Cooperation of nitrifiers and anammox bacteria under oxygen-limited conditions
J. Yan¹,², Huub Op den Camp¹, Yong Hu², Mike Jetten¹ & Suzanne Haaijer¹
¹Department of Microbiology, Radboud University Nijmegen, the Netherlands; ²South China University of Technology, Guangzhou, China

The process of anaerobic ammonium oxidation (anammox) contributes significantly to dinitrogen gas production in marine ecosystems. Anammox bacteria convert nitrite with ammonium to dinitrogen gas under anaerobic conditions. Nitrite can be supplied via partial nitrate reduction or by partial nitrification. Little is known about the cooperation between marine anammox bacteria and nitrifiers with regard to the development of such communities, the effects of environmental parameters and the physiological traits of their constituents. We therefore developed a marine model system. Oxygen was carefully introduced into a marine anammox community in a bioreactor. Changes in the activities of the relevant functional groups (anammox bacteria, aerobic ammonium oxidizers and nitrite oxidizers) were monitored by batch tests. Changes in community composition were followed by Fluorescence in situ Hybridization (FISH) and by amplification and sequencing of 16S rRNA, amoA and nxrA genes. A co-culture of Scalindua anammox bacteria, a Nitrosomonas-like species, and an aerobic nitrite oxidizer was obtained. DNA was extracted and sequenced by Illumina technology to gain more insight into the metabolic properties of the community.