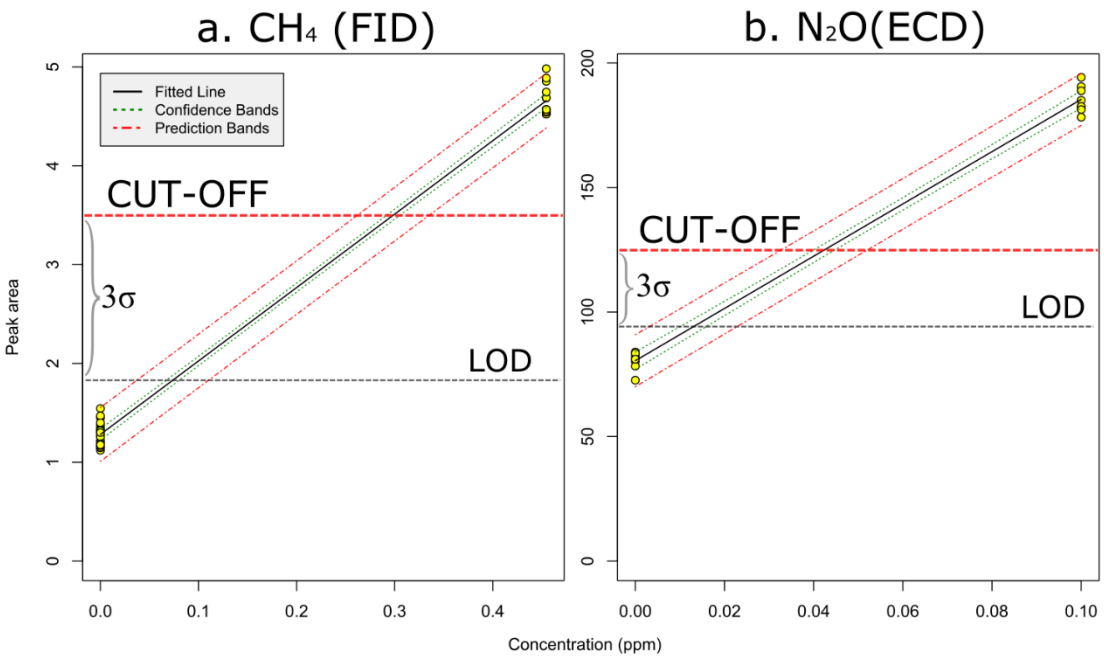

Figure S1. Establishment of cut-off concentrations of CH_4 (left) and N_2O (right), below which measured sample values are regarded as indistinguishable from those of blank pre-evacuated Exetainers. Yellow points represent measured peak areas of CH_4 and N_2O from blank pre-evacuated Exetainers (i.e. Exetainers from the supplier, subsequently filled with N_2, nominal CH_4 and N_2O concentrations = 0 ppm) and measured peak areas of the lowest standards for each gas, also stored in pre-evacuated Exetainers (CH_4 and N_2O concentrations 0.45 ppm and 0.1 ppm, respectively). A total of NN replicate blanks and NN replicate low standards were measured. The linear fits (peak area vs. ppm) derived from the blanks and the low standards are shown for both gases, with the corresponding 95% confidence and prediction bands. Note that these fits are linear across the full range of standards (not shown). Limit of detection (LOD) was determined according to Armbruster and Pry (2008) ($mean_{blank}$ + 1.645 * SD_{blank}) + 1.645 * $SD_{low\ standard}$. To determine the cut-off, a conservative additional margin was added to the LOD to account for the imprecision of real sample data (in contrast to standard measurements), in which multiple transfers of water and gas between Niskin bottles, syringes and pre-evacuated Exetainers introduce error between replicates. The mean standard deviation in peak area determined from all triplicate samples (n=N) was multiplied by 3 and added to LOD to estimate cut-offs of 3.49 and 125.82 peak area units for CH_4 and N_2O, respectively (3σ in the figure). Mean standard deviation of samples was calculated as the square root of mean variances of all sample triplicates: $\sqrt{\frac{\sum \sigma^2_{sample}}{n_{samples}}}$.

Note the different y-axis scales of the panels, which are due to the different detectors used for the GC measurement of each gas (FID vs. ECD).

Reference:

Armbruster, D. A. and Pry, T.: Limit of blank, limit of detection and limit of quantitation., Clin. Biochem. Rev., 29 Suppl 1(August), S49-52

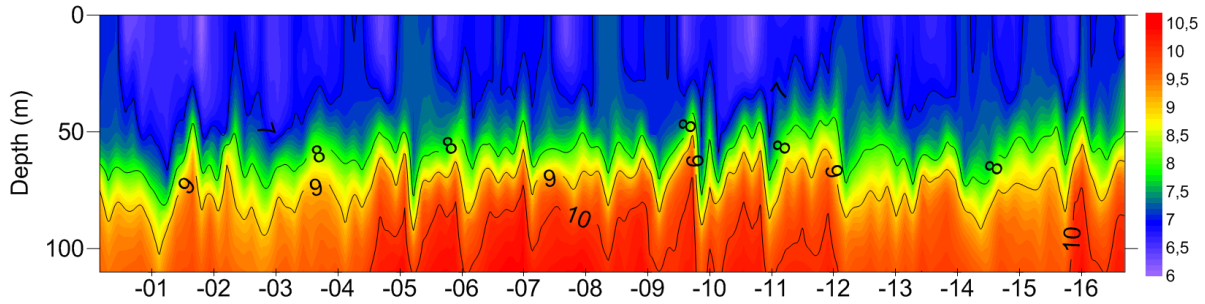

Figure S2. Water column salinity at western Gotland Basin station BY38 from 2000 to 2016, based on CTD salinity data retrieved from the SMHI Shark database (http://www.smhi.se/klimatdata/oceanografi/havsmiljodata/marina-miljoovervakningsdata). Note the annual to multi-annual oscillations in halocline depth.

Table S1. Sampling dates and depths of gas samples, along with exact sampling station coordinates in decimal minutes (WGS 84).

Sampling Date	Site	Coordinates (D M.m) Long.	Lat.	Ship / org.	Max depth (m)	Sampling depths (m) 20	40	50	60	70	80	90	100	105	109	110	115	120	125	130	135	140	142	143	144	145	150	155	160	165	167	170	175	185	190	192	195	196	200	225	236	237	238
17.3.2015	BY20	57 59.89 N	019 52.73 E	Aranda / SMHI	195	x	x		x	x	x	x	x						x								x						x		x								
17.3.2015	BY15	57 18.73 N	020 04.57 E	Aranda / SMHI	239	x			x	x	x	x	x						x								x						x	x	x		x		x	x		x	
17.3.2015	BY10	56 38.02 N	019 35.09 E	Aranda / SMHI	145	x	x		x	x	x	x	x						x																								
22.3.2015	BY32	58 01.01 N	017 59.07 E	Aranda / SMHI	202	x	x	x	x	x	x	x	x						x								x						x										
22.3.2015	BY38	57 07.03 N	017 40.12 E	Aranda / SMHI	110	x	x	x	x	x	x	x	x		x																												
21.4.2015	BY20	57 59.89 N	019 52.74 E	Aranda / SMHI	195	x	x		x	x	x	x	x						x								x						x		x								
21.4.2015	BY15	57 18.89 N	019 56.03 E	Aranda / SMHI	225	x			x	x	x	x	x						x	x	x	x				x	x						x						x	x			
21.4.2015	BY10	56 38.02 N	019 35.09 E	Aranda / SMHI	144	x	x		x	x	x	x	x						x					x																			
26.4.2015	BY32	58 01.01 N	017 59.07 E	Aranda / SMHI	201	x	x	x	x	x	x	x	x						x								x						x					x					
26.4.2015	BY38	57 07.03 N	017 40.12 E	Aranda / SMHI	110	x	x	x	x	x	x	x	x		x																												
4.6.2015	BY32	57 59.99 N	017 59.81 E	Aranda / SYKE	171	x	x	x	x	x	x	x	x						x								x					x											
5.6.2015	BY20	58 00.00 N	019 53.81 E	Aranda / SYKE	193	x	x		x	x	x	x	x						x								x						x					x					
5.6.2015	BY15	57 19.20 N	020 03.00 E	Aranda / SYKE	239	x			x	x	x	x	x	x		x	x	x	x	x	x	x					x						x						x	x		x †	
6.6.2015	BY10	56 38.00 N	019 35.00 E	Aranda / SYKE	143	x	x		x	x	x	x	x						x				x																				
5.8.2015	BY20	58 00.00 N	019 53.81 E	Aranda / SYKE	195	x	x		x	x	x	x	x						x								x						x				x						
5.8.2015	BY15	57 19.20 N	020 03.00 E	Aranda / SYKE	238	x			x	x	x	x	x	x		x	x	x	x	x	x						x						x						x	x			x
6.8.2015	BY10	56 38.00 N	019 35.00 E	Aranda / SYKE	142	x	x		x	x	x	x	x						x				x																				
6.8.2015	BY38	57 07.00 N	017 40.00 E	Aranda / SYKE	109	x	x	x	x	x	x	x	x		x																												
7.8.2015	BY32	57 59.99 N	017 59.81 E	Aranda / SYKE	170	x	x	x	x	x	x	x	x						x								x					x											
24.10.2015	BY15	57 19.22 N	020 03.12 E	Salme / TTU	231	x			x	x	x	x	x			x		x	x	x	x						x						x						x	x			
25.10.2015	BY20	57 59.99 N	019 57.12 E	Salme / TTU	169				x	x	x	x	x						x								x				x												
8.12.2015	BY20	57 59.89 N	019 52.73 E	Aranda / SMHI	196	x	x		x	x	x	x	x						x								x						x			x							
8.12.2015	BY15	57 18.73 N	020 04.57 E	Aranda / SMHI	239	x	x	x	x	x	x	x	x						x								x	x	x	x		x	x						x	x	x		
9.12.2015	BY10	56 38.02 N	019 35.09 E	Aranda / SMHI	145	x	x		x	x	x	x	x						x						x																		
13.12.2015	BY38	57 07.03 N	017 40.12 E	Aranda / SMHI	111	x	x	x	x	x	x	x	x			x																											
13.12.2015	BY32	58 01.01 N	017 59.07 E	Aranda / SMHI	202	x	x	x	x	x	x	x	x						x								x						x						x				

† gas samples lost