Nitrogen cycling in a deep ocean margin sediment (Sagami Bay, Japan)

Glud, Ronnie N., Bo Thamdrup, Henrik Stahl, Frank Wenzhoefer, Anni Glud, Hidetaka Nomaki, Kazumasa Oguri, Niels Peter Revsbech, Hiroshi Kitazato

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ABSTRACT: On the basis of in situ NO_3^{-} microprofiles and chamber incubations complemented b laboratory-based assessments of anammox and denitrification we evaluate the nitrogen turnover an ocean margin sediment at 1450-m water depth. In situ NO_3^{-} profiles horizontally separated by 12 mm reflected highly variable NO_3^{-} penetration depths, NO_3^{-} consumption rates, and nitrification. On average the turnover time of the pore-water NO_3^{-} pool was ~0.2 d. Net release NH_4^{+} during mineralization (0.95 mmol m^{-2} d^{-1}) sustained a net efflux of ammonia (53%), nitrificatio (24%), and anammox activity (23%). The sediment had a relatively high in situ net influx of NO_3^{-} (1.44 mmol m^{-2} d^{-1}) that balanced the N_2 production as assessed by onboard tracer experiments. production was attributed to prokaryotic denitrification (59%), anammox (37%), and foraminifera-based denitrification (4%). Anammox thereby represented an important nutrient sink, but the N2 production was dominated by denitrification. Despite the fact that NO_3^{-} stored inside foraminifera represented ~80% of the total benthic NO_3^{-} pool, the slow intracellular NO_3^{-} turnover that, on average, sustained foraminifera metabolism for 12-52 d, contributed only to a minor extent to the overall N_2 production. The microbial activity in the surface sediment is a ne nutrient sink of ~1.1 mmol N m^{-2} d^{-1}, which aligns with many studies performed in coastal and she environments. Continental margin areas can act as significant N sinks and play an important role regional N budgets.