Benthic Production of an Anammox-associated Biomarker, Bacteriohopanetetrol II, Under Oxic Gulf of Mexico Waters

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Studies of nitrogen cycling in ancient oceans can reveal critical linkages between N, marine productivity, carbon cycling, and climate. The anaerobic oxidation of ammonia (anammox) by bacteria, thought to be responsible for >50% of fixed N loss from the ocean, is a key process in the N cycle. Efforts to reconstruct past anammox (and, by extension, oxygen deficiency), however, are limited by the poor preservation of ladderanes, characteristic membrane lipids of anammox bacteria. Recently, a more recalcitrant biomarker, bacteriohopanetetrol II (BHT II), was identified in enrichment cultures of anammox bacteria (*Scalindua)* and in oxygen-deficient waters and underlying sediments [1]. BHT II is being developed as a paleoproxy for water column anammox, but the potential for benthic anammox bacteria to overprint pelagic signals has not been explicitly investigated.

Here, we report evidence for benthic production of BHT II in sediments underlying oxygenated waters in the southeast Gulf of Mexico. *Scalindua* was the single most abundant microbial taxon at 5-13 cm below seafloor, and BHT II peaked at 10-11 cmbsf. The BHT II/total BHT ratio increased with depth in the core, suggesting the imprint of anammox bacteria on the BHT record persists. We discuss our combined 16S rRNA amplicon and BHT dataset in the context of oceanographic and geochemical factors that may influence anammox biogeography, in order to refine our understanding and application of BHT II as a proxy.

[1] Rush *et al.* (2014)*Geochim Cosmochim Acta* **140**, 50–64.