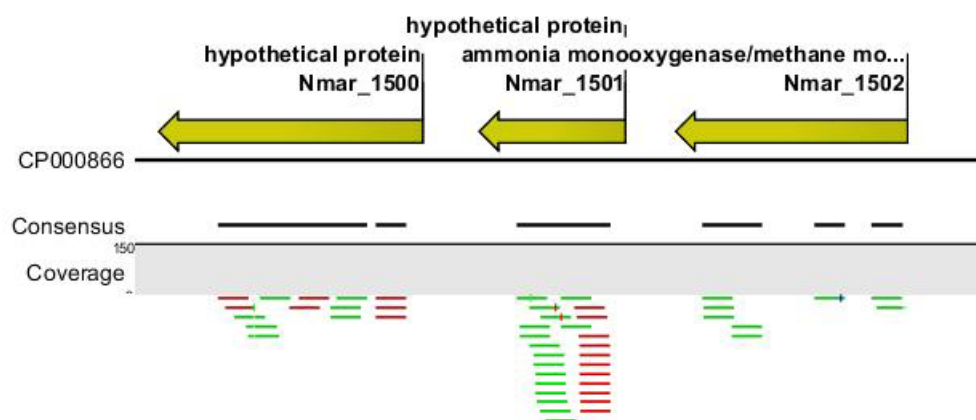


Fig. S4. Gene expression of selected *Nitrosopumilus maritimus* SCM1 genes under oxygen limitation.

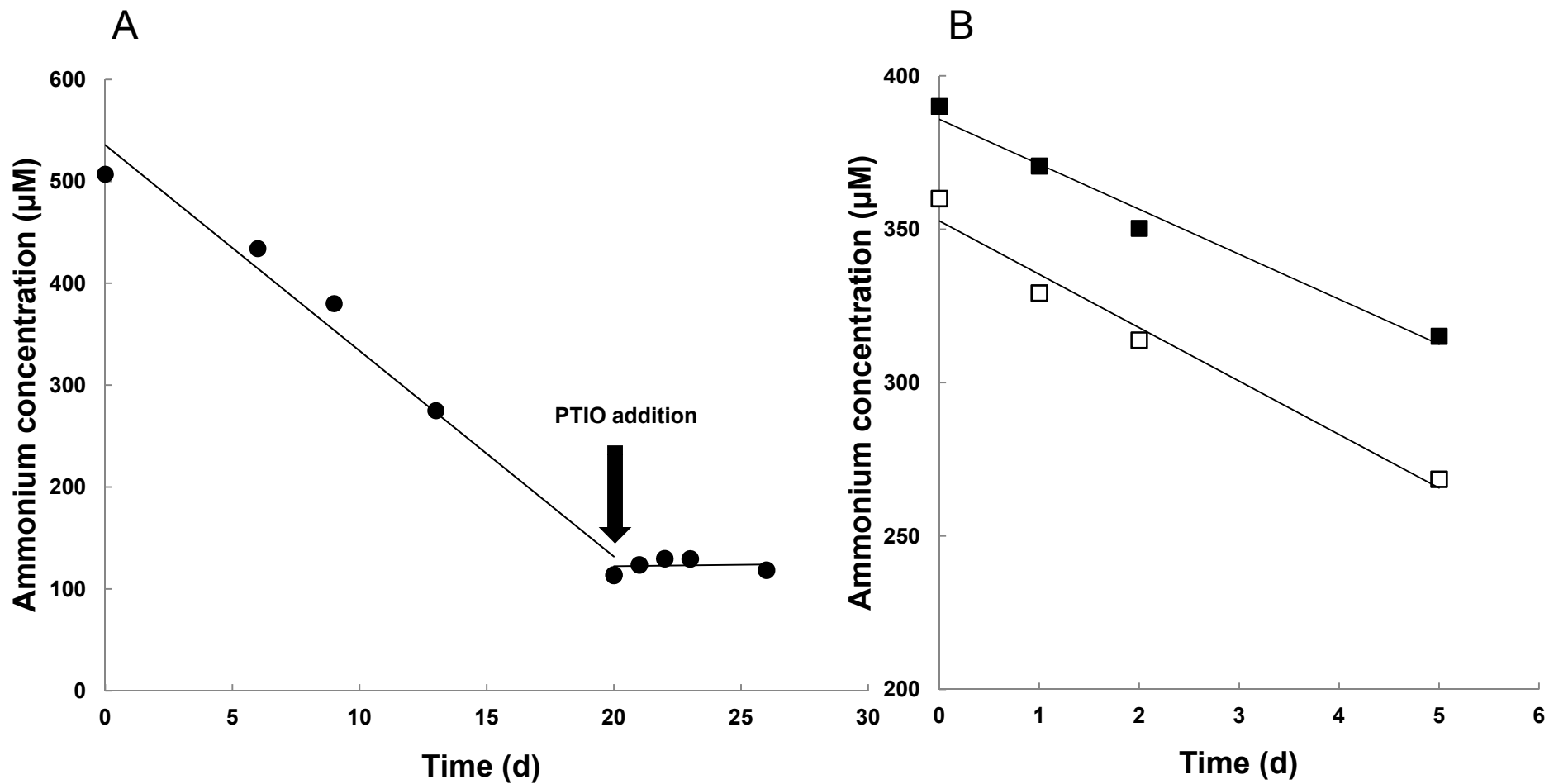


Fig. S5. Potential aerobic ammonia-oxidizing activity of the *Nitrosopumilus maritimus* culture (A) and *Nitrosomonas*-like AOB enrichment (B). Open squares (□) and closed squares (■) indicate AOB enrichment with and without PTIO addition, respectively.