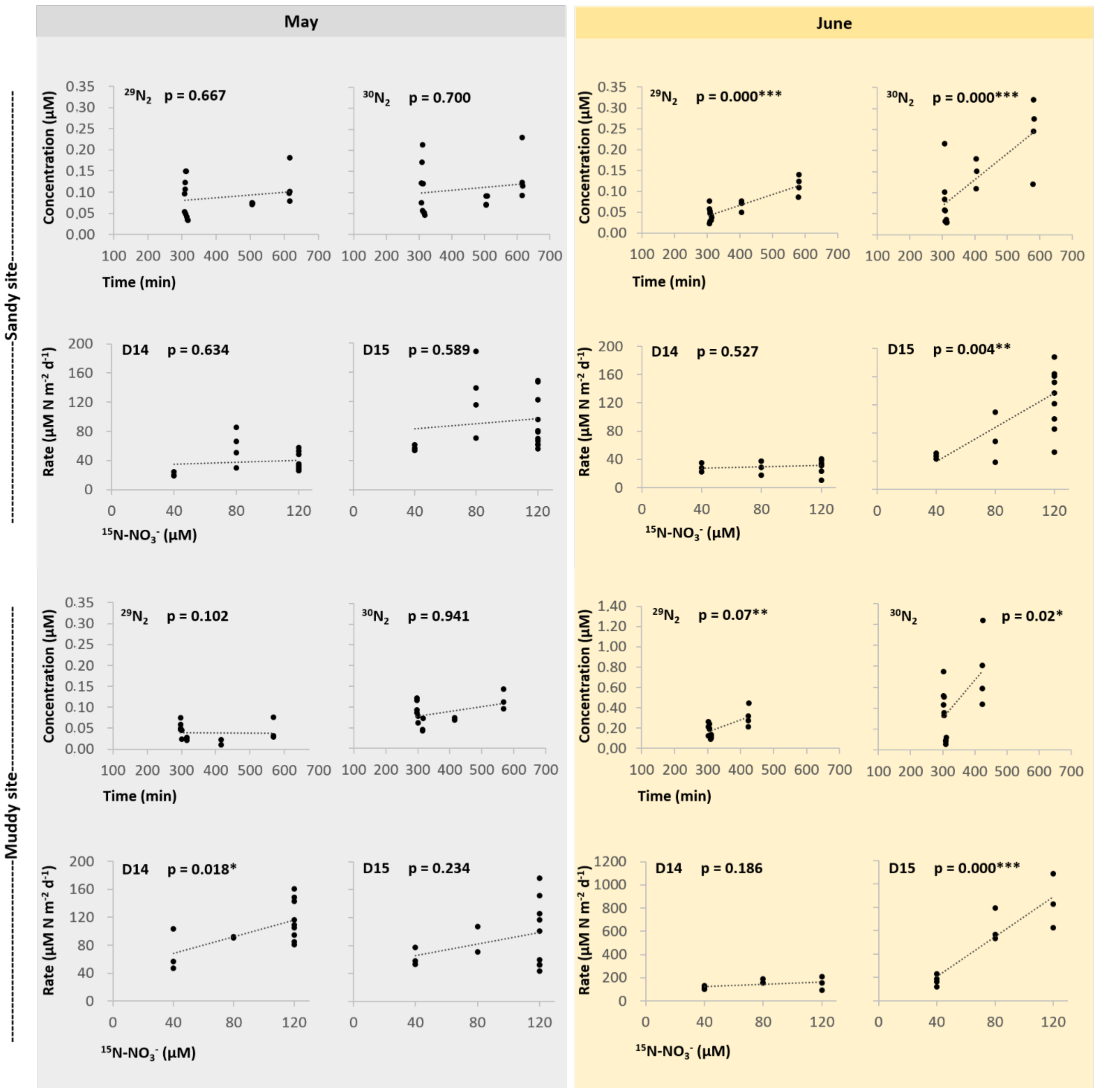

Figure S1: Regression analyses of $^{29,30}N_2$ concentrations with time and D14 and D15 rates with tracer concentrations. Shown are the analyses of the months May and June as examples, whereas these analyses were performed for all months; top panel: sandy site, lower panel: muddy site. The concentrations of $^{29,30}N_2$ should increase with time, if denitrifying bacteria are active, which was not the case before June at either site. Similarly, D15 rates should increase with increasing $^{15}NO_3^-$ concentrations, indicating uptake of the ^{15}N-tracer as result of NO_3^- limitation of the sediment and homogeneous tracer distribution, which are key requirement of the isotope pairing technique (Nielsen 1992); this, as well, was not the case at either site before June. D14 rates would increase with increasing tracer concentrations only when anammox contributed to total N_2 production (Risgaard-Petersen et al. 2003), which was not the case at either site; the significant regression in May at the muddy site is likely an artefact as at the same time $^{29,30}N_2$ concentrations and D15 rates indicated microbial inactivity. Significance levels $*p < 0.05$, $**p < 0.01$, $***p < 0.001$.

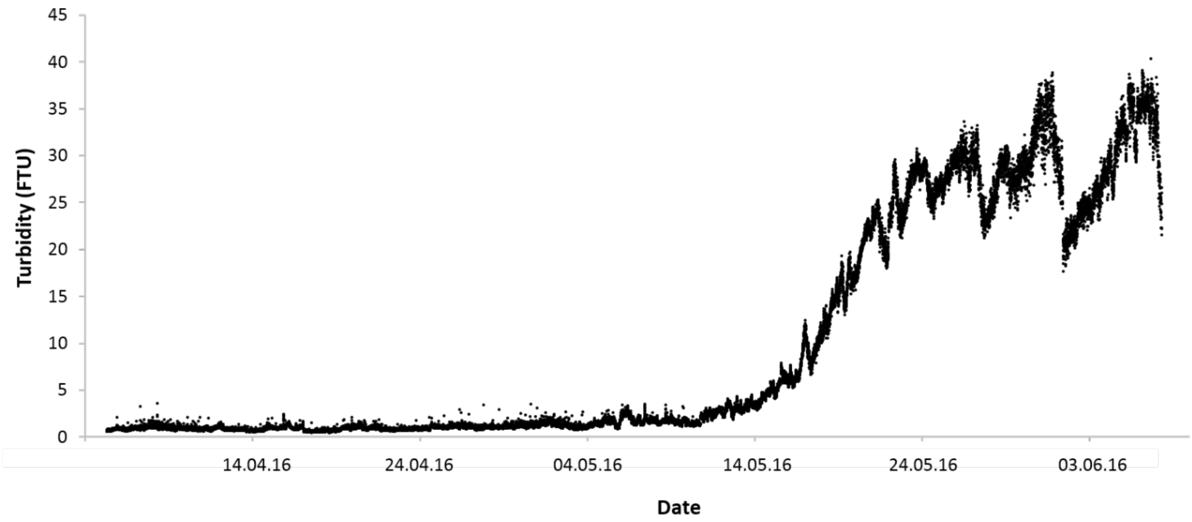

Figure S2. Bottom water turbidity measured during 05.04.2016–07.06.2016 at ~ 1 m above the sea floor (~ 23 m water depth) at the sandy site.

Text S1: Estimating occurrence of advective pore-water flow in the sandy sediment

Theoretical pressure gradients at the sediment surface, established via the interaction of near bottom flow with sediment topography (Huettel & Gust 1992), were estimated from measured bottom flow velocity during winter (15.12.15–14.01.16), spring I (05.04.16–12.05.16; before density stratification) and spring II (13.05.16–07.06.16; during density stratification; Table 2), and a theoretical topography object (sediment mound of 1 cm height), following Figure 4 in Huettel et al. (1996). Bottom flow velocity was measured in ~ 1 m above the sediment; hence, the actual near-bottom flow velocity can be expected to be even lower, as friction increases with decreasing distance to the sediment. The height of the topography object was representative for stones observed at the site. The theoretical horizontal pore-water flow over a distance of 1 cm was calculated after Bear (1972), using the estimated pressure gradient and equations derived from Darcy´s Law, with average measured hydraulic conductivity, water density and porosity. The Peclet (Pe) number as indicator of the dominant transport mechanism in the sediment was calculated by dividing the pore-water flow velocity with the diffusive transport velocity, using oxygen as example element to be transported over 1 cm distance by molecular diffusion in the sediment, calculated after Schulz (2005) with season specific salinity and porosity, at 20°C for comparability with hydraulic conductivity measurements. At Pe ≥ 5 advective processes dominate over diffusive processes (Bear 1972). Based on the results given in Table S1, we could estimate that this threshold would be reached at a bottom water velocity ≥ 14 cm s^{-1}.

Table S1: Estimated pressure gradient at the sediment surface, resulting pore-water (PW) flow velocity and Peclet number (output variables) in winter and spring at the sandy site of low permeability (K_m = 1.6–2.3 × 10^{-12} m^2), based on the interaction of measured bottom water (BW) flow velocity with a theoretical object of 1 cm height, and molecular diffusion of oxygen as example element (input variables). Averages with maximum values in brackets.

	----------------Input variables---------------		----------------------Output variables----------------------		
Period	**BW flow velocity** (cm s^{-1})	**Molecular diffusion** (10^{-6} cm s-1)	**Pressure gradient** (Pa)	**PW flow velocity** (10^{-6} cm s^{-1})	**Peclet Nb**
winter	4.0 (16.0)	7.33	0.2 (2.0)	4.53 (45.35)	0.6 (6.2)
spring I	2.7 (12.7)	8.21	0.1 (1.3)	2.99 (37.36)	0.4 (4.6)
spring II	2.1 (9.4)	8.21	<0.1 (0.8)	2.69 (23.91)	0.4 (2.9)

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