

SUPPLEMENTARY TABLES

Table S1. Primer sets used for the amplification of *nifH* in marine environments.

Gene	Primer	Sequence	Environment	Reference
<i>nifH</i>		TCAGGACCACCGGACTCAAC	Open ocean	(Langlois et al., 2008)
		TAGCTGCAGAAAGAGGAAGTGTAGAAG		
		GCAAATCCACCGCAAACAAC		
		TGGCCGTGGTATTATTACTGCTATC		
		TCAGGACCACCAGATTCTACACACT		
		TGCTGAAATGGGTTCTGTTGAA		
		GGTATCCTTCAAGTAGTACTTCGCTAGCT		
		TCTACCCGTTTGATGCTACACACTAA		
		AACAATGTAGATTTCTGAGCCTTATTC		
		TTATGATGTTCTAGGTGATGTG		
		CATCGCGAAACCACCACATAC		
		TTGTGCAGGTCGTGGTGTAATC		
		GCAGACCACGTCACCCAGTAC		
		ACCTCGATCAACATGCTCGAA		
	<i>nifH</i>	nifH1 / mnifHF		
<i>nifH</i>	nifH2 / mnifHR	ANDGCCATCATYTCNCC		
<i>nifH</i>	nifH3 / YAA	ATRTTRTTNGCNGCRTA		
<i>nifH</i>	nifH4	TTYTAYGGNAARGGNGG		
<i>nifH</i>		AGCTATAACAACGTTTTATGCGTTGA	Open ocean	(Moisander et al., 2010)
		ACCACGACCAGCACATCCA		
		CGTAATGCTCGAAGGGTTTGA		
		CACGACCAGCACAACT		
		GACGAAGTATTGAAGCCAGTTTC		
		CGGCCAGCGCAACCTA		
		CGGTTCCGTGGTGTACGTT		
		CATTAAGTGTGTTGAATCTGGTGGTCCTGAGC		
		TGGTTACCGTGATGTACGTT		
		AATGCCGCGACCAGCACAAC		
		CGGTTCCGTGGCGTACGTT		
		AATACCACGACCAGCACAAC		
		CGGTAGAGGATCTTGAGCTTGAA		
		CACCTGACTCCACGCACTTG		

Gene	Primer	Sequence	Environment	Reference
		GAGCCAGGTGTTGGTTGTGC		(Gradoville et al., 2017)
		GTTCTCACGAATGGGCATGG		
		AGGCACGGTTGAGGATCTCG		
		CATACGCACCCTCTTCTTCAAGG		
		TCATGGAAATGGCTGCTGAAG		
		GATTACACCGCGACCAGCAC		
		CGTAGGTTGCGACCCTAAGGCTGA		
	CNF	GCATACATCGCCATCATTTCACC		(Mazard et al., 2004)
		CAAGGCCAGAACACCATCA	Estuary	(Bentzon-Tilia et al., 2015)
		TTCGAGGAAGTTGATCGCGG		
		AGCTGCAGAAAGAGGAACTGT		
		GGCTCAGGACCACCAGATTC		
		TCCAAGGCTCAAACAACCGT		
		CAACCTACACCGGGTTCTGG		
		ACCATTATGGAGATGGCCGC		
		GCCAATTTGCAGCACGTCTT		
		GATGCTTGGTGGATTGGCAC		
		ACAGAGTTCCGCTAAAGCCC		
	nif2F	TGAGACAGATAGCTATYTYGGHAA	Coast	(Wen et al., 2017)
	nif623R	GATGTTGCGCGGCACGAADTRNATSA		
		ACGGCGGAACTTGGTGTGT	Open ocean, estuary	(Church et al., 2008; Short et al., 2004)
		AATACCGCGACCTGCACAAC		
		ATGGCGGAACTTGGTGTGT		
		GATGCCACGACCGGCACAGC		
		GGTTATGGACAAGTCCGTGAA		
		AGCCGCGTTTACAGACATCTTC		
		GGTCATGGACAAAGTCCGTGAC		
		AGCCCCACTTCAACACATCTTC		
		AACCCTTGCACAAACATCTTC		
		GGTTATGGACAAGTCCGCGAA		
	nifHfw	GGHAARGGHGGHATHGGNAARTC	Deep sea, methane seep sediments, hydrothermal vent	(Cao et al., 2015; Dang et al., 2009b; Dekas et al., 2014; Mehta et al., 2003; Miyazaki et al., 2009; Wu et al., 2014)
	nifHrv	GGCATNGCRAANCCVCCRCANAC		
		GGAGGATACCCAGATGACTTAG		
		CCRAANGCRCANCCNCKYTCNGT		(Mehta and Baross, 2006)
	IGK	AARGNGGNATHGGNAA	Coral reef	(Olson and Lesser, 2013)
		ATGTCGGYTGYGAYCCSAARGC		
		ATGGTGTGGCGGCRATAVAKSGCCATCAT		
	F2	TGYGAYCCIAAIGCIGA		
	R6	TCIGGIGARATGATGGC		
				(Pogoreutz et al., 2017)

Table S2. Primer sets used for the amplification of genes involved in nitrification (archaeal *amoA*, bacterial *amoA*, *nxr*) in marine environments.

Gene	Primer	Sequence	Environment	Reference
archaeal- <i>amoA</i>	Arch-amoAF	ACACCAGTTTGGYTACCWTCDCG	Ocean, deep ocean, hydrothermal vent, marine sediments, coastal sediments, coral reef	(Beman et al., 2012; Cao et al., 2012; Dang et al., 2009a; Luo et al., 2014; Shiozaki et al., 2016; Wittorf et al., 2016; Xu et al., 2014; Yang et al., 2013; Zhang et al., 2014)
	Arch-amoAR	GCGGCCATCCATCTGTATGT	Ocean, deep ocean, hydrothermal vent, marine sediments, coastal microbial mat, coastal sediments, coral reef	(Beman et al., 2012; Cao et al., 2012; Dang et al., 2009a; Fan et al., 2015; Luo et al., 2014; Shiozaki et al., 2016; Wittorf et al., 2016; Xu et al., 2014; Yang et al., 2013; Zhang et al., 2014;)
	CrenAmoAQ-F	GCARGTMGGWAARTTCTAYAA	Ocean, coast, coastal microbial mat	(Church et al., 2010; Fan et al., 2015; Mincer et al., 2007; Pitcher et al., 2011)
	CrenAmoAModR	AAGCGGCCATCCATCTGTA	Ocean, sponges, coast	(Church et al., 2010; Mincer et al., 2007; Pitcher et al., 2011)
	Arch-amoAFB	CATCCRATGTGGATTCCATCDTG	Ocean	(Shiozaki et al., 2016)
	arch-amoAfor	CTGAYTGGGTCYTGGACATC	Open ocean, deep ocean, estuary	(Agogu� et al., 2008; Caffrey et al., 2007; De Corte et al., 2009; Luo et al., 2014; Sintes et al., 2013)
	arch-amoArev	TTCTTCTTTGTTGCCAGTA		
	19F / CrenamoA23F	ATGGTCTGGCTWAGACG	Sponges, coast, marine sediments	(Bertagnolli and Ulloa, 2017; Radax et al., 2012; Wittorf et al., 2016; Yu et al., 2018)
	thaum-amoA-628	TGGACATACMGRTGGATGG	Sponges	(Radax et al., 2012)
	Arch344F-GC	ATGGGGCGCAGCAGGCGAGA	Ascidians	(Mart�nez-Garc�a et al., 2008)
	907R	CCGCAATTCCTTTAAGT		
	CrenamoA23R	GCCATACABCKRTANGTCCA	Coast	(Bertagnolli and Ulloa, 2017)
	CrenAMO_F	AATGGTCTGGCTWAGACGC	Deep ocean	(Nakagawa et al., 2007)
	CrenAMO_R	GACCARGCGGCCATCCA		
	CrenamoA616r	GCCATCCABCKRTANGTCCA	Deep ocean, marine and coastal sediments	(Wittorf et al., 2016; Yu et al., 2018)

Gene	Primer	Sequence	Environment	Reference
bacterial- <i>amoA</i>	amoA1F	GGGGTTTCTACTGGTGGT	Open ocean, deep ocean, hydrothermal vent, marine sediments, coral reef, coast, coastal sediments, coastal microbial mat	(Agogu� et al., 2008; Beman et al., 2007, 2012; Cao et al., 2012; De Corte et al., 2009; Fan et al., 2015; Mincer et al., 2007; Mohamed et al., 2010; Nakagawa et al., 2007; Santoro et al., 2010; Shiozaki et al., 2016; Siboni et al., 2008; Smith et al., 2016; Wittorf et al., 2016; Xu et al., 2014; Yu et al., 2018)
	amoA2R	CCCCTCKGSAAAGCCTTCTTC		(Beman et al., 2007, 2012; Cao et al., 2012; Fan et al., 2015; Mincer et al., 2007; Mohamed et al., 2010; Nakagawa et al., 2007; Santoro et al., 2010; Siboni et al., 2008; Smith et al., 2016; Wittorf et al., 2016; Xu et al., 2014; Yu et al., 2018)
	amoA3F	GGTGAGTGGGYTAACMG	Marine sediments	(Nunoura et al., 2013)
	amoB4R	GCTAGCCACTTTCTGG		
	A189-for	GGNGACTGGGACTTCTGG	Estuary	(Caffrey et al., 2007)
<i>nxA</i>	48f	GCGVCCGGACGGACGC	Marine sediments	(Rani et al., 2016)
	88f	CAGTCCAACCTCCGGTAYGG		
	263r	CRCCGTCTTCCGCCTTGG		
	300r	GTGWAMCGRACYGGTTCCCAC		
	25f	CGCTCGGTTAAAGCGCACGAA		
	370r	CGCGGAYGTACTGACCTGC		
	376r	TTAAATTTTCACGCGGAYGTACTG		
	F1norA	CAGACCGACGTGTGCGAAAG	Marine sediments	(Nunoura et al., 2013)
	R1norA	TCYACAAGGAACGGAAGGTC		
Nbacter_nxA-F	GATAACGYTTCCGCAGTA			
Nbacter_nxA-R	GACATCATGATGTCRAAGCC			

Table S3. Primer sets used for the amplification of *nrfA* in marine environments.

Gene	Primer	Sequence	Environment	Reference
<i>nrfA</i>	nrfAR1 /7R1	TWNGGCATRTGRCARTC	OMZ, estuary, intertidal marsh, coastal sediments	(Decleyre et al., 2015; Lam et al., 2009; Song et al., 2014; Takeuchi, 2006; Wittorf et al., 2016; Yu et al., 2018; Zheng et al., 2016)
	nrfA6F	GAYTGCCAYATGCCRAAAGT	OMZ, estuary	(Lam et al., 2009; Takeuchi, 2006)

Gene	Primer	Sequence	Environment	Reference
	nrfA6R	GCBKCTTTYGCTTCRAAGTG		
	nrfAF2aw	CARTGYCAYGTBGARTA	OMZ, estuary, intertidal marsh, coastal sediments	(Decleyre et al., 2015; Wittorf et al., 2016; Yu et al., 2018; Zheng et al., 2016)
	F1	GCNTGYTGGWSNTGYAA	Estuary	(Decleyre et al., 2015)
	F2	GYCAYGTNGARTAYTAYTTY		
	nrfA2F	CACGACAGCAAGACT		(Dong et al., 2009; Smith et al., 2007; Song et al., 2014)
	nrfA2R	GCCGCCGGCACTTTCGAGCCC		(Dong et al., 2009; Smith et al., 2007)
	4F	TTAGTCCAGTCAGAGAAGGC		(Takeuchi, 2006)
	4R	GCATCCGCSGCTTTATCCAT		

Table S4. Primer sets used for the amplification of *nas* genes in marine environments.

Gene	Primer	Sequence	Environment	Reference
<i>nasA</i>	nasA964/nasA1F	CARCCNAAAYGCNATGGG	Ocean, seagrass beds	(Allen et al., 2001; Cai and Jiao, 2008; Jiang et al., 2015; Adhitya et al., 2007)
	nasA1735/nasA1733/nasA2R	ATNGTRTGCCAYTGRTC		
	nas22	TGYCCNTAYTGYGGNGT		
	nas1933/nas1935	CARTGCATNGGNAYRAA		
	Mar259F	GCGTTGTCCCACCGTGATTGT	Ocean	(Allen et al., 2005)
	Mar373R	ATTGGTGACGGTGCCATCCTT		
<i>narB</i> (Cyanobacterial nas)	narBF	GGCATGGTGTGCGTGAARGGNGCNAC	Coast and ocean	(Jenkins et al., 2006)
	narCF	GCCTGGGCACCAACAAYTTYGAYRC		
	narJR	GCCCACTTCGGCGAAGATYTSCCARTC		
	narIR	GGTTTCGGTGGGGTGGTANGCRTCYTG		
	narGR	GGTTCTTGACCATAAAGCKRTANCCNGG		

Table S3. Primer sets used for the amplification of genes involved in denitrification (*narG*, *napA*, *nirK*, *nirS*, *nosZ*) in marine environments.

Gene	Primer	Sequence	Environment	Reference
<i>narG</i>	1960F	TAYGTSGGCCARGARAA	OMZ	(Lam et al., 2009)
	2650R	TTYTCRTACCABGTBGC		
	narG1F	GACTTCGCGATGTCRAC	Estuary	(Smith, 2007)
	narG1R	TTYTCGTACCAGGTGGC		

	narG2F	CTCGAYCTGGTGGTYGA		
	narG2R	TTYTCGTACCAGGTS GC		
<i>napA</i>	napA1F	GTYATGGARGAAAAATTCAA		
	napA1R	GARCCGAACATGCCRAC		
	napA2F	GAACCKAYGGGYTGTTATG		
	napA2R	TGCATYTCSGCCATRTT		
	napA3F	CCCAATGCTCGCCACTG		
	napA3R	CATGTTKGAGCCCCACAG		
	V66	TAYTTYTNHSNAARATHATGTAYGG	OMZ	(Lam et al., 2009)
	V67	DATNGGRTGCATYTCNGCCATRTT		
	<i>nirK</i>	nirK1F	GGMATGGTKCCSTGGCA	Suboxic zone, marine and estuarine sediments, deep sea
nirK583Fdgr		TCATGGTGCTGCCGCGYANGG	Suboxic zone, coastal and estuarine sediments	(Mosier and Francis, 2010; Nunoura et al., 2013; Oakley et al., 2007)
nirK1aCuf/nirK1aCu		ATCATGGTSCTGCCGCG	Copepod carcasses, estuary, coastal sediments	(Glud et al., 2015; Magalhães et al., 2011; Wittorf et al., 2016)
nirK3CuR/nirK3Cu		GCCTCGATCAGRTTGTGGTT		
nirK2F		GCSMTSATGGTSCTGCC	Deep sea	(Tamegai et al., 2007)
nirK3R		GAAC TTGCCGGTVGYCCAGAC		
nirK4R		GGRATRARCAGGTTTCC		
nirK5R / nirK1040R / Cunir4		GCCTCGATCAGRTTRTGG	Deep sea, marine and estuarine sediments, intertidal sediments	(Braker et al., 2000; Francis et al., 2013; Mosier and Francis, 2010; Nunoura et al., 2013; Tamegai et al., 2007; Wang et al., 2014)
nirK-q-F		TCATGGTGCTGCCGCGYGA	Estuary	(Mosier and Francis, 2010)
nirK1aCuF		ATCATGGTSCTGCCGCG		(Magalhães et al., 2011)
Cunir3		CGTCTAYCAYTC CGCVCC		(Francis et al., 2013)
nirK876F		ATYGGCGVCA YGGCGA	Intertidal sediments	(Wang et al., 2014)
NirKCF_F		TAYTWCATCGGNGAGCARGA	Marine sediments	(Nunoura et al., 2013)
NirKC_R		ATCAGRTTRTGRTTCACRTARGC		

	NirK-F_R1	ATCAGRTTRTGRTTSARRTAGGC		
	NirK-F_R2	ATCAGRTTRTGRTTSARRTACAC		
	Modified nirK583F	TCATGGTGCTGCCGCGGYGANGG		
	Modified nirK5F	GCYTCGATCAGRTRTRTGR		
<i>nirS</i>	nirS1F	CCTAYTGGCCGCCRCART	OMZ, suboxic zone, ocean, marine sediments, hydrothermal vent, estuary	(Abell et al., 2013; Bourbonnais et al., 2014; Braker et al., 2000; Castro-Gonzalez et al., 2005; Falk et al., 2006; Jayakumar et al., 2004; Mosier and Francis, 2010; Nunoura et al., 2013; Oakley et al., 2007; Tamegai et al., 2007;)
	nirS3R	GCCGCCGTCTRTGVAGGAA	Deep sea, OMZ	(Jayakumar et al., 2004; Tamegai et al., 2007)
	nirS6R/nirS-NR	CGTTGAACTTRCCGGT	Suboxic zone, ocean, marine sediments, hydrothermal vents, deep sea, estuary	(Abell et al., 2013; Bourbonnais et al., 2014; Braker et al., 2000; Falk et al., 2006; Nunoura et al., 2013; Oakley et al., 2007; Smith et al., 2015; Tamegai et al., 2007)
	nirS cd3af / nirSR3cdR	G TSAACG TSAAGGARACSGG	Copepod carcasses, marine sediments, estuary,	(Glud et al., 2015; Magalhães et al., 2011; Li et al., 2013)
	nirS3cdr	GASTTCGGRTGSGTCTTGA	Copepod carcasses, marine sediments	(Glud et al., 2015; Li M et al., 2013)
	nirS2F	TACCACCCSGARCCGCGCGT	Deep sea	(Tamegai et al., 2007)
	nirS3F	TTCCTBCAYGACGGCGGC		
	nirs4F	TTCRTCAAGACSCAYCCGAA		
	nirS5R	CTTGTTGWACTCGSSCTGCAC		
	nirS-q-R	TCCMAGCCRCRTRTGCAG	Estuary	(Mosier and Francis, 2010)
	nirS-ef-F	CACCCGGAGTTCATCGTC		(Smith et al., 2015)
	nirS-ef-R	ACCTTGTTGGACTGGTGGG		
	nirS-m-F	GGAAACCTGTTCGTC AAGAC		
	nirS-MR	CSGARTCCTTGCGACGT		

	nirS-n-F	AAGGAAGTCTGGATYTC		
	mod-nirSCd3aF/ nirSCd3aFm	AACGYSAAGGARACSGG	Intertidal sediments, estuary, coastal sediments	(Magalhães et al., 2011; Wang et al., 2014; Wittorf et al., 2016)
	mod-nirSCd3cd/ nirSCd3cdm	GASTTCGGRTGSGTCTTSAYGAA	Intertidal and coastal sediments	(Wang et al., 2014; Wittorf et al., 2016)
	nirS1FMR	RWAYTGYGGCGGCCARTA	Marine sediments	(Nunoura et al., 2013)
	nirS_590F	MGNTGYGCVGGBTGYCAYGG		
<i>nosZ</i>	nosZF1	GAYGTNCANTAYCARCCNGGNCA	Ocean	(Coates and Wyman, 2017)
	nosZR	CATYTCCAARTGNADNGCRTGRC		
	nosHMForAC	GGNCCNYTNCAAYACNRCNTACGA		
	nosHMForTC	GGNCCNYTNCAAYACNRCNTTCGA		
	nosHMForAT	GGNCCNYTNCAAYACNRCNTATGA		
	nosHMForTT	GGNCCNYTNCAAYACNRCNTTTGA		
	nosHMRevA	CATYTCSADRTGNADNGCATG		
	nosHMRevG	CATYTCSADRTGNADNGCGTG		
	nosHQFor2_T	GGNYCNYTNCAAYACNSARTTTG		
	nosHQFor2_C	GGNYCNYTNCAAYACNSARTTCG		
	nosHQRev2	TGCATYTCYTGRTGNARNGC		
	NosGrp2F	AGCYCATCGACATTTCCAC		
	NosGrp2R	AGTTGCCGGATTTCAGCTTC		
	NosGrp4F	GTGTCTACATGCACTCCGTC		
	NosGrp4R	TCACCTCGTCACCCTGTTTC		
	nosZ661f	CGGCTGGGGGCTGACCAA	Hydrothermal vents, OMZ	(Bowles et al., 2012; Castro-González et al., 2015)
	nosZ1773r	ATRTCGATCARCTGBTCGTT		
NosZI1840F	CGCRACGGCAASAAGGTSMSST	Coastal marine sediments	(Wittorf et al., 2016)	
NosZI2090R	CAKRTGCAKSGCRTGGCAGAA			
NosZIIF	CTIGGICCIYTKCAYAC			
NosZIIR	GCIGARCARAAITCBGTR C			

Table S4. Primer sets used for the amplification of genes involved in n-damo.

Gene	Primer	Sequence	Environment	Reference
NC10-Specific	202F	GACCAAAGGGGGCGAGCG	Intertidal zone, mangrove sediments, estuary, coast	(Chen et al., 2015; Li-dong et al., 2014; Wang et al., 2017; Zhang et al., 2018)
	qP1F	GGGCTTGACATCCCACGAACCTG		
	qP2R	CTCAGCGACTTCGAGTACAG		
<i>pmoA</i>	cmo182	TCACGTTGACGCCGATCC	OMZ, coast	(Chen et al., 2015; Padilla et al., 2016)
	cmo568	GATGGGGATGGAGTATGTGC		

Table S5. Primer sets used for the amplification of anammox genes in marine environments.

Gene	Primer	Sequence	Environment	Reference
Anammox bacteria 16S rRNA	Brod541F	GAGCACGTAGGTGGGTTTGT	Marine and estuarine sediments, cold seep sediments, deep ocean sediments	(Dang et al., 2013; Hong et al., 2011a, 2011b; Li et al., 2013; Shao et al., 2014)
	Brod1260R	GGATTCGCTTCACCTCTCGG	Estuarine sediments, cold seep sediments	(Dang et al., 2013; Shao et al., 2014)
	Pla46F	GACTTGCATGCCTAATCC	OMZ, hydrothermal vent, estuary, coast	(Byrne et al., 2009; Hou et al., 2013; Tal et al., 2005; Woebken et al., 2008)
	Pla58F	GGCATGGATTAGGCATGC	OMZ, suboxic zone	(Fuchsman et al., 2012; Woebken et al., 2008)
	1037R /1930R	CGACAAGGAATTCGCTAC	OMZ, estuary	(Hou et al., 2013; Woebken et al., 2008)
	926R	CCACCGCTTGTGTGAGCCCC	Suboxic zone	(Fuchsman et al., 2012)
	AMX-808-F	ARCYGTAAACGATGGGCACTAA	Marine sediments	(Shehzad et al., 2016)
	AMX-1040-R	CAGCCATGCAACACCTGTRATA		
	Amx368F	TTCGCAATGCCCGAAAGG	Deep ocean sediments, estuary	(Hong et al., 2011a, Hou et al., 2013)
	Amx820R	AAAACCCCTCTACTTAGTGCCC	Marine sediments, hydrothermal vent, estuary, coast,	(Byrne et al., 2009; Hong et al., 2011a, 2011b; Hou et al., 2013; Li et al., 2010, 2013; Tal et al., 2005)
	AMX1240	TTTAGCATCCCTTTGTACCAACC	Coast	(Tal et al., 2005)
	BS820R	TAATTCCTCTATTAGT	Hydrothermal vent	(Byrne et al., 2009)
	526F	TAYTTTGAAGGDGACTGG	Cold seep, hydrothermal vent	(Russ et al., 2013)
	1857r	AAABGGYGAATCATARTGGC		
	757FScal	AGTTCNAAAYTTTGACCC		
<i>hzoA/hzoB</i>	hzoF1	TGTGCATGGTCAATTGAAAG	OMZ, marine sediments, cold seep and estuarine sediments	(Dang et al., 2010; Hirsch et al., 2011; Hong et al., 2011a, 2011b; Kong et al., 2013; Li et al., 2013; Shao et al., 2014)
	hzoc11R2	ACTCCAGATRTGCTGACC	Marine sediments, estuarine sediments,	(Han et al., 2017; Hirsch et al., 2011;

Gene	Primer	Sequence	Environment	Reference
			coastal sediments	Hong et al., 2011b; Nunoura et al., 2013; Schmid et al., 2008; Han et al., 2017; Wittorf et al., 2016;)
	hzoF5	AGTATGGGTATGTCHAATG	Marine sediments	(Li et al., 2013)
	hzoR5	CATCWGTCCATACCAAA		
	hzocl1F1	TGYAAGACYTGYCAYTGG	OMZ, marine sediments, coastal and estuarine sediments	(Han et al., 2017; Hirsch et al., 2011; Nunoura et al., 2013; Schmid et al., 2011; Wittorf et al., 2016)
	hzoR1	CAACCTCTTCWGCAGGTGCATG	OMZ, marine sediments, cold seep and estuarine sediments	(Hirsch et al., 2011; Hong et al., 2011a; Kong et al., 2013; Li et al., 2013; Shao et al., 2014)
	hao/hzocl2aF1	TGTCACATGGGTGTAGACCA	OMZ, marine sediments	(Kong et al., 2013; Nunoura et al., 2013)
	hao/hzocl2aR1	ACCTGGAACATACCCAT	Marine sediments	(Nunoura et al., 2013)
	hzoAB1R	CTCTTCNGCAGGTGCATGATG	Estuarine sediments	(Hirsch et al., 2011, Lisa et al., 2014)
	hzoAB4F	TTGARTGTGCATGGTCTAWTGAAAG		
	hzocl2aF1	GGTTGYCACACAAGGC	Marine sediments	(Han et al., 2017; Nunoura et al., 2013)
	hzocl2aR2	ATATTCACCATGYTTCCAG	OMZ, marine sediments	(Han et al., 2017; Kong et al., 2013; Nunoura et al., 2013)
	hzoAB4R	GCTGACCTGACCARTCAGG	Marine sediments	(Hirsch et al., 2011; Han et al., 2017)
	hzoAB1F	GAAGCNAAGGCNGTAGAAATTATCA C		
	Ana-hzo1F	TGTGCATGGTCAATTGAAAG		
	Ana-hzo2R	ACCTCTTCWGCAGGTGCAT		
hzsA_526F	TAYTTTGAAGGDGACTGG			
<i>hzsA</i>	hzsA_1857R	TCATACCACCARTTGTA	Marine sediments	(Nunoura et al. 2013; Harhangi et al. 2012, Yu et al., 2018)
	hzsA_1597F	WTYGGKTATCARTATGTAG		
	hzsA_757F Scalindua	AGTTCNAAyTWGACCC		
	hzsA_1829R Scalindua	CTGAACCACCARTTGTA	Marine sediments	(Harhangi et al., 2012; Rasigraf et al., 2017)
	hzsA_Scal1211F	ATGATCCDGAGTGGAAATGAT		
	hzsA_Scal1248R	CATCTTGGTTTGTAACGTGGATAA	Marine sediments	(Nunoura et al., 2013)
	<i>nirS</i> (<i>Scalindua</i>)	Scnir372F	TGT AGC CAG CAT TGT AGC GT	OMZ, marine sediments
Scnir845R		TCA AGC CAG ACC CAT TTG CT		
AnnirS379F		TCTATCGTTGCATCGCATTT	Marine sediments	(Han et al., 2017)
AnnirS821R		GGATGGGTCTTGATAAACA		

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