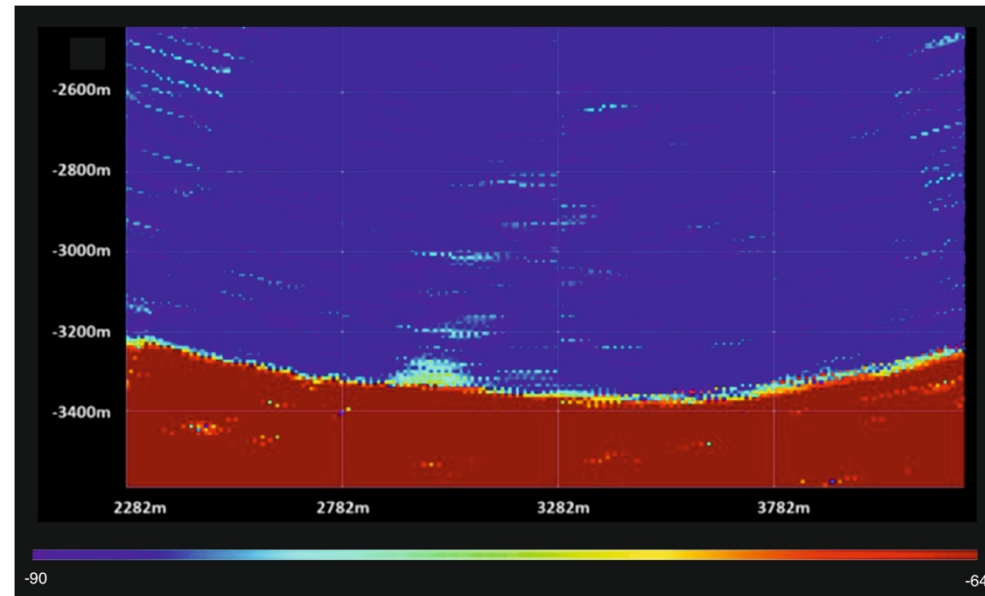


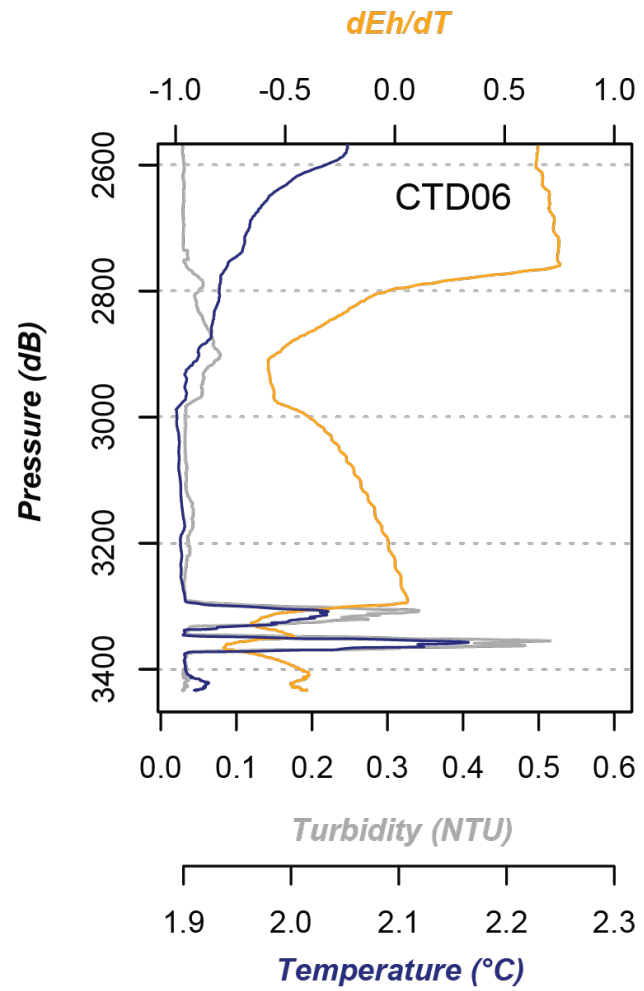
Supplementary information for “Active hydrothermal vents in the Woodlark Basin may act as dispersing centres for hydrothermal fauna”

Boulart, C.^{1,*}, Rouxel, O.², Scalabrin, C.², Le Meur, P.³, Pelleter, E.², Poitrimol, C.^{1,4}, Thiebaut, E.¹, Matabos, M.⁴, Castel, J.¹, Tran Lu Y, A.^{5,10}, Michel, L.N.⁴, Cathalot, C.², Cheron, S.², Boissier, A.², Germain, Y.², Guyader, V.², Arnaud-Haond, S.⁶, Bonhomme, F.⁵, Broquet, T.¹, Cueff-Gauchard, V.⁷, Le Layec, V.^{1,10}, L'Haridon, S.⁷, Mary, J.¹, Le Port, A-S.¹, Tasiemski, A.⁸, Kuama, D.C.⁹, Hourdez, S.¹⁰, Jollivet, D.¹

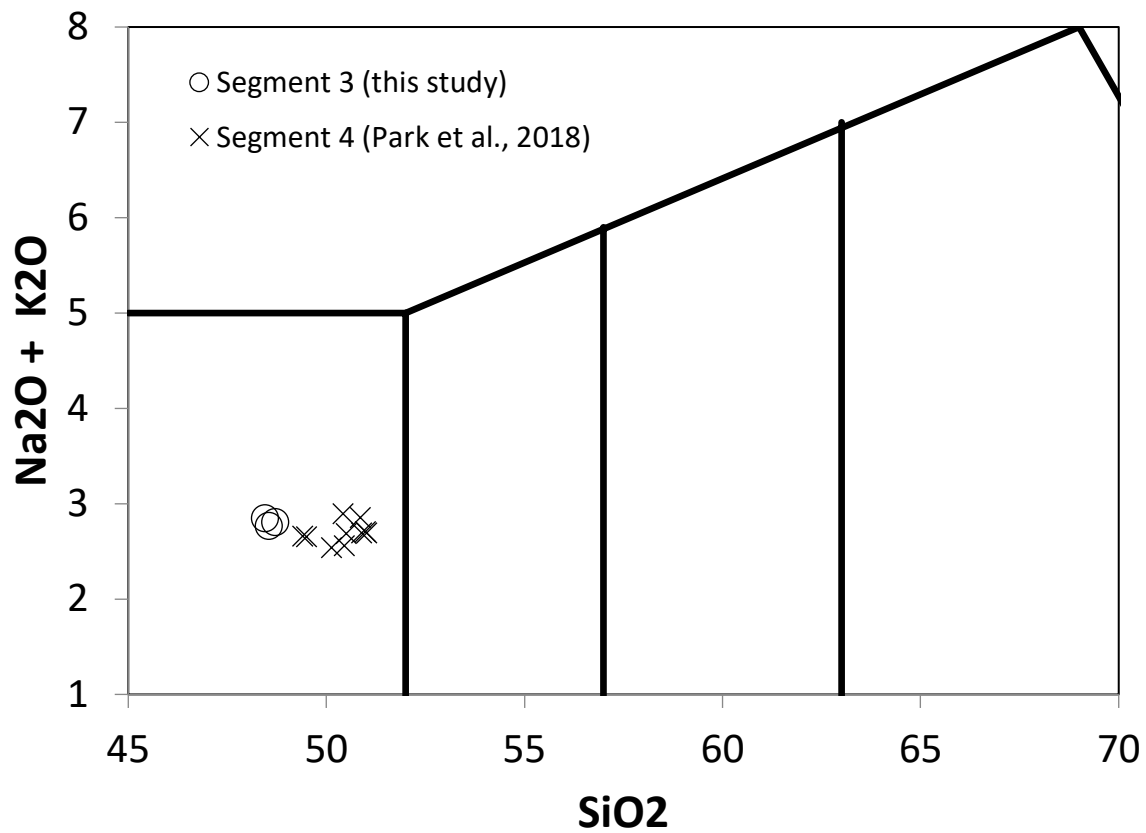
Supplementary Results and Discussion



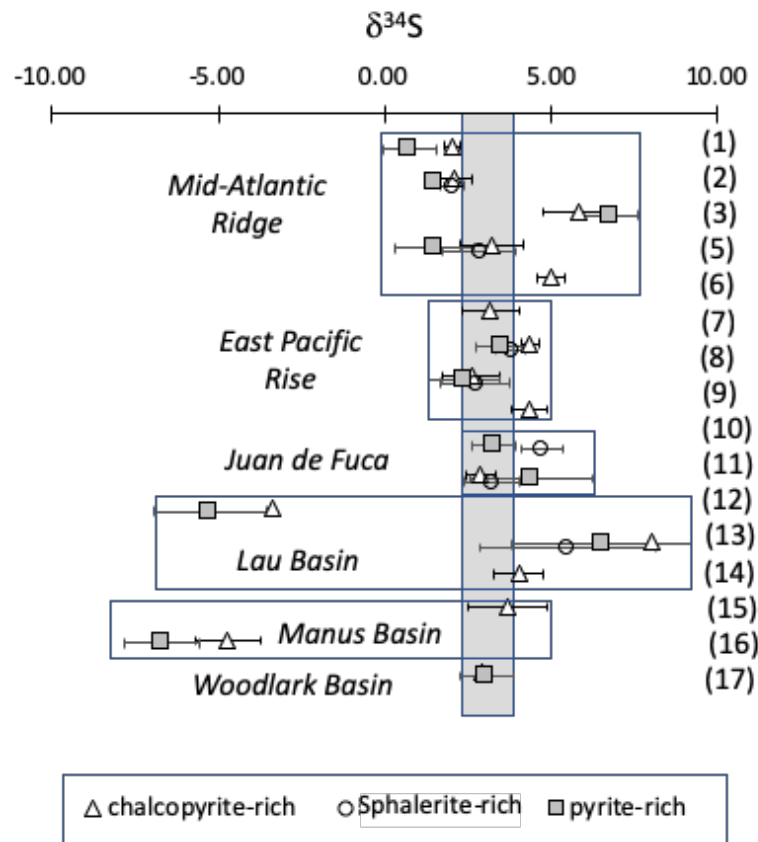
Supplementary Figure 1. Acoustic data of the water column. Expanded view of the post processed echograms of the second profile showing the echo attributed to La Scala hydrothermal vent field above the arc of the specular circle (red color) near the seafloor (colour scale -90 to -64 dB).



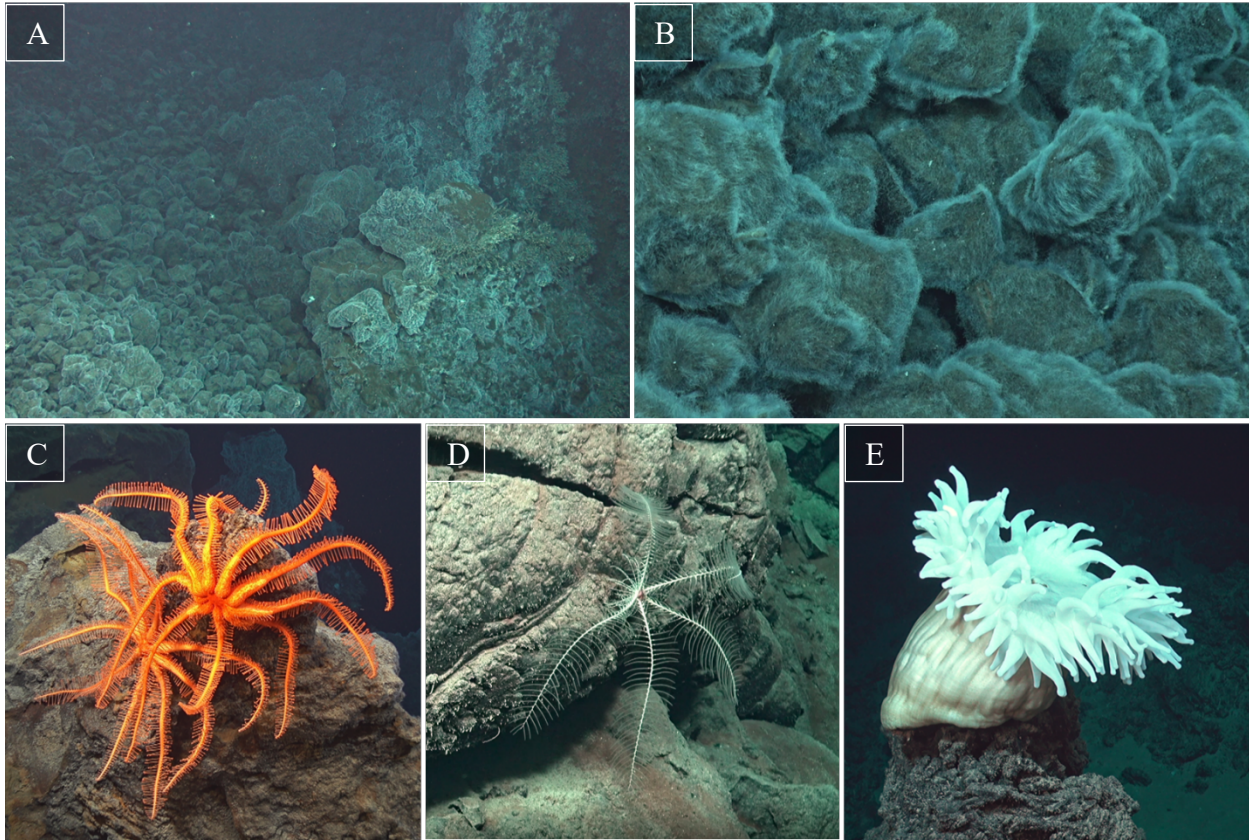
Supplementary Figure 2. CTD06 Vertical profile. Data show an isothermal water column below 3000 mbsl and Eh, temperature, and turbidity anomalies close to the seafloor.



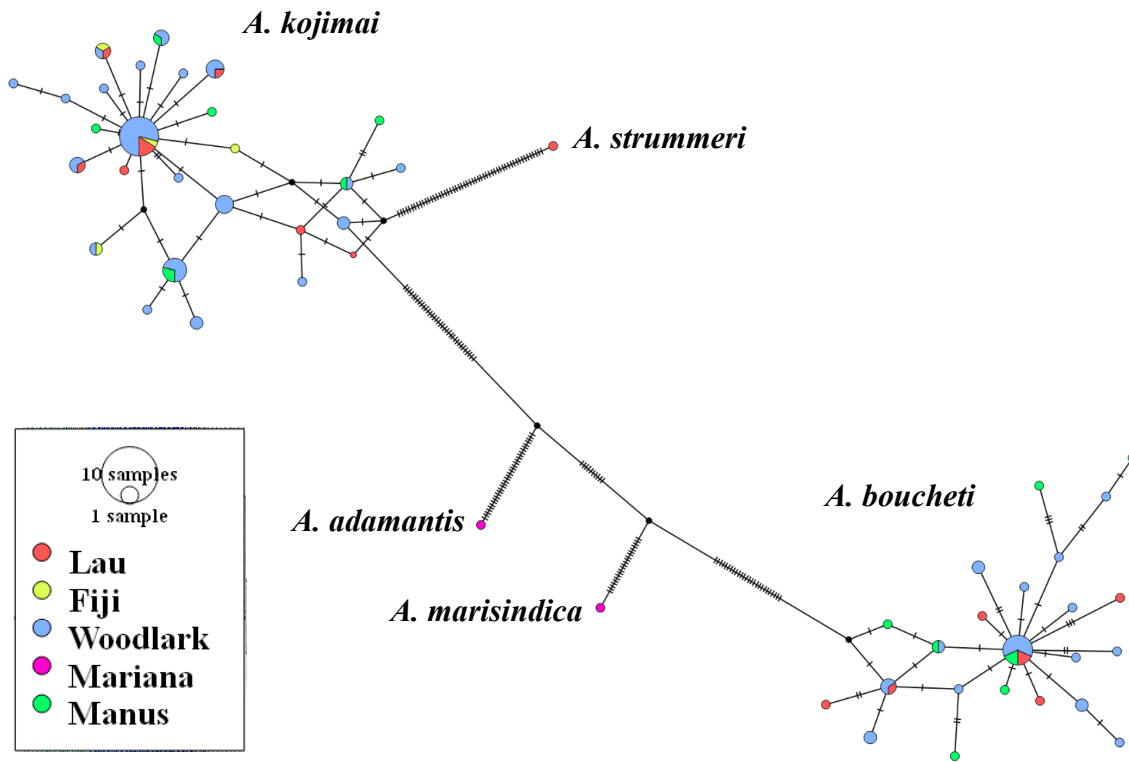
Supplementary Figure 3. Total alkali ($\text{Na}_2\text{O} + \text{K}_2\text{O}$) vs. silica (SiO_2) diagram. Data are reported for unaltered basalt (pillow lava) and volcanoclastic rocks from La Scala vent field and its vicinity (segment 3 of the Wooldark Basin, this study). For comparison, data for unaltered glass from basalt recovered from segment 4 of the Woodlark Basin²⁰. Field boundaries for igneous rock classification are from Le Maitre et al. (1989)⁵⁷.



Supplementary Figure 4. Distribution of $\delta^{34}\text{S}$ in sulfides (distinguishing chalcopyrite, pyrite/marcasite, and sphalerite-rich mineral assemblages) at Woodlark Basin (La Scala vent field). The diagram compared LSVF data with literature data for other vent fields (VF) along the Mid-Atlantic Ridge, East Pacific Rise, Juan de Fuca, Lau Basin and Manus Basin. Only average $\delta^{34}\text{S}$ values are reported, with error bars corresponding to 1 standard deviation. Data sources: (1) Broken Spur VF⁵⁸; (2) Snake Pit VF⁵⁹; (3) TAG (ODP site); Knott et al. 1998; (4) Lucky Strike VF⁶⁰; (5) Logatchev VF⁶¹; (6) Rainbow VF⁶¹; (7) EPR 11-13°N VF⁶²; (8) EPR 21°N VF⁶³⁻⁶⁵; (9) Southern EPR VF⁶⁶; (10) Axial Seamount VF⁶⁷; (11) Southern JdF VF⁶⁸; (12) Hine Hina VF⁶⁹; (13) Vai Lili, White Church VF⁷⁰; (14) ABE, Tui Malila, Mariner VF⁶⁶; (15) Roman and Roger's Ruins VF^{66,71}; (16) SuSu Knolls VF^{66,71}; (17) La Scala VF, this study.



Supplementary Figure 5. La Scala peripheral communities. A. Field of bacterial mats with Munidopsidae squat lobsters (white dots). B. Bacterial mats. C. Brisingidae. D. Crinoidea. E. Actiniaria.

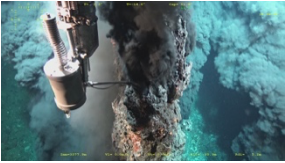

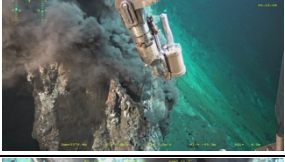




Supplementary Figure 6. Haplotype network. Haplotype network of the Woodlark *Alviniconcha Cox1* gene (accession numbers: OK391249-OK392008) with sequences of the five reference species using the minimum spanning method implemented in the software PopArt (Leigh et al. 2015). Woodlark specimens equally fall within two (*A. boucheti* and *A. kojimai*) of the five previously described species of the genus.

Supplementary Table 1. Geochemical composition of volcanic rocks and sediment recovered at La Scala vent field and its vicinity

Name	Lat	Long	LOI	Total	SiO ₂	TiO ₂	Al ₂ O ₃	Fe ₂ O ₃ T	MnO	MgO	CaO	Na ₂ O	K ₂ O	P ₂ O ₅	Zr
			%	%	%	%	%	%	%	%	%	%	%	%	ppm
CHU-PL20-R2	S 09 47.939	E 155 03.127	0.87	99.6	48.44	1.25	17.36	8.72	0.38	8.58	11.06	2.73	0.12	0.13	90
CHU-PL19-R5	S 09 47.516	E 155 03.511	< 0.2	100.3	48.55	1.27	17.30	9.04	0.15	9.51	11.56	2.69	0.08	0.10	100
CHU-PL19-R6B	S 09 47.924	E 155 03.160	< 0.2	100.0	48.70	1.29	17.12	9.11	0.15	9.14	11.60	2.73	0.08	0.11	100
CHU-PL19-R6S	S 09 47.924	E 155 03.160	30.1	100.3	20.90	0.37	6.62	4.37	0.25	2.18	33.36	1.14	0.15	0.17	50

Supplementary Table 2. Coordinates, depths and preliminary chemical characteristics of the sampled vents.

Sample Name ID	DIVE	Titanium sampler	Lat. S	Long. E	Immersion (m)	Bearing (°)	Max T°C (ROV)	Comments	pH (21°C)	H ₂ S (mM)	Mg (mM)	Pictures
CHU-PL19-TiG1	PL19	TiG1	9°47.95	155°03.11	3378	9.5	366	Top of 7m tall black smoker (POI smoker #5)	3.58	3.64	3.75	
CHU-PL19-TiG2	PL19	TiG2	9°47.94	155°03.124	3376	9.5	364	Black smoker 6	5.71	0.34	40.95	
CHU-PL19-TiD2	PL19	TiD2	9°47.94	155°03.124	3376	9.5	364	Black smoker 6	4.31	1.17	27.11	
CHU-PL19-TiD3	PL19	TiD3	9°47.95	155°03.11	3380	11.7	367	Base of black smoker 10cm diam.	3.41	4.04	1.94	
CHU-PL20-TiD2	PL20	TiD2	9°47.9315	155°03.1295	3358	262	365	Base of diffuser. Very large conduit	3.64	3.75	4.00	
CHU-PL20-TiG2	PL20	TiG2	9°47.9315	155°03.1295	3358	260	365	Base of diffuser. Very large conduit	3.31	4.08	1.64	