

Cluster III *nifH*-harboring microbes dominated diazotroph communities in the Chukchi Sea (western Arctic Ocean)

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Marine nitrogen fixation is now considered to occur not only in subtropical and tropical regions but also in colder regions, although the extent of and the identity of diazotrophs responsible for nitrogen fixation in the Arctic Ocean remain poorly understood. Here we examined diazotroph community structure and activity in the Chukchi Sea, a marginal sea of the western Arctic, during summer 2015. The diazotroph community determined by Illumina sequencing was mainly composed of Cluster III *nifH* phylotypes (putative anaerobes), accounting for 60–100% of the total sequences examined except one surface sample. This result is strikingly different from the previous findings in other oceanic regions. The *nifH* sequences other than Cluster III were mostly affiliated with UCYN-A2 (symbiotic cyanobacteria), which accounted for less than 15% of the total sequences. Nitrogen fixation rates were measurable at all the stations, with the maximum rate of 1.84 nmol L⁻¹ d⁻¹. The nitrogen fixation rates varied in a complex manner, displaying no clear relationship with depth (light intensity) and nitrate concentrations. The nitrogen fixation rate exceeded the nitrate assimilation rate in some nitrate-depleted waters, indicating that the diazotrophs could be an important source of new nitrogen in the Chukchi Sea.

Keywords: Nitrogen fixation, Arctic Ocean, *nifH* gene