Supplement of Biogeosciences, 18, 327–341, 2021
https://doi.org/10.5194/bg-18-327-2021-supplement

Biogeosciences Open Access EGU

Supplement of

Denitrification by benthic foraminifera and their contribution to N-loss from a fjord environment

Constance Choquel et al.

Correspondence to: Constance Choquel (constance.choquel@gmail.com) and Emmanuelle Geslin (emmanuelle.geslin@univ-angers.fr)

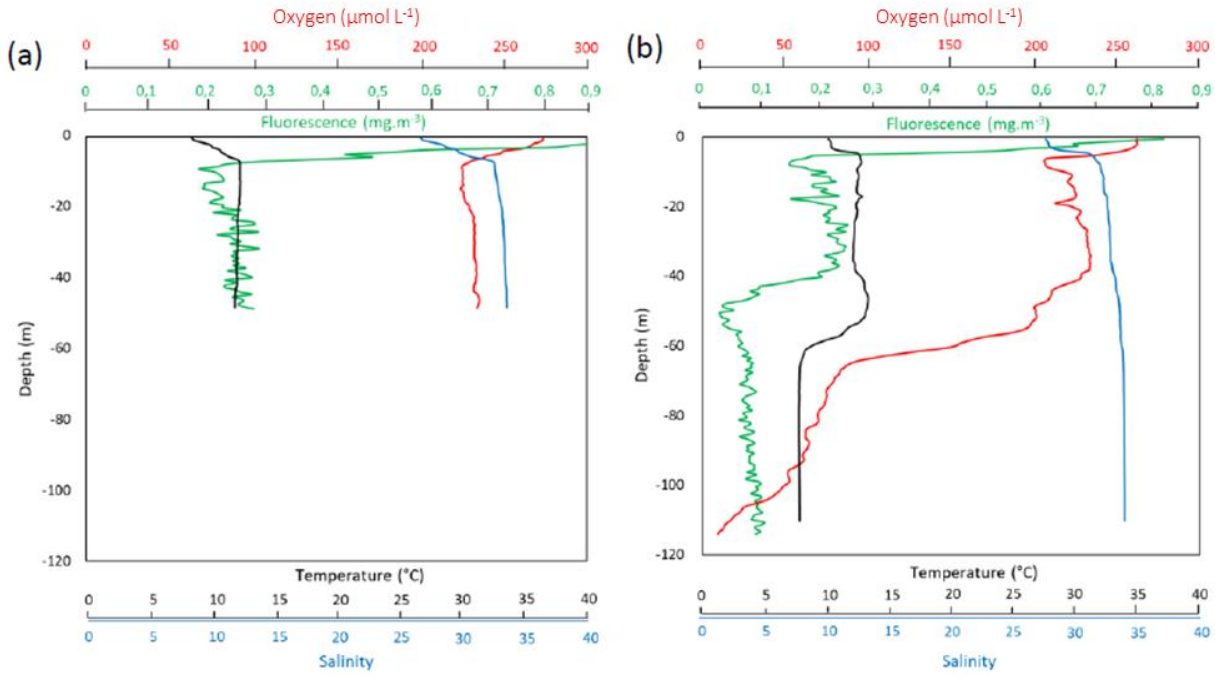

Figure S1. CTD profiles of temperature, salinity, fluorescence and oxygen concentration in the water column of the both stations: (a) GF17-3 oxic station (50 m water depth) and (b) GF17-1 hypoxic station (near Alsbäck, 117 m water depth).

Equation S1. Detailed calculation for biovolume correction for the denitrification rate of the NIS *Nonionella* sp. T1 from the November 2017 cruise. Equation used according to Geslin et al. (2011) and Glock et al. (2019).

ln(denitrification rate 2018 cruise) * (0.68 * ln (BV 2017 cruise) – 5.57) / (0.68 * ln (BV 2018 cruise) – 5.57) = ln(corrected denitrification rate 2017 cruise)

Example: ln(21) * (0.68 * ln (1.3 10^{+06}) – 5.57) / (0.68 * ln (4.0 10^{+06}) – 5.57) = ln(38).

Table S1: PROFILE software parameters used to generate the porewater nitrate modelling in both stations GF17-3 and GF17-1 in the Gullmar Fjord (see details in Berg et al., 1998).

PROFILE parameters	GF17-3	GF17-1
Depth at top of calculation domain (cm)	0	0
Depth at bottom of calculation domain (cm)	4.8	4.8
Max number of equally spaced zones in interpretation (1 to 12)	8	8
Type of boundary conditions (4:t=C b=F)	4	4
First boundary condition (µmol L^{-1})	13.1	4.2
Second boundary condition	0	0
Nitrate diffusion coefficient (cm^{-2} s^{-1}) in water	1.4 10^{-05}	1.4 10^{-05}
Expression for sediment diffusivity (Ds) (2: Ds=FI^2*D)	2	2
Concentration in water column (µmol L^{-1})	14.6	5.7
Minimum for production rate	-1.0 10^{+20}	-1.0 10^{+20}
Maximum for production rate	1.0 10^{+20}	1.0 10^{+20}
Maximum deviation (in %) when accepting a calculated minimum	0.001	0.001
Level of significance in the F statistics	0.01	0.01

Table S2. Total densities (individuals per slice of 10 cm^3) and relative abundances (%) of the foraminiferal fauna from the GF17-3A and 3C cores and from the GF17-1A and 1C cores of the Gullmar Fjord (GF). The cores were sliced every 2 mm from the SWI to 20 mm depth and every 5 mm from 20 to 50 mm depth. The foraminiferal sections are divided as: the NIS and potential invasive *Nonionella* sp. T1 species in the GF according to Polovodova Asteman and Schönfeld (2015) and Deldicq et al. (2019), the known denitrifying species in the GF according to Risgaard-Petersen et al. (2006) and Woehle et al. (2018), the non-denitrying species according to Pina-Ochoa et al. (2010) and the minor other species of the fauna.

GF17-3A	Species	0-2	2-4	4-6	6-8	8-10	10-12	12-14	14-16	16-18	18-20	20-25	25-30	30-35	35-40	40-45	45-50	Total density per species	Relative abundance (%)
invasive species	*Nonionella* sp.T1 (Deldicq and al., 2019)	9	6	15	24	14	18	15	15	17	7	14	6	19	45	91	122	436	34
known denitrifying species in GF	*Globobulimina turgida* (Bailey)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Globobulimina auricula (Höglund)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
candidate denitrifying species	*Bolivina pseudopunctata* (Höglund)	1	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	4	0
	Stainforthia fusiformis (Williamson)	2	0	0	1	3	1	0	0	2	0	1	0	0	0	0	0	10	1
non-denitrifyng species	*Bulimina marginata* (d'Orbigny)	22	48	37	32	30	35	12	14	26	26	15	6	25	26	73	43	471	37
	Cassidulina laevigata (d'Orbigny)	10	41	4	19	9	2	2	24	3	1	0	0	0	0	0	0	114	9
	Leptohalysis scotti (Chaster)	2	1	6	6	4	9	9	6	17	29	13	8	6	5	5	9	134	11
minor other species	*Ammonia falsobeccari* (Rouvillois)	0	0	0	0	0	0	1	0	1	0	0	0	1	0	0	0	3	0
	Bolivina skagerrakensis (Qvale and Nigam)	0	0	3	0	0	0	0	0	3	0	0	0	0	0	0	0	6	1
	Bolivina spathulata (Williamson)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Bolivina sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Cribrostomoides nitida (Goës)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Eggerella scabra (Williamson)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Elphidium clavatum-selseyensis (d'Orbigny)	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0
	Hyalinea balthica (Schroeter)	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0
	Lenticulina sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Liebusella goesi (Höglund)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Nonionella labradorica (Dawson)	0	0	4	0	3	0	0	0	0	3	0	0	0	0	0	0	10	1
	Nonionella turgida (Williamson)	1	0	1	1	6	9	0	0	0	0	2	0	0	0	0	0	20	2
	Pyrgo williamsoni (Silvestry)	4	9	0	5	1	0	0	0	0	0	0	0	0	0	0	0	19	2
	Quinqueloculina bosciana (d'Orbigny)	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	2	0
	Quinqueloculina seminulum (Linné)	1	5	0	0	1	0	0	0	0	0	0	0	0	0	0	0	7	1
	Quinqueloculina stalkeri (Loeblich and Tappan)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
	Reophax subfusiformis (Earland)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Scutulons sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Stainforthia loeblichi (Feyling-Hanssen)	1	0	3	2	1	0	0	2	0	1	0	0	0	0	0	0	11	1
	Textularia earlandi (Parker)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Textularia sagittula (Defrance)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	other species	0	0	1	2	0	0	0	1	0	2	0	1	0	1	0	0	7	1
	Total density per slice	53	111	73	93	73	75	40	63	68	68	45	22	52	77	170	175	1256	100

GF17-3C	Species	0-2	2-4	4-6	6-8	8-10	10-12	12-14	14-16	16-18	18-20	20-25	25-30	30-35	35-40	40-45	45-50	Total density per species	Relative abundance (%)
invasive species	*Nonionella* sp.T1 (Deldicq and al., 2019)	17	45	34	82	63	35	41	25	56	51	56	98	145	140	89	88	1063	74
known denitrifying species in GF	*Globobulimina turgida* (Bailey)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Globobulimina auricula (Höglund)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
candidate denitrifying species	*Bolivina pseudopunctata* (Höglund)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Stainforthia fusiformis (Williamson)	0	2	2	0	2	1	0	0	1	0	0	0	0	0	0	0	8	1
non-denitrifyng species	*Bulimina marginata* (d'Orbigny)	18	9	9	16	11	2	2	2	1	2	0	0	1	0	0	1	75	5
	Cassidulina laevigata (d'Orbigny)	15	14	15	12	9	5	9	0	0	0	0	0	0	0	0	0	79	5
	Leptohalysis scotti (Chaster)	15	9	8	16	7	7	12	5	21	11	9	3	2	1	3	0	128	9
minor other species	*Ammonia falsobeccari* (Rouvillois)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Bolivina skagerrakensis (Qvale and Nigam)	1	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	7	0
	Bolivina spathulata (Williamson)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Bolivina sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Cribrostomoides nitida (Goës)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Eggerella scabra (Williamson)	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0
	Elphidium clavatum-selseyensis (d'Orbigny)	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0
	Hyalinea balthica (Schroeter)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Lenticulina sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Liebusella goesi (Höglund)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Nonionella labradorica (Dawson)	0	5	1	3	0	4	1	7	7	4	1	0	0	0	0	0	31	2
	Nonionella turgida (Williamson)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pyrgo williamsoni (Silvestry)	0	2	0	0	0	1	0	0	0	0	0	0	0	0	0	0	3	0
	Quinqueloculina bosciana (d'Orbigny)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Quinqueloculina seminulum (Linné)	3	2	0	3	0	0	0	0	0	0	0	0	0	0	0	0	8	1
	Quinqueloculina stalkeri (Loeblich and Tappan)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Reophax subfusiformis (Earland)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Scutulons sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Stainforthia loeblichi (Feyling-Hanssen)	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	2	0
	Textularia earlandi (Parker)	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0
	Textularia sagittula (Defrance)	6	7	1	2	0	3	0	0	0	0	0	0	0	0	0	0	18	1
	other species	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0
	Total density per slice	80	98	74	134	91	57	65	38	85	68	66	101	148	141	92	88	1428	100

GF17-1A	Species	0-2	2-4	4-6	6-8	8-10	10-12	12-14	14-16	16-18	18-20	20-25	25-30	30-35	35-40	40-45	45-50	Total density per species	Relative abundance (%)
invasive species	*Nonionella* sp.T1 (Deldicq and al., 2019)	0	1	0	1	1	0	0	9	15	19	21	2	2	3	1	1	74	5
known denitrifying species in GF	*Globobulimina turgida* (Bailey)	0	1	1	0	0	0	0	1	0	1	0	0	0	1	0	0	5	0
	Globobulimina auricula (Höglund)	0	0	1	0	0	0	1	0	1	0	1	2	0	0	1	2	8	1
candidate denitrifying species	*Bolivina pseudopunctata* (Höglund)	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0
	Stainforthia fusiformis (Williamson)	8	4	13	3	1	5	0	0	0	2	0	1	1	1	3	2	43	3
non-denitrifyng species	*Bulimina marginata* (d'Orbigny)	83	130	165	63	115	112	51	36	32	38	23	19	16	14	24	17	937	64
	Cassidulina laevigata (d'Orbigny)	27	47	46	13	30	12	38	4	4	5	2	2	1	0	2	1	234	16
	Leptohalysis scotti (Chaster)	19	10	6	3	5	2	4	0	0	2	5	0	3	4	1	1	65	4
minor other species	*Ammonia falsobeccari* (Rouvillois)	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0
	Bolivina skagerrakensis (Qvale and Nigam)	0	0	5	1	0	1	0	0	0	1	0	0	0	0	0	0	8	1
	Bolivina spathulata (Williamson)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Bolivina sp.	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0
	Cribrostomoides nitida (Goës)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Eggerella scabra (Williamson)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Elphidium clavatum-selseyensis (d'Orbigny)	0	1	1	0	0	1	1	0	0	0	1	0	0	0	0	1	6	0
	Hyalinea balthica (Schroeter)	1	4	2	1	1	0	1	0	0	0	0	0	0	0	0	0	11	1
	Lenticulina sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Liebusella goesi (Höglund)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Nonionella labradorica (Dawson)	2	2	2	0	0	7	3	4	0	0	2	0	0	0	0	0	20	1
	Nonionella turgida (Williamson)	0	0	1	0	1	0	1	2	2	6	2	0	0	0	0	0	15	1
	Pyrgo williamsoni (Silvestry)	0	1	0	0	0	0	0	0	0	0	1	2	0	0	0	0	4	0
	Quinqueloculina bosciana (d'Orbigny)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Quinqueloculina seminulum (Linné)	3	2	7	1	2	0	0	1	0	0	0	0	0	0	0	0	16	1
	Quinqueloculina stalkeri (Loeblich and Tappan)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Reophax subfusiformis (Earland)	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
	Scutulons sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Stainforthia loeblichi (Feyling-Hanssen)	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0
	Textularia earlandi (Parker)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Textularia sagittula (Defrance)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	other species	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0
	Total density per slice	143	207	249	86	156	139	99	56	55	73	59	27	24	24	33	26	1457	100

GF17-1C	Species	0-2	2-4	4-6	6-8	8-10	10-12	12-14	14-16	16-18	18-20	20-25	25-30	30-35	35-40	40-45	45-50	Total density per species	Relative abundance (%)
invasive species	*Nonionella* sp.T1 (Deldicq and al., 2019)	2	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	4	1
known denitrifying species in GF	*Globobulimina turgida* (Bailey)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Globobulimina auricula (Höglund)	0	0	0	0	0	0	0	11	1	1	1	0	0	0	0	0	14	2
candidate denitrifying species	*Bolivina pseudopunctata* (Höglund)	2	1	1	1	1	1	5	2	1	4	0	0	0	0	0	0	18	2
	Stainforthia fusiformis (Williamson)	11	8	0	0	0	0	1	1	1	0	1	0	0	0	0	0	23	3
non-denitrifyng species	*Bulimina marginata* (d'Orbigny)	31	38	66	17	31	9	11	12	12	1	3	1	2	2	2	4	244	30
	Cassidulina laevigata (d'Orbigny)	9	24	26	20	11	7	5	9	6	3	0	0	0	0	0	0	119	15
	Leptohalysis scotti (Chaster)	21	12	17	8	17	14	17	18	35	31	18	18	6	17	24	19	293	36
minor other species	*Ammonia falsobeccari* (Rouvillois)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Bolivina skagerrakensis (Qvale and Nigam)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Bolivina spathulata (Williamson)	0	2	2	0	0	1	0	0	0	0	0	0	0	0	0	0	5	1
	Bolivina sp.	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0
	Cribrostomoides nitida (Goës)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Eggerella scabra (Williamson)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Elphidium clavatum-selseyensis (d'Orbigny)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
	Hyalinea balthica (Schroeter)	1	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	3	0
	Lenticulina sp.	0	2	0	0	1	0	0	0	0	0	0	0	0	0	0	0	3	0
	Liebusella goesi (Höglund)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Nonionella labradorica (Dawson)	1	0	1	0	0	2	0	0	3	0	0	0	0	0	0	0	7	1
	Nonionella turgida (Williamson)	0	0	0	0	0	0	0	0	0	1	3	0	0	0	0	0	4	0
	Pyrgo williamsoni (Silvestry)	2	2	6	1	2	1	1	5	3	1	0	0	0	0	0	0	24	3
	Quinqueloculina bosciana (d'Orbigny)	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0
	Quinqueloculina seminulum (Linné)	3	3	1	0	0	1	0	0	0	0	0	0	0	0	0	0	8	1
	Quinqueloculina stalkeri (Loeblich and Tappan)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Reophax subfusiformis (Earland)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
	Scutulons sp.	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
	Stainforthia loeblichi (Feyling-Hanssen)	1	1	0	0	0	1	1	0	0	1	0	0	0	0	0	0	5	1
	Textularia earlandi (Parker)	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
	Textularia sagittula (Defrance)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	other species	0	0	1	1	0	1	0	1	0	0	0	0	0	0	0	0	4	1
	Total density per slice	85	96	123	47	63	38	41	61	63	43	27	20	9	20	26	24	786	100

Table S3: Relative abundance (%) of the main foraminiferal species of the Gullmar Fjord per zones defined by porewater nitrate modelling profiles. In the GF17-3 oxic station, three zones are delimited: the nitrification zone from 0 to 12 mm depth, the 1st denitrification zone from 12 to 35 mm depth and the 2nd denitrification zone from 35 to 50 mm depth, then the foraminiferal relative abundance of the total core from 0 to 50 mm depth. In the GF17-1 hypoxic station, one zone is delimited by the porewater nitrate modelling profile: the nitrification zone from 0 to 16 mm depth. Then, the rest of the core corresponded to the undetected nitrate zone from 16 to 50 mm depth. The foraminiferal sections are divided as: the invasive *Nonionella* sp. T1 species according to Polovodova Asteman and Schönfeld (2015) and Deldicq et al. (2019), the known denitrifying species in the GF according to Risgaard-Petersen et al. (2006) and Woehle et al. (2018), the non-denitrying species according to Pina-Ochoa et al. (2010) and the minor other species of the fauna.

GF17-3A	Species	Relative percentage from 0-12 mm depth zone	Relative percentage from 12-35 mm depth zone	Relative percentage from 35-50 mm depth zone	Total Relative percentage from 0-50 mm depth zone
invasive species	*Nonionella* sp.T1	18	27	60	34
known denitrifying species in GF	*Globobulimina turgida*	0	0	0	0
	Globobulimina auricula	0	0	0	0
candidate denitrifying species	*Bolivina pseudopunctata*	1	0	0	0
	Stainforthia fusiformis	2	1	0	1
non-denitrifying species	*Bulimina marginata*	42	34	34	37
	Cassidulina laevigata	16	7	0	9
	Leptohalysis scotti	6	25	5	11
minor other species	other species (<5%)	16	6	1	8
	% by zone	100	100	100	100

GF17-3C	Species	Relative percentage from 0-12 mm depth zone	Relative percentage from 12-35 mm depth zone	Relative percentage from 35-50 mm depth zone	Total Relative percentage from 0-50 mm depth zone
invasive species	*Nonionella* sp.T1	50	78	98	74
known denitrifying species in GF	*Globobulimina turgida*	0	0	0	0
	Globobulimina auricula	0	0	0	0
candidate denitrifying species	*Bolivina pseudopunctata*	0	0	0	0
	Stainforthia fusiformis	1	0	0	1
non-denitrifying species	*Bulimina marginata*	12	2	0	5
	Cassidulina laevigata	13	2	0	5
	Leptohalysis scotti	11	13	1	9
minor other species	other species (<5%)	13	5	0	6
	% by zone	100	100	100	100

GF17-1A	Species	Relative percentage from 0-16 mm depth zone	Relative percentage from 16-50 mm depth zone	Total average from 0-50 mm depth zone
invasive species	*Nonionella* sp.T1	2	15	5
known denitrifying species in GF	*Globobulimina turgida*	0	0	0
	Globobulimina auriculata	0	2	1
candidate denitrifying species	*Bolivina pseudopunctata*	0	0	0
	Stainforthia fusiformis	2	4	3
non-denitrifying species	*Bulimina marginata*	66	61	64
	Cassidulina laevigata	19	5	16
	Leptohalysis scotti	4	6	4
minor other species	other species (<5%)	7	7	6
	% by zone	100	100	100

GF17-1C	Species	Relative percentage from 0-16 mm depth zone	Relative percentage from 16-50 mm depth zone	Total average from 0-50 mm depth zone
invasive species	*Nonionella* sp.T1	0	0	1
known denitrifying species in GF	*Globobulimina turgida*	0	0	0
	Globobulimina auricula	0	0	0
candidate denitrifying species	*Bolivina pseudopunctata*	3	1	2
	Stainforthia fusiformis	3	1	3
non-denitrifying species	*Bulimina marginata*	35	11	30
	Cassidulina laevigata	19	2	15
	Leptohalysis scotti	24	75	36
minor other species	other species (<5%)	13	10	14
	% by zone	100	100	100

Equation S2. Calculation example of the *Nonionella* sp. T1 denitrification rate (nmol cm^{-3} d^{-1}) and the contributions (%) of *Nonionella* sp. T1 to nitrogen cycle (GF17-3A).

Conversion of *Nonionella* sp. T1 denitrification rate in nmol cm^{-3} s^{-1}

Corrected *Nonionella* sp. T1 denitrification rate = 38 pmol ind^{-1} d^{-1}

38 pmol ind^{-1} d^{-1}/ 1000/ 86400 = 4.4 nmol ind^{-1} s^{-1}

4.4 nmol ind^{-1} s^{-1} * 841 (number of *Nonionella* sp. T1)/ (PI * 25/4) (cross section area of the microtube) = 1.90 E^{-05} nmol cm^{-3} s^{-1}

Contribution of *Nonionella* sp. T1 to benthic denitrification

Contribution A (%) = Foraminifera denitrification / Denitrification estimated by PROFILE from nitrate porewater.

Contribution A (%) from GF17-3A= (1.90 E^{-05} nmol cm^{-3} s^{-1} * 100) / 4.07 E^{-05} nmol cm^{-3} s^{-1} (sum of the two porewater denitrifying zones, Fig. 5 d, Table 1) = 47%.

Contribution B (%) = Foraminifera denitrification / (Foraminifera denitrification + Denitrification estimated by PROFILE from nitrate porewater).

Contribution B (%) from GF17-3A= (1.90 E^{-05} nmol cm^{-3} s^{-1} * 100) / (1.90 E^{-05} nmol cm^{-3} s^{-1} + 4.07 E^{-05} nmol cm^{-3} s^{-1}) sum of the two porewater denitrifying zones, Fig. 5 d, Table 1) = 32%.