Supporting information for

Spatial Variations in Vent Chemistry at the Lucky Strike Hydrothermal Field, Mid Atlantic Ridge (37°N): Updates for Subseafloor Flow Geometry from the Newly Discovered Capelinhos Vent.

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Introduction

This supporting information provide geochemical and Sr isotopic composition of hydrothermal fluids collected at LSHF.

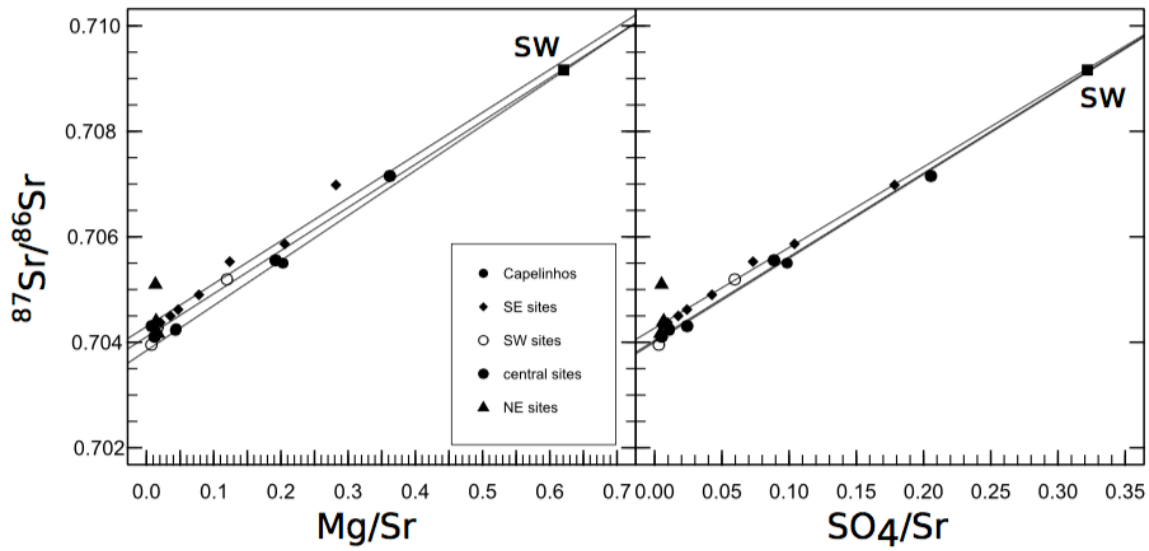

Figure S1. Diagram of $^{87}Sr/^{86}Sr$ as a function of Mg/Sr in (a) and SO_4/Sr in (b). SW stands for seawater. a) shows the usual way of determining the Sr isotope signature of end-member fluids based on the Mg/Sr ratio. b) is an alternative method based on sulfate concentration. Sulfate contents of fluids will be dependent on seawater entrainment during sampling, as SO_4 is enriched in seawater compared to pure hydrothermal fluid. Sulfate will also be dependent on anhydrite. Dissolution of anhydrite may contribute to Ca, SO_4 and Sr concentrations measured in the fluid and may modify its Sr isotope signature. Assuming Sr isotope signatures of seawater and hydrothermal fluid, dissolution of anhydrite dissolution bias can be corrected as shown in Fig S1b. Consequently, endmember determined for South-West sites are better determined by SO_4/Sr least square regression. When no suspicion of anhydrite dissolution, Mg/Sr should be preferred instead of SO_4/Sr, i.e. for slightly negative end-member SO_4 value (e.g. Capelinhos). All the data are reported in Table S1.

Table S1. Geochemical compositions and Sr isotope signatures of hydrothermal fluids collected during the MoMARSAT'13 cruise. $^{87}Sr/^{86}Sr$ ratios of hydrothermal end-members are calculated by linear extrapolation to zero Mg/Sr or SO_4/Sr of the least-square regression method (r^2 are provided). All geochemical measurements made aboard the cruise are available in the cruise report at the following doi: http://dx.doi.org/10.17600/13030040.

site	groupe	sample	Cl mM	Mg mM	SO4 mM	Sr µM	Mg/Sr	SO4/Sr	87Sr/86Sr	r2
Capelinhos	cap	M13FLU028	322.7	8.69	4.22	42.78	0.203	0.099	0.705501	
Capelinhos	cap	M13FLU029	275	1.68	0.42	38.98	0.043	0.011	0.704226	
Capelinhos	cap	M13FLU031	265.4	1.63	0.40	36.86	0.044	0.011	0.704256	
		end-member					0		0.70384	0.999
		end-member						0	0.704034	0.999
Aisics	SE	M13FLU002	466.1	16.77	8.48	81.55	0.206	0.104	0.705865	
Aisics	SE	M13FLU003	435	2.86	1.41	80.42	0.036	0.018	0.704499	
Aisics	SE	M13FLU042	429.2	1.14	0.55	82.34	0.014	0.007	0.704386	
Aisics	SE	M13FLU043	442.3	6.28	3.43	80.44	0.078	0.043	0.7049	
Montségur	SE	M13FLU010	434.1	3.86	1.97	81.92	0.047	0.024	0.70462	
Montségur	SE	M13FLU011	431.7	1.63	0.76	79.51	0.02	0.01	0.704376	
Tour Eiffel	SE	M13FLU044	424.5	0.89	0.42	80.61	0.011	0.005	0.704324	
Tour Eiffel	SE	M13FLU045	487.1	23.74	15.03	84.21	0.282	0.178	0.706983	
Tour Eiffel	SE	M13FLU047	451.2	10.27	6.07	82.92	0.124	0.073	0.705528	
		end-member					0		0.70430	0.987
		end-member						0	0.704267	0.998
Cyprès	Central	M13FLU039	530.7	1.93	0.48	111.73	0.017	0.004	0.704174	
Isabel	Central	M13FLU008	497.6	1.55	0.73	108.61	0.014	0.007	0.704413	
White Castle	Central	M13FLU015	483.4	1.47	0.57	110.25	0.013	0.005	0.705108	
		end-member					0		0.704453	0,969
		end-member						0	0.704487	0.971
Crystal	SW	M13FLU022	563.0	19.16	8.85	99.66	0.192	0.089	0.705554	
Crystal	SW	M13FLU023	572.6	1.61	4.93	203.94	0.008	0.024	0.704307	
Sapins	SW	M13FLU049	576.6	33.87	19.22	93.54	0.362	0.205	0.707153	
South Crystal	SW	M13FLU017	573.9	1.49	0.64	123.70	0.012	0.005	0.704104	
		end-member					0		0.704102	0,997
		end-member						0	0.704004	0,998
Sintra	NE	M13FLU027	550.1	12.99	6.46	108.5	0.124	0.06	0.705191	
Y3	NE	M13FLU032	601.2	1.06	0.45	144.61	0.007	0.003	0.703953	
Y3	NE	M13FLU035	578.4	2.29	1.15	141.84	0.016	0.008	0.704275	
		end-member					0		0.704071	0,997
		end-member						0	0.70909	0,996
		seawater (SW)		54	28	87	0.621	0.322	0.709162	