

Supplementary Materials

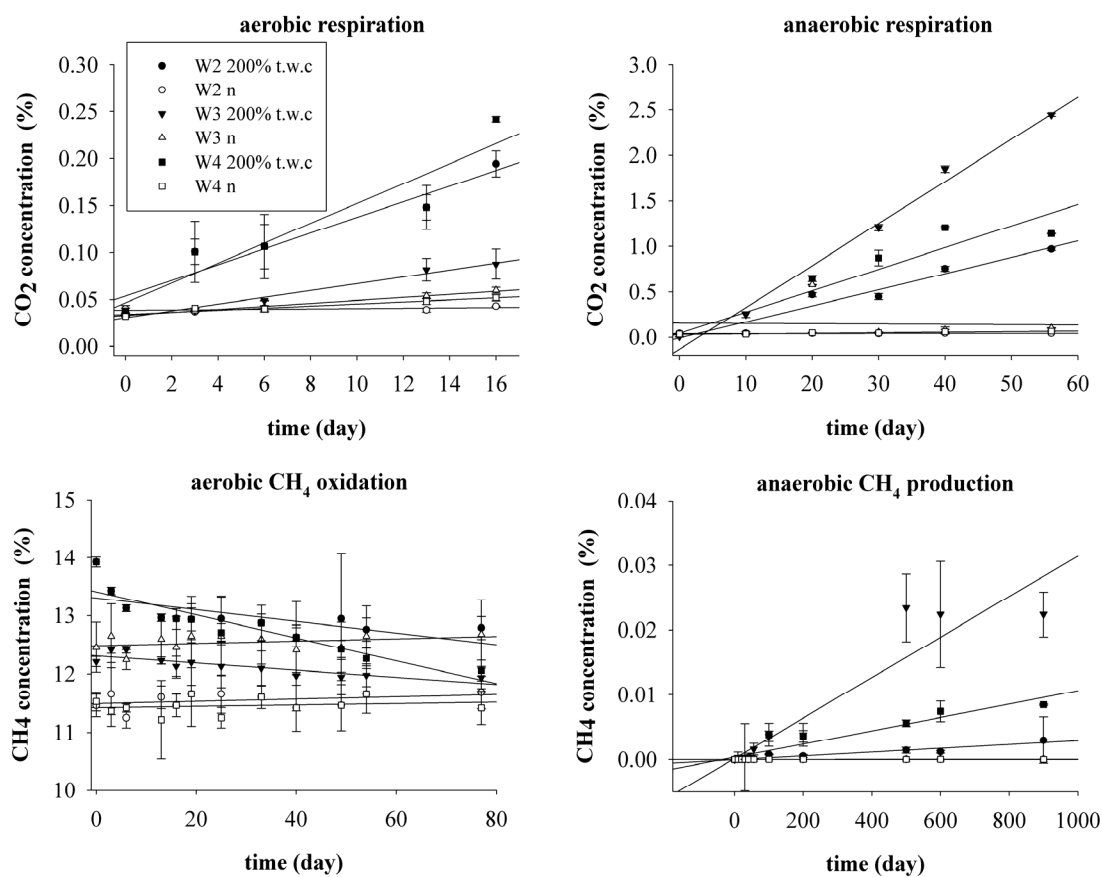


Figure S1. Concentration of the CO₂ and CH₄ in marine sediments under different moisture (natural – n and saturated – 200% t.w.c.) and aeration conditions at 20°C (error bars represent standard deviation, n=3).

Table S1. Unclassified sequences matched with NCBI database sequences.

ID	NCBI: Description	Accession number	Identity (%)	source
Unclassified_WGW032	Uncultured bacterium	LN532098.1	100	Denmark: rapid sand filter material of groundwater treatment for drinking water production
	Uncultured anaerobic ammonium-oxidizing bacterium	HQ906638.1	100	China: biofilm reactor
	Uncultured anaerobic ammonium-oxidizing bacterium	AB164467.1	100	Japan: anaerobic biological filtrated reactor
Unclassified_WGW025	Uncultured bacterium	AB775711.1	99.75	Japan: biofilm reactor
	Uncultured bacterium	HQ640583.1	99.75	China: ANNAMOX bioreactor
	uncultured anaerobic bacterium	KP091461.1	98.26	waste water (Chiny)
Unclassified_WGW185	Uncultured bacterium	MG858442.1	100	Fermented grains (China)
	Uncultured bacterium	KF830585.1	100	waste water
	Uncultured organism	HQ791754.1	100	human digestive tract
Unclassified_WGW232	Uncultured bacterium	MH531073.1	100	forest soil (New Zealand)
	Uncultured bacterium	MF968510.1	100	paddy soil (China)
	uncultured bacterium	LT720609.1	100	marine water (Brazil, Atlantic Ocean)
Unclassified_WGW034	uncultured bacterium	MG717054.1	100	Mountain forest soil
	uncultured bacterium	JN616142.1	100	butterscotch organic ooze from lava
	uncultured bacterium	LN715677.1	99.76	Fen soil
Unclassified_WGW186	Uncultured bacterium	HQ640637.1	99.5	ANNAMOX bioreactor
	Uncultured bacterium	KC605909.1	85.43	groundwater
	Uncultured bacterium	JQ376311.2	85.01	soil
Unclassified_WGW035	Uncultured bacterium	KF494600.1	99.50	permafrost soil
	Uncultured bacterium	MN194919.1	98.51	rhizosphere
	Uncultured bacterium	KT790300.1	100	Chiny: rhizosphere
Unclassified_WGW002	Uncultured bacterium	MH524929.1	99.06	forest soil (New Zealand)
	Uncultured bacterium	KC620946.1	98.83	pyrite mine (China)
	uncultured <i>Gallionella</i> sp.	KU587047.1	98.59	Eastern Siberia open-cast mine, acidic mine drainage (Russia)
	Uncultured bacterium	KJ616247.1	98.35	Baltic sea Fe-Mn concretions and sediment
Unclassified_WGW001	Uncultured bacterium	LN715646.1	99	Methane-emitting Mire Soils
	Uncultured <i>Acidobacteria</i>	HQ598923.1	99	woodland soil
	Uncultured bacterium	JF301231.1	99	boreal forest soil
Unclassified_WGW010	Uncultured bacterium	MH989759.1	100	paddy soil
	uncultured <i>Methylocystaceae</i> bacterium	EF072118.1	100	agriculture soil (USA)
	Uncultured bacterium	FJ615931.1	100	agricultural field (USA)
Unclassified_WGW010	<i>Streptomyces</i> sp.	MN093655.1	97.04	pine forest soil

WGW149	Uncultured bacterium	KC554093.1	97.04	soil of Yanshan Mountain
	<i>Pseudonocardiaceae</i> bacterium	MH669549.1	96.81	cave silver biofilms (Sanford Underground Research Facility)
Unclassified_ WGW077	Uncultured bacterium	HQ899249.1	99.53	Eyjafjallajokull lava
	Uncultured bacterium	FJ532329.1	99.53	PCB-contaminated soil
	Uncultured			Elodea nuttallii rhizospheric
	<i>Methylophilaceae</i> bacterium	HE648207.1	99.29	mercury contaminated sediments

Table S2. *Bacillus* sequences matched with NCBI database sequences. All elected items from NCBI (100% identity, 100% coverage).

ID	NCBI: Description	Accession number	source
Bacillus_CL1	<i>Bacillus megaterium</i>	MN133858.1	soil
	<i>Bacillus flexus</i>	MT299641.1	sea water, shellfish, and sediment from the north coast of Java (Indonesia)
	<i>Bacillus flexus</i>	MT279688.1	Benthic Soil, East Kolkata Wetland
Bacillus_CL2	<i>Bacillus licheniformis</i>	MN128072.1	Sangameshwar, Tural hotspring (India)
	<i>Geobacillus stearothermophilus</i>	MH729364.1	Compost (India)
	<i>Bacillus</i> sp.	MK120089.1	Salt (Turkey)
Bacillus_CL3	<i>Bacillus marisflavi</i>	MT510150.1	Sea sediment (South Korea)
	<i>Bacillus haikouensis</i>	MT299665.1	sea water, shellfish, and sediment from the north coast of Java (Indonesia)
	<i>Bacillus</i> sp.	MT437013.1	Baiyangdian Lake sediment (China)
	<i>Bacillus paramycoides</i>	MN134492.1	Caves (India)
Bacillus_CL4	<i>Bacillus toyonensis</i>	MN134491.1	
	<i>Bacillus</i> sp.	MN128021.1	Coalmine soil (India)
	<i>Bacillus anthracis</i>	MN122435.1	Saline source (India)
	<i>Bacillus cereus</i>	LC487876.1	Seawater (India)
Bacillus_CL5	<i>Bacillus</i> sp.	MK421402.1	Lithium brines (Chile)
	<i>Bacillus altitudinis</i>	MT373595.1	Stalactite (caves in Hungary)
	<i>Bacillus stratosphericus</i>	MW131050.1	surface of the Mars Science Laboratory
	<i>Bacillus aerius</i>	MW199095.1	Wetland sediments (India)
Bacillus_CL6	<i>Bacillus mesonae</i>	MN511751.1	Bamboo Rhizosphere
	<i>Bacillus drenthensis</i>	HQ857753.1	soil
	<i>Bacterium</i> HN1-10-48	JN118011.1	flooded paddy soil