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## Regional patterns in ammonia-oxidizing communities throughout Chukchi Sea waters from the Bering Strait to the Beaufort Sea

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**ABSTRACT:** The shallow Chukchi Sea is a highly productive region of the Arctic Ocean, fed by Pacific water transported north through the Bering Strait. Nitrification in Chukchi Sea bottom waters oxidizes significant amounts of regenerated ammonium, which increases the pool of nitrate available for denitrification and changes the nutrient balance of this water prior to export to the Canada Basin. However, little is known about the ammonia-oxidizing microbial communities in Chukchi Sea waters. We used quantitative polymerase chain reaction assays to determine the abundance and transcriptional activity of both ammonia-oxidizing *Archaea* (AOA) and ammonia-oxidizing *Bacteria* (AOB) along coastal Chukchi Sea bottom waters, as well as waters of Atlantic-origin over the Beaufort slope. While AOA significantly outnumbered AOB in deeper Beaufort slope waters, AOB were more abundant at most coastal stations, potentially due to a greater concentration of regenerated ammonium trapped in coastal bottom waters. Quantification of 2 marine AOA ecotypes, Water Column A (WCA) and Water Column B (WCB), showed a surprisingly high abundance of WCB, generally considered a deep-water ecotype, in shallow coastal waters as well as deep slope waters, likely due to transport via shelfbreak upwelling. Transcript abundances also suggested WCA and WCB in coastal waters were transcriptionally active at comparable levels. The relatively high abundance of AOB and WCB suggests the Chukchi Sea has unique ammonia-oxidizing communities compared to most shallow coastal oceans, highlighting the importance of regional biogeochemical processes (ammonium regeneration) and physical processes (upwelling) in structuring coastal microbial communities.

**KEY WORDS:** *Thaumarchaeota* · Ammonia oxidizers · Arctic · Ammonium · Ecotypes · Nitrification

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