

Supplementary Material

1 Supplementary Data

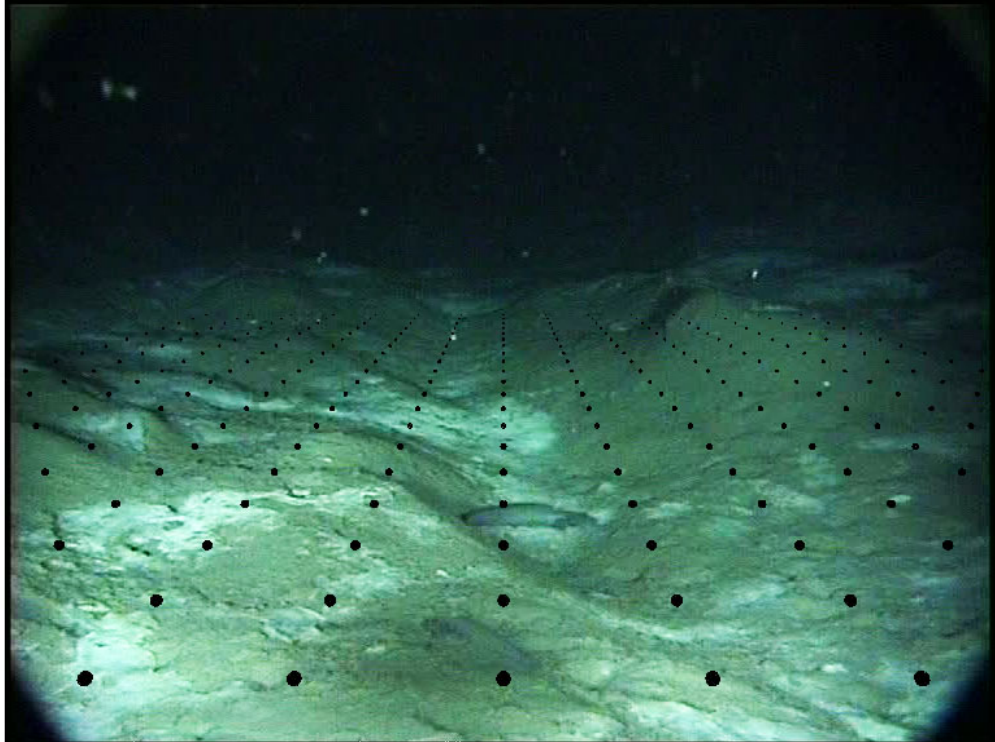
Supplementary Video 1. Video footage recorded by the AIM showing several zoarcid fish of the *Lycodes squamiventer* species. This video clip was recorded on September 10, 2009 at 20:58 (before the eruption) and its speed was increased (x2).

Supplementary Video 2. Video footage recorded by the AIM showing an *Amblyraja hyperborea* skate swimming through the field of view (36s into the sequence). This video clip was recorded on August 4, 2009 at 20:58 (before the eruption) and its speed was increased (x2).

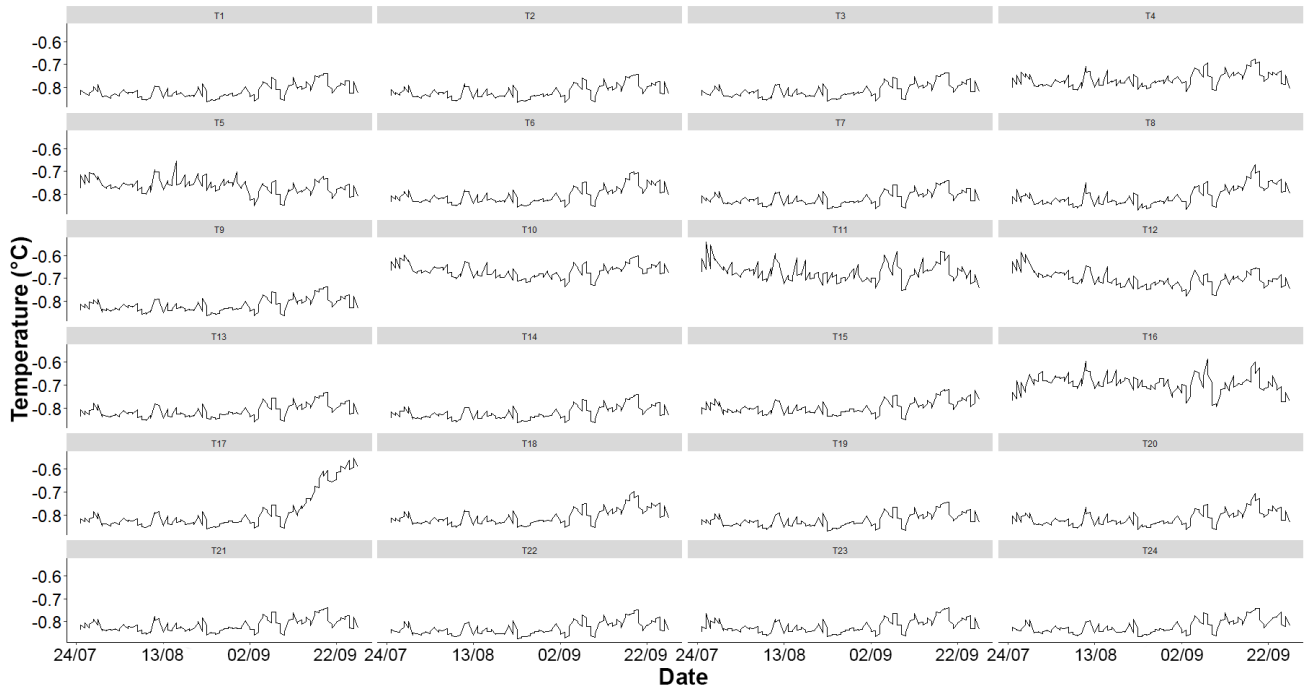
Supplementary Video 3. Video footage recorded by the AIM showing three *Nymphon macronyx* pycnogonids (two on mats and one on adjacent sediments). The pycnogonid visible in the foreground appears to be foraging in the microbial mat or sediments. This video clip was recorded on October 9, 2009 at 08:58 (after the eruption) and its speed was increased (x2).

2 Supplementary Figures and Tables

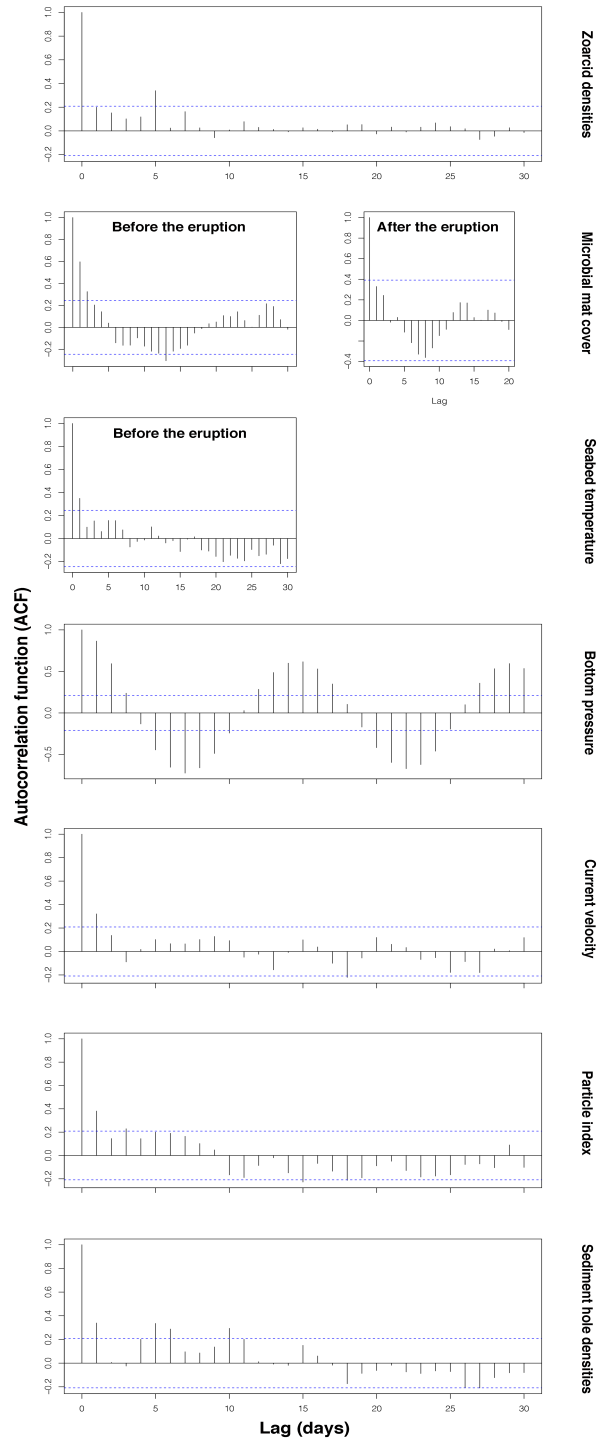
2.1 Supplementary Figures



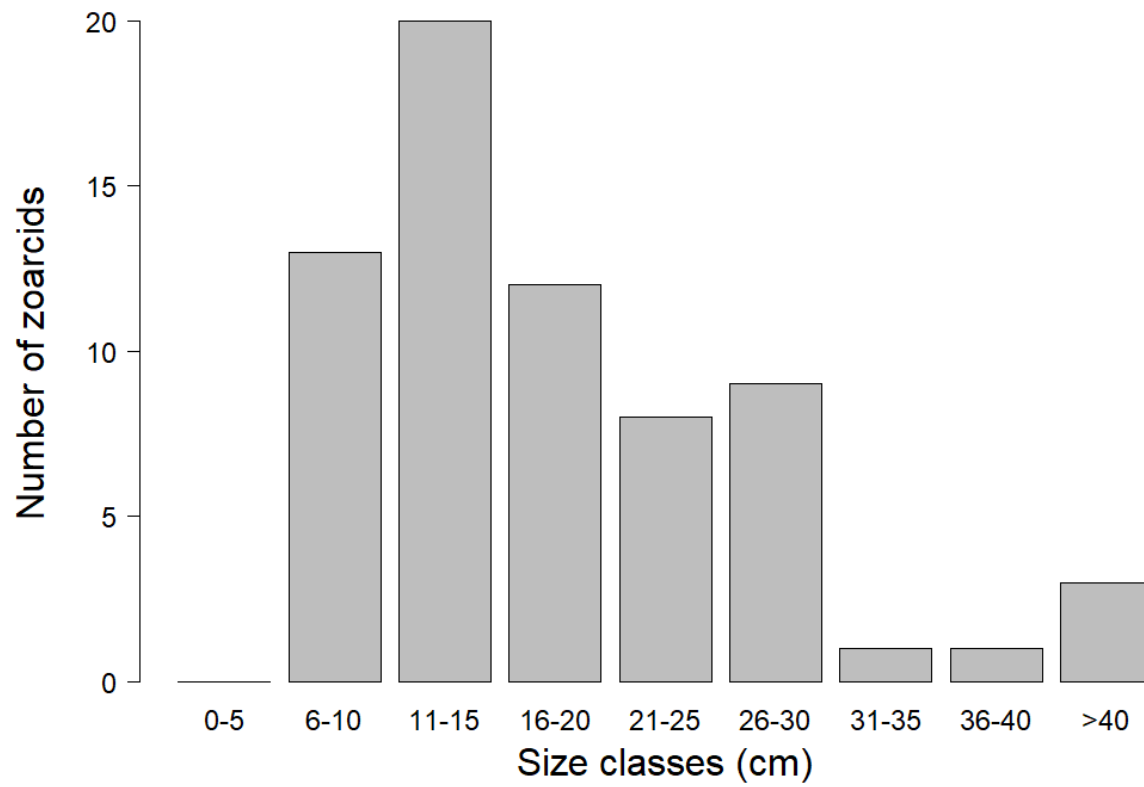
Supplementary Figure 1. 10 x 10 cm grid overlaid on a video frame grab prior to the mud eruption. The grid was used to measure the total surface visible within the camera field of view and estimate the size of zoarcids.



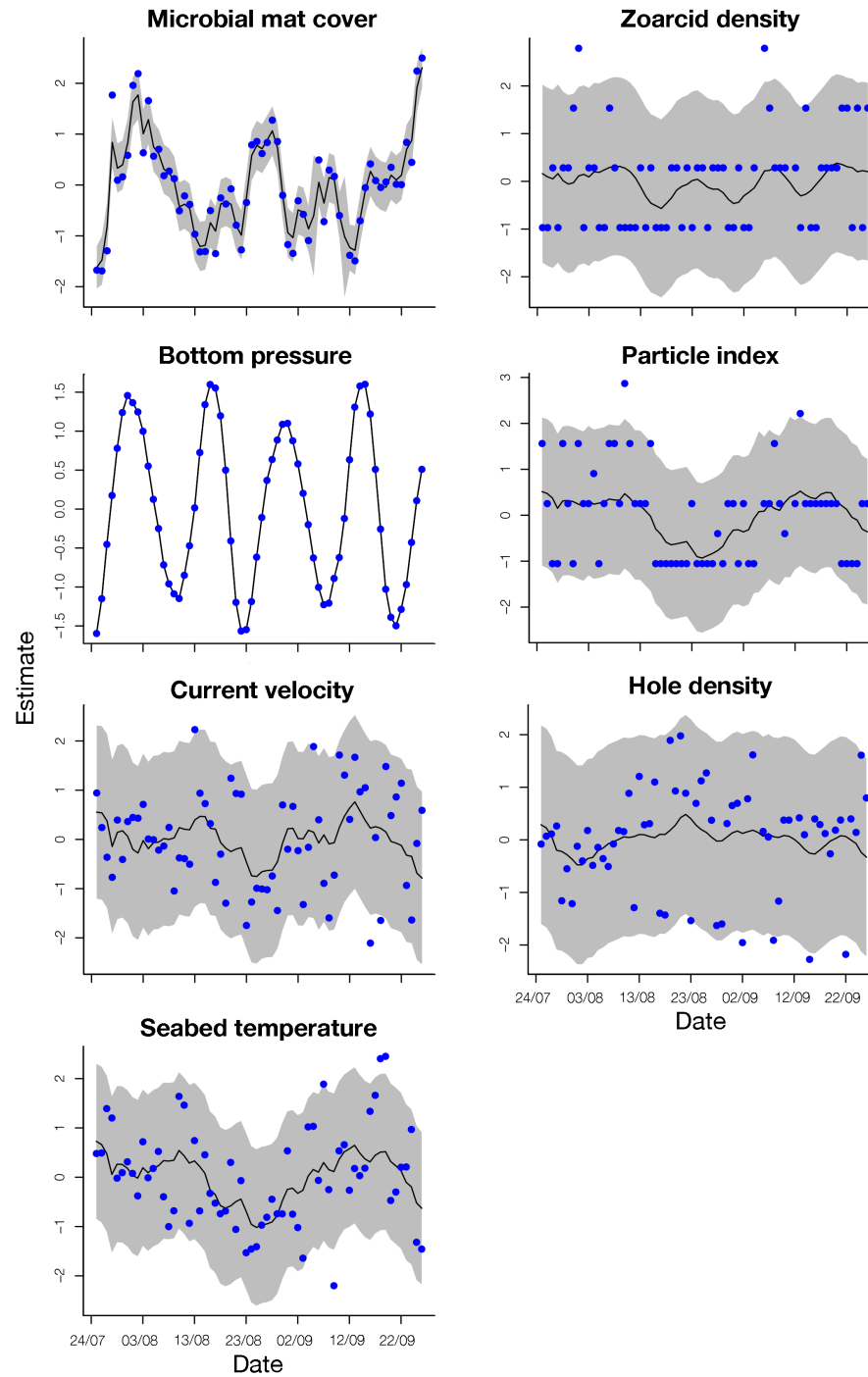
Supplementary Figure 2. Seabed temperature time series recorded by the 24 thermistors along the 100 m-long chain before the mud eruption (Feseker, 2009). Except for thermistors 22, 23 and 24, which were located near the observatory frame, all thermistors were in the active center of the volcano. Temperatures recorded by thermistor 23 were used for analyses.



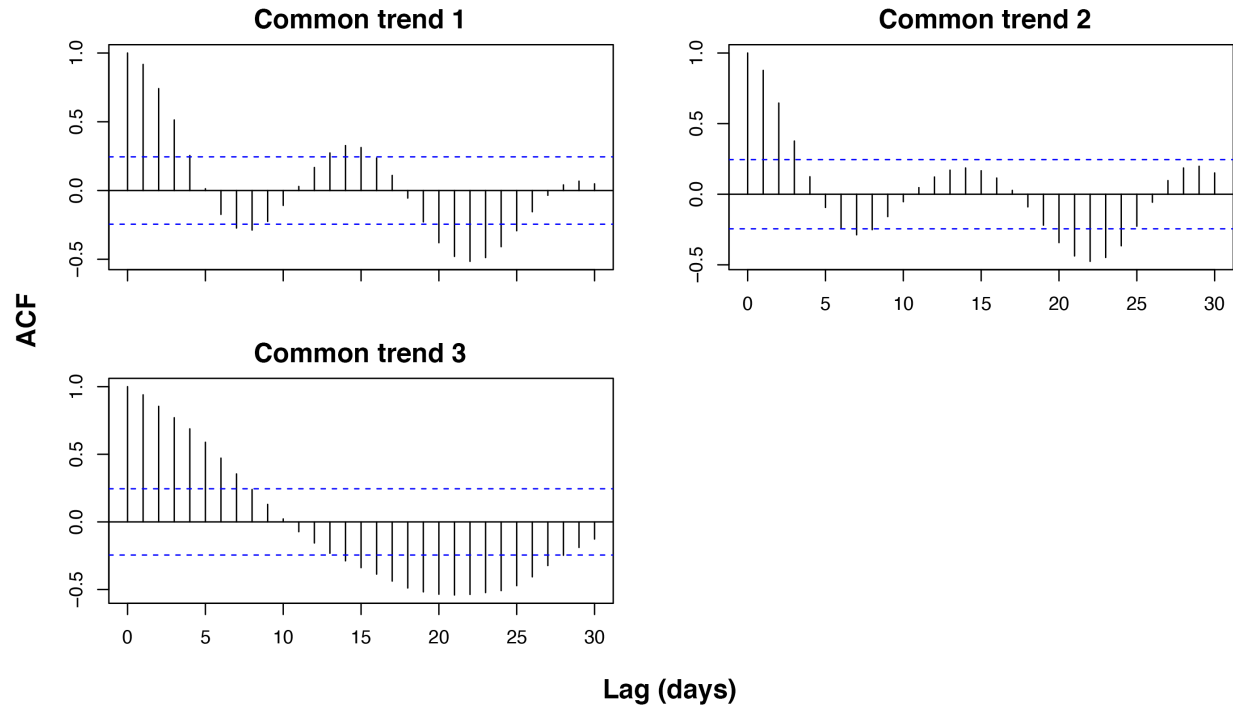
Supplementary Figure 3. Autocorrelation plots of all variables calculated throughout the study period or before and after the mud eruption separately. The blue dotted line indicates significant correlations. Zoarcid density, percentage microbial mat cover, particle index and hole density were estimated from imagery, and bottom pressure (Blandin, 2009), current speed (Wenzhöfer, 2009) and seabed temperature (Feseker, 2009) were measured using sensors.



Supplementary Figure 4. Size distribution of the zoarcid fish species *Lycodes squamiventer* before the mud eruption. All sizes were estimated using the 10 x 10 cm grid overlaid on video frame grabs prior to the mud eruption (Supplementary Figure 1).



Supplementary Figure 5. Fitted values obtained from a dynamic factor analysis model with three common trends and a diagonal and unequal covariance matrix $\mathbf{R}$. For each time series, the black line represents the fitted values while the blue dots represent the observed values. Shading indicate 95% confidence intervals of the model fit.



Supplementary Figure 6. Autocorrelation plots of common trends identified by a dynamic factor analysis model with three common trends and a diagonal and unequal covariance matrix $\mathbf{R}$. The blue dotted line indicates significant correlations.

2.2 Supplementary Tables

Supplementary Table 1. Correlations between all possible pairs of thermistors. Thermistors are numbered from 1 to 24 and all correlation coefficients are shown.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
2	0.99																						
3	0.99	0.99																					
4	0.92	0.93	0.93																				
5	0.33	0.36	0.34	0.50																			
6	0.96	0.97	0.96	0.90	0.27																		
7	0.99	0.99	0.99	0.94	0.37	0.96																	
8	0.93	0.94	0.94	0.90	0.26	0.98	0.93																
9	0.98	0.99	0.98	0.95	0.39	0.96	0.99	0.94															
10	0.75	0.78	0.75	0.79	0.64	0.75	0.79	0.74	0.80														
11	0.54	0.58	0.54	0.73	0.67	0.53	0.59	0.56	0.62	0.84													
12	0.46	0.49	0.45	0.55	0.73	0.42	0.51	0.41	0.53	0.89	0.85												
13	0.98	0.98	0.98	0.95	0.39	0.95	0.98	0.93	0.99	0.79	0.62	0.52											
14	0.99	0.99	0.99	0.94	0.36	0.96	0.99	0.94	0.99	0.79	0.60	0.51	0.99										
15	0.93	0.94	0.94	0.90	0.42	0.95	0.94	0.93	0.95	0.84	0.64	0.57	0.95	0.95									
16	0.41	0.43	0.41	0.58	0.62	0.38	0.44	0.38	0.47	0.56	0.71	0.54	0.48	0.45	0.47								
17	0.69	0.69	0.70	0.57	-0.0	0.82	0.68	0.83	0.68	0.51	0.20	0.14	0.67	0.69	0.76	0.04							
18	0.97	0.97	0.97	0.92	0.28	0.99	0.97	0.97	0.97	0.75	0.55	0.43	0.96	0.97	0.94	0.40	0.79						
19	0.99	0.99	0.99	0.94	0.37	0.96	0.99	0.94	0.99	0.80	0.60	0.51	0.99	0.99	0.95	0.45	0.70	0.97					
20	0.96	0.97	0.96	0.95	0.40	0.97	0.97	0.96	0.98	0.81	0.66	0.53	0.97	0.97	0.95	0.49	0.71	0.97	0.97				
21	0.98	0.99	0.98	0.95	0.41	0.95	0.99	0.93	0.99	0.80	0.63	0.53	0.98	0.99	0.95	0.48	0.65	0.96	0.99	0.97			
22	0.99	0.99	0.99	0.91	0.32	0.96	0.99	0.92	0.98	0.75	0.53	0.46	0.98	0.99	0.93	0.40	0.69	0.97	0.99	0.96	0.98		
23	0.96	0.97	0.95	0.93	0.40	0.94	0.97	0.93	0.98	0.83	0.67	0.58	0.97	0.97	0.95	0.45	0.66	0.95	0.97	0.97	0.98	0.96	
24	0.99	0.98	0.99	0.90	0.29	0.97	0.98	0.94	0.98	0.75	0.51	0.44	0.98	0.98	0.94	0.37	0.74	0.97	0.98	0.95	0.97	0.99	0.95

Supplementary Table 2. Results from linear regression models fitted to the different time series measured using sensors or estimated from imagery before and after the mud eruption. Slope estimates and associated standard errors (SE) are given. Asterisks indicate significance.

Measurement method	Variables	Before		After	
		Estimate	SE	Estimate	SE
Imagery	Zoarcid density	0.0033	0.0021	0.117*	0.0472
Imagery	Microbial mat cover	0.114***	0.0299	0.146	0.207
Sensor	Bottom pressure (dbar)	- 0.0023	0.0027	-0.0055	0.0101
Sensor	Current speed (cm/s)	0.0447*	0.0204	-0.216***	0.0508
Sensor	Seabed temperature (°C)	0.0007***	0.0002	NA	NA
Imagery	Particle index	- 0.0070	0.0052	-0.0062	0.0142
Imagery	Sediment hole density	1.66**	0.522	7.45	3.73

* p-value < 0.05; ** p-value < 0.01; *** p-value < 0.001

Supplementary Table 3. Dynamic factor analysis model selection results. The numbers of trends (m) and parameters estimated (K), as well as maximum likelihood (LogLik) and AICc values are indicated for each model. The lowest AICc value is represented in bold.

Matrix R	m	LogLik	K	AICc
diagonal and equal	1	-611.62084	8	1239.5758
	2	-602.84013	14	1234.66849
	3	-593.08004	19	1225.96959
	4	-593.18336	23	1235.02057
	5	-593.07991	26	1241.55933
diagonal and unequal	1	-610.30701	14	1249.60225
	2	-591.36958	20	1224.74393
	3	-541.23118	25	1135.60245
	4	-540.83989	29	1143.92369
	5	-541.11715	32	1151.42349
equalvarcov	1	-611.27362	9	1240.96585
	2	-602.8273	15	1236.78668
	3	-592.74372	20	1227.49221
	4	-592.8091	24	1236.50977
	5	-592.80907	27	1243.28805
unconstrained	1	-558.60708	35	1193.45179
	2	-540.47397	41	1171.6012
	3	-533.2069	46	1169.41635
	4	-533.20676	50	1179.52405
	5	-533.00514	53	1186.8393

3 References

Blandin, J. (2009). Physical oceanography measurements at the Håkon Mosby mud volcano (LOOME). *PANGAEA*, <https://doi.org/10.1594/PANGAEA.757577>.

Feseker, T. (2009). Temperatures at the sediment surface of the Håkon Mosby mud volcano measured continuously with a thermistor string (LOOME). *PANGAEA*, <https://doi.org/10.1594/PANGAEA.757662>.

Wenzhöfer, F. (2009) Autonomous recording current meter measurements at the Håkon Mosby mud volcano (LOOME). *PANGAEA*, <https://doi.org/10.1594/PANGAEA.757573>.