

**Table S4.** 454 metagenomic libraries and their associated metadata that were used for fragment recruitment analyses.

Dataset / Location / (Site ID)	Short Reads Archive Number/ BioProject ID (or MGRAST ID)	Lat. / Long.	Date (mm/dd/yy)	Sampling depth (m)	Habitat description	Filter used ( $\mu\text{m}$ )	Total reads (counts)	Temp. ( $^{\circ}\text{C}$ )	Salinity (psu)	Diss.O <sub>2</sub> ( $\mu\text{mol kg}^{-1}$ )	NO <sub>x</sub> ( $\mu\text{M}$ )	PO <sub>4</sub> <sup>-</sup> ( $\mu\text{M}$ )	Iron (nM)	Chl <i>a</i> ( $\mu\text{g kg}^{-1}$ )	Water depth (m)
<b>Water column Eastern Tropical South Pacific (ETSP) <sup>a, b</sup></b>															
2008OMZ-15m	SRX080962	-20.07 / -70.23	June, 2008	15.0	Open ocean	0.2 – 1.6	771,623	17.0	34.82	198.9				1.270	1050
2008OMZ-50m	SRX025906	-20.07 / -70.23	June, 2008	50.0	Open ocean	0.2 – 1.6	341,163	14.7	34.74	98.9				0.440	1050
2008OMZ-85m	SRX025908	-20.07 / -70.23	June, 2008	85.0	Open ocean	0.2 – 1.6	569,046	13.6	34.83	28.5				0.030	1050
2008OMZ-110m	SRX025910	-20.07 / -70.23	June, 2008	110.0	Open ocean	0.2 – 1.6	380,764	13.2	34.91	4.9				0.040	1050
2008OMZ-200m	SRX025912	-20.07 / -70.23	June, 2008	200.0	Open ocean	0.2 – 1.6	485,911	12.5	34.87	3.4				0.000	1050
2008OMZ-500m	SRX080950	-20.07 / -70.23	June, 2008	500.0	Open ocean	0.2 – 1.6	515,676	8.2	34.58	13.1				0.000	1050
2009OMZ-35m	SRX080953	-20.07 / -70.23	1/16/09	35.0	Open ocean	0.2 – 1.6	973,420	16.8	35.03	203.1				4.081	1050
2009OMZ-50m	SRX080954	-20.07 / -70.23	1/16/09	50.0	Open ocean	0.2 – 1.6	1,042,057	14.54	34.82	57.2				2.698	1050
2009OMZ-70m	SRX029170	-20.07 / -70.23	1/15/09	70.0	Open ocean	0.2 – 1.6	1,147,856	13.8	34.84	4.9				0.331	1050
2009OMZ-110m	SRX080955	-20.07 / -70.23	1/12/09	110.0	Open ocean	0.2 – 1.6	905,059	13.0	34.87	1.3				0.200	1050
2009OMZ-200m	SRX029171	-20.07 / -70.23	1/11/09	200.0	Open ocean	0.2 – 1.6	930,359	12.1	34.84	1.8				0.110	1050
2010OMZ-50m	SRX080956	-20.07 / -70.23	1/15/10	50.0	Open ocean	0.2 – 1.6	1,530,891	13.8	34.83	0.1	16.460	3.210		0.990	1050
2010OMZ-80m	SRX029172	-20.07 / -70.23	1/16/10	80.0	Open ocean	0.2 – 1.6	1,359,823	13.6	34.91	0.0	17.300	3.280		0.250	1050
2010OMZ-110m	SRX080960	-20.07 / -70.23	1/12/10	110.0	Open ocean	0.2 – 1.6	1,456,845	13.2	34.90	0.0	16.400	3.220		0.180	1050
<b>Water column Central Red Sea <sup>c, d, e</sup></b>															
50 m	SRS403288 (4446000)	21.2076 / 38.468	27/10/2008	50.0	Open ocean	0.1 – 0.8	1,082,048	27.3	39.38	238.4	0.140	0.120		0.229	1050
200 m	(4446962)	21.2076 / 38.468	27/10/2008	200.0	Mesopelagic	0.1 – 0.8	638,577	22.0	40.50	129.0					
700 m	(4446968)	21.2076 / 38.468	27/10/2008	700.0	Mesopelagic	0.1 – 0.8	640,233	21.6	40.55	81.2				0.062	
1500 m	(4446029)	21.2076 / 38.468	27/10/2008	1500.0	Bathypelagic	0.1 – 0.8	1,125,134	21.7	40.55	115.0				0.000	
50 m	SRS598124	21.60528 / 38.2025	6/4/10	50.2	Open ocean	0.1 – 0.8	1,319,943	25.0	39.80	174.0					
200 m	SRS598125	21.60528 / 38.2025	6/4/10	202.0	Mesopelagic	0.1 – 0.8	1,112,752	22.0	40.40	124.0					
700 m	SRS598128	21.60528 / 38.2025	6/4/10	700.3	Mesopelagic	0.1 – 0.8	987,012	21.6	40.50	69.0					
1500 m	SRS598129	21.60528 / 38.2025	6/4/10	1515.7	Bathypelagic	0.1 – 0.8	749,110	21.7	40.60	85.0					
<b>Brine-seawater interface (BSI) &amp; brine samples <sup>d, f</sup></b>															
SW Basin, Atlantis II Deep BSI (AD-bsi)	SRR988525/	21.20748 / 38.4831	12/4/10	1997.0	Brine-seawater interface (bsi)	0.1 – 0.8	604,000	31.8	56.00	2.2	55.300		0.500		
SW Basin, Atlantis II Deep upper convective layer (AD-ucl)	n.p./ SAMN02401041	21.20710 / 38.4820	12/4/10	2050.0	Upper convective layer (ucl)	0.1 – 0.8	660,692	46.0	86.00	0.5	37.900		0.800		
SW Basin, Atlantis II Deep lower convective layer (AD-lcl)	n.p./ SAMN02401042	21.20833 / 38.4867	12/4/10	2058.8	Lower convective layer (lcl)	0.1 – 0.8	3,562,967	65.0	154.00	0.5	46.100		70.500		
Discovery Deep BSI (DD-bsi)	SRR988526/	21.16894 / 38.3023	8/4/10	2031.0	Brine-seawater interface (bsi)	0.1 – 0.8	658,619	35.8	138.00	0.3	30.100		0.600		
Discovery Deep brine (DD-brine)	n.p./ SAMN02401043	21.16980 / 38.2980	8/4/10	2095.6	Brine	0.1 – 0.8	669,512	44.8	260.00	0.3	43.900		0.100		
Kebrit Deep upper convective layer (KD-ucl)	SRR988536; SRR988537/	24.4341 / 36.1663	24/03/2010	1467.0	Upper convective layer (ucl)	0.1 – 0.8	1,417,636	21.9	182.00	4.6	28.400		40.400		
Kebrit Deep lower convective layer (KD-lcl)	SRR988539/	24.4341 / 36.1663	24/03/2010	1469.0	Lower convective layer (lcl)	0.1 – 0.8	1,370,213	23.0	220.00	3.1					
Kebrit Deep brine (KD-brine)	n.p./	24.4341 / 36.1663	24/03/2010	1490.0	Brine	0.1 – 0.8	1,139,639	23.4	260.00	2.3	44.100		1.500		

n.p., not provided but currently being processed (Lotaief et al, manuscript in preparation).

<sup>a</sup> Stewart et al. (2011). Genome Biol. 12:R26.

<sup>b</sup> Bryant et al. (2012). Ecol. 93: 1659–1673.

<sup>c</sup> Ferreira et al. (2014). PLoS One 9: e97338.

<sup>d</sup> Ngugi et al. (2014). ISME J. 9: 396–411.

<sup>e</sup> Thompson et al. (2013). Ecol. Evol. 6: 1780–1797.

<sup>f</sup> Adballah et al. (2014). Front. Microbiol. 5: 487.

