

**Supplementary Table 1.** Station names, Latitude, and Longitude

<b>Station</b>	<b>Latitude</b>	<b>Longitude</b>	<b>Classification</b>
GC600	27.3611	90.5670	Seep
GC600 Seep	27.3635	90.5640	Seep
AT357	27.5554	89.7660	Non-seep
OC26	28.6694	88.3745	Non-seep
Control 1	28.3248	88.3868	Seep
VK826	29.1492	88.0244	Seep
MC294	28.6576	88.4771	Non-seep
MC118	28.8492	88.4842	Seep
MC388	28.6329	88.1711	Non-seep
DC673	28.3148	87.1528	Non-seep
Whiting Dome	28.7417	88.2819	Non-seep
MC208	28.7593	88.3859	Non-seep
GC699	27.2923	90.0410	Non-seep
GC185	27.7831	91.5073	Seep
GC186	27.7613	91.4308	Non-seep
BP074	28.7002	88.3825	Non-seep
GIP17	28.6322	88.5480	Seep
MC75	28.9201	88.4553	Non-seep
VK816	29.1448	88.4982	Non-seep
GB480	27.4147	91.9675	Non-seep
GC574	27.3553	91.8145	Non-seep
GC848	27.1058	91.3657	Non-seep
GC767	27.2080	91.0097	Non-seep
S of OC26	28.7622	88.3711	Non-seep
GC415	27.5326	90.9932	Seep
GC232	27.7412	91.3179	Seep
AT18-2	28.7259	88.4014	Seep
GC246	27.7071	90.6508	Seep
Hot site	27.3180	92.1082	Seep
AC601	26.3886	94.5093	Seep
Macondo Well	28.73666	88.3872	Blowout
GB425	27.5533	92.54	Mud volcano

**Supplementary Table 2.** Results from comparison of means performed on nitrate and phosphate data in 2010, 2012, 2013, 2014, 2015 from OC26 and GC600. Only significant p-values are listed.

Category	Year	Year	OC26				GC600			
			Nitrate	DON	Phosphate	DOP	Nitrate	DON	Phosphate	DOP
400m and above	2010	2012	ND	ND	ND	ND	ND	ND	ND	ND
	2010	2013	ND	ND	ND	ND	ND	ND	ND	ND
	2010	2014	ND	ND	ND	ND	ND	ND	ND	ND
	2010	2015	ND	ND	ND	ND	ND	ND	ND	ND
	2012	2013	ND	ND	ND	ND	ND	ND	ND	ND
	2012	2014	ND	ND	ND	ND	ND	<0.0001	ND	ND
	2012	2015	ND	ND	ND	ND	ND	<0.0001	ND	ND
	2013	2014	ND	ND	ND	ND	ND	ND	ND	ND
	2013	2015	ND	ND	ND	ND	ND	ND	ND	ND
	2014	2015	ND	ND	ND	ND	ND	ND	ND	ND
400 m to 1000 m	2010	2012	ND	ND	ND	ND	ND	0.0002	ND	ND
	2010	2013	ND	ND	ND	ND	ND	ND	ND	ND
	2010	2014	ND	ND	ND	ND	ND	ND	ND	ND
	2010	2015	ND	ND	ND	ND	ND	ND	ND	ND
	2012	2013	ND	ND	ND	ND	ND	ND	ND	ND
	2012	2014	ND	ND	ND	ND	0.034	0.02	ND	ND
	2012	2015	ND	ND	ND	ND	ND	0.02	ND	ND
	2013	2014	ND	ND	ND	ND	ND	ND	ND	ND
	2013	2015	ND	ND	ND	ND	ND	ND	ND	ND
	2014	2015	ND	ND	ND	ND	ND	ND	ND	ND
1000m and below	2010	2012	0.0218	ND	ND	ND	0.04	0.01	ND	ND
	2010	2013	ND	ND	ND	0.007	ND	ND	ND	ND
	2010	2014	ND	ND	ND	ND	0.003	ND	ND	ND
	2010	2015	ND	ND	ND	0.0007	ND	ND	ND	0.003
	2012	2013	ND	ND	ND	ND	ND	ND	ND	ND
	2012	2014	ND	ND	ND	ND	ND	0.05	0.02	ND
	2012	2015	ND	ND	ND	ND	ND	0.008	ND	0.03
	2013	2014	ND	ND	ND	ND	ND	ND	ND	ND
	2013	2015	ND	ND	ND	ND	ND	ND	ND	ND
	2014	2015	ND	ND	ND	ND	ND	ND	ND	0.01

ND- No difference between years

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**Supplementary Table 3.** Kendall’s Tau correlation analysis between nitrate, phosphate, methane oxidation (MOx), and turnover constant (K) in 2010, 2012, 2013, 2014, 2015 at OC26 and GC600 for 400m and above in the water column. Only p-values lower than 0.05 are listed.

<i>400m and above</i>		<b>OC26</b>				<b>GC600</b>			
		<b>Nitrate</b>	<b>DON</b>	<b>Phosphate</b>	<b>DOP</b>	<b>Nitrate</b>	<b>DON</b>	<b>Phosphate</b>	<b>DOP</b>
<b>All years</b>	<b>MOx</b>	NR	NR	NR	NR	NR	0.27**	-0.19*	NR
	<b>K</b>	NR	NR	NR	NR	NR	0.34***	NR	NR
<b>2010</b>	<b>MOx</b>	NR	NR	NR	NR	NR	NR	NR	NR
	<b>K</b>	NR	NR	NR	NR	NR	NR	NR	NR
<b>2012</b>	<b>MOx</b>	NR	NR	NR	NR	NR	NR	NR	NR
	<b>K</b>	NR	NR	NR	NR	NR	NR	NR	NR
<b>2013</b>	<b>MOx</b>	NR	NR	NR	NR	NR	NR	NR	NR
	<b>K</b>	NR	NR	NR	NR	NR	NR	NR	NR
<b>2014</b>	<b>MOx</b>	NR	NR	NR	NR	NR	NR	NR	-0.35*
	<b>K</b>	NR	NR	NR	NR	NR	NR	NR	-0.48**
<b>2015</b>	<b>MOx</b>	NR	NR	NR	NR	NR	NR	-0.64**	NR
	<b>K</b>	NR	NR	NR	NR	NR	NR	-0.56**	NR

NR- no relationship listed for p-values over 0.05  
 \*significant relationship; p<0.05  
 \*\*significant relationship; p<0.005  
 \*\*\*significant relationship; p<0.0005

22 **Supplementary Table 4.** Kendall's Tau correlation analysis between nitrate, phosphate,  
 23 methane oxidation (MOx), and Turnover constant (K) in 2010, 2012, 2013, 2014, 2015 at OC26  
 24 and GC600 for 400m to 1000m in the water column. Only p-values lower than 0.05 are listed.

400m to 1000m		OC26				GC600			
		Nitrate	DON	Phosphate	DOP	Nitrate	DON	Phosphate	DOP
All years	MOx	0.33*	NR	NR	NR	NR	0.22*	NR	NR
	K	NR	NR	0.38*	NR	NR	0.39***	NR	NR
2010	MOx	NR	NR	NR	NR	NR	NR	NR	NR
	K	NR	NR	0.64**	-0.56*	NR	NR	0.64*	-0.56*
2012	MOx	NR	NR	NR	NR	-0.69**	NR	NR	NR
	K	NR	NR	NR	NR	-0.48*	NR	NR	NR
2013	MOx	NR	NR	NR	NR	NR	NR	NR	NR
	K	NR	NR	NR	NR	NR	NR	NR	NR
2014	MOx	NR	NR	NR	NR	NR	NR	NR	NR
	K	NR	NR	NR	NR	NR	NR	NR	NR
2015	MOx	NR	NR	NR	NR	NR	NR	NR	NR
	K	NR	NR	NR	NR	NR	NR	NR	NR

25 NR- no relationship listed for p-values over 0.05

26 \*significant relationship; p<0.05

27 \*\*significant relationship; p<0.005

28 \*\*\*significant relationship; p<0.0005

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41 **Supplementary Table 5.** Kendall's Tau correlation analysis between nitrate, phosphate,  
 42 methane oxidation (MOx), and Turnover constant (K) in 2010, 2012, 2013, 2014, 2015 at OC26  
 43 and GC600 for 1000m and below in the water column. Only p-values lower than 0.05 are listed.

<i>1000m and below</i>		OC26				GC600			
		Nitrate	DON	Phosphate	DOP	Nitrate	DON	Phosphate	DOP
<b>All years</b>	<b>MOx</b>	-0.35***	0.28***	-0.22***	NR	-0.28***	0.20**	-0.31***	NR
	<b>K</b>	NR	0.39***	NR	NR	NR	0.25***	NR	NR
<b>2010</b>	<b>MOx</b>	-0.40***	0.33***	-0.25*	-0.20*	-0.40***	0.33***	-0.25*	-0.20*
	<b>K</b>	NR	0.41***	0.19*	-0.42***	NR	0.41***	0.19*	-0.42***
<b>2012</b>	<b>MOx</b>	NR	NR	NR	NR	NR	NR	NR	NR
	<b>K</b>	NR	NR	NR	NR	NR	0.69*	0.76*	-0.67*
<b>2013</b>	<b>MOx</b>	NR	NR	0.67*	NR	NR	NR	NR	NR
	<b>K</b>	NR	NR	0.80*	-0.69*	NR	NR	NR	NR
<b>2014</b>	<b>MOx</b>	NR	NR	NR	NR	NR	NR	NR	-0.20*
	<b>K</b>	NR	NR	NR	NR	NR	NR	NR	NR
<b>2015</b>	<b>MOx</b>	NR	NR	NR	NR	NR	NR	NR	0.82*
	<b>K</b>	NR	NR	NR	NR	NR	NR	NR	0.73*

44 NR- no relationship listed for p-values over 0.05

45 \*significant relationship; p<0.05

46 \*\*significant relationship; p<0.005

47 \*\*\*significant relationship; p<0.0005

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61 **Supplementary Table 6.** Kendall's Tau correlation analysis between turnover constant and  
 62 methane concentration. Data was separated by turnover constant, year of sampling, and seep vs  
 63 non-seep.

<b>Year:Classification</b>	<b>Turnover Constant vs CH<sub>4</sub></b>
<b>Log Fractional Turnover (&lt;0.005)</b>	
2012:NS	0.31**
2012:S	0.07
2013:S	N.D.
2013:NS	N.D.
2014:S	-0.73*
2014:NS	N.D.
2015:S	N.D.
2015:NS	N.D.
<b>Log Fractional Turnover (&gt;0.005)</b>	
2012:NS	N.D.
2012:S	N.D.
2013:S	0.12
2013:NS	-0.11
2014:S	0.12
2014:NS	0.34**
2015:S	0.01
2015:NS	0.08

64 \*significant relationship <0.05

65 \*\*significant relationship <0.005

66 N.D. indicates no data or lack of data to perform a correlation analysis.

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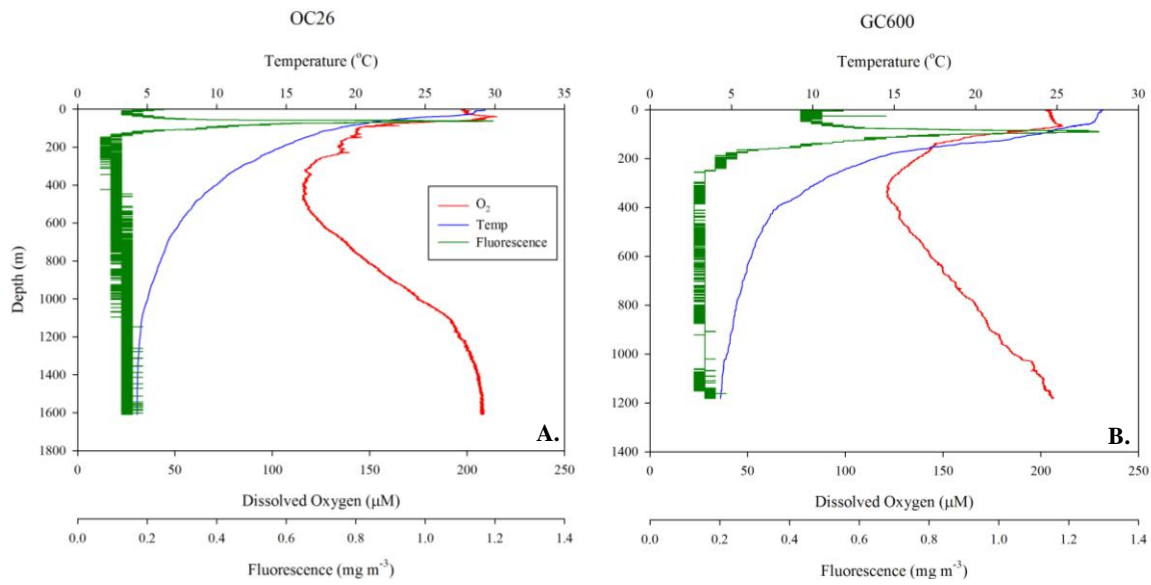
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78 **Supplementary Figure 1. Hydrographic profiles at OC26 (a) and GC600 (b).** Fluorescence  
79 denoted by the green line; dissolved oxygen denoted as the red line; temperature denoted as the  
80 blue line.



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