



Supplementary Figure 1: AOM and carbonate precipitation rates of modern cold seep systems.

Notice that where available, AOM rates overlap with carbonate precipitation rates. This association along with the relatively high AOM rates of Hydrate Ridge, Costa Rica and Eel River Basin suggest that these locations have a high propensity to record disequilibrium clumped isotope signatures. Data references as follows A¹; B²; C³; D⁴; E¹; F^{5,6}; G⁷; H¹; I⁸; J⁹; K^{10,11}; L¹²; M¹³; N¹⁴; O¹⁵; P¹⁶; Q¹⁷; R¹⁸; S¹⁹; T²⁰; U^{21,22}; V²³; W^{24,25}; X^{26,27}.

Supplementary Table 1

Apparent ancient seep carbonate precipitation temperatures

Notice consistently high temperatures compared to typical bottom waters using both calibrations^{28,29}.

Sample	phases	temp (°C)		temp (°C)		s.e. (°C)
		²⁸ Tang et al., 2014	²⁹ Tripati et al., 2015			
<i>Teepee Buttes</i>						
100-110	micrite	134		97		5
130-140	micrite	193		128		5
190-200	micrite	160		112		7
20-30	micrite	163		113		3
230-240	micrite	207		135		4
250-260	micrite	260		159		6
310-320	micrite	286		169		8
320-2h	micrite	107		81		10
360-370	micrite	181		123		3
40-50	micrite	182		123		4
65-70	micrite	142		102		1
star 230-240	micrite	150		106		4
teepee hrm 210-220	micrite	185		125		5
teepee hrm 400-40	micrite	132		96		3
100-110fc	fibrous cement	178		121		3
190-200fc	fibrous cement	219		141		7
210-220fc	fibrous cement	263		160		9
460-470fc	fibrous cement	196		130		4
711.5 VI S 2	spar					
320-2 PS	peloidal sparite					
704.5 1 PS	peloidal sparite					
711 WI PS	peloidal sparite					
711.5 VI PS 2	peloidal sparite					
711.5 VI PS1	peloidal sparite	113		84		11
HRS 674.6 PS	peloidal sparite					
<i>Quinault Fm</i>						
Sample 1 Quin Fm	micrite	83		66		3
Sample 9 Quin	micrite	46		40		9
Sample 11 Quin Fm	micrite	42		37		2
<i>Pysht Fm</i>						
Sample 4 Pysht	micrite	47		41		7
Sample 5 Pysht	micrite	56		47		10
<i>Panoche Hills</i>						
PTH 04	micrite	28		27		2
PTH-07	micrite	19		20		2
PTH-08	micrite	27		26		8
PTH-18	micrite	31		29		1
PTH-19	micrite	40		35		1
<i>Lincoln Creek Fm</i>						
Sample 8 LC	micrite	46		40		7

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