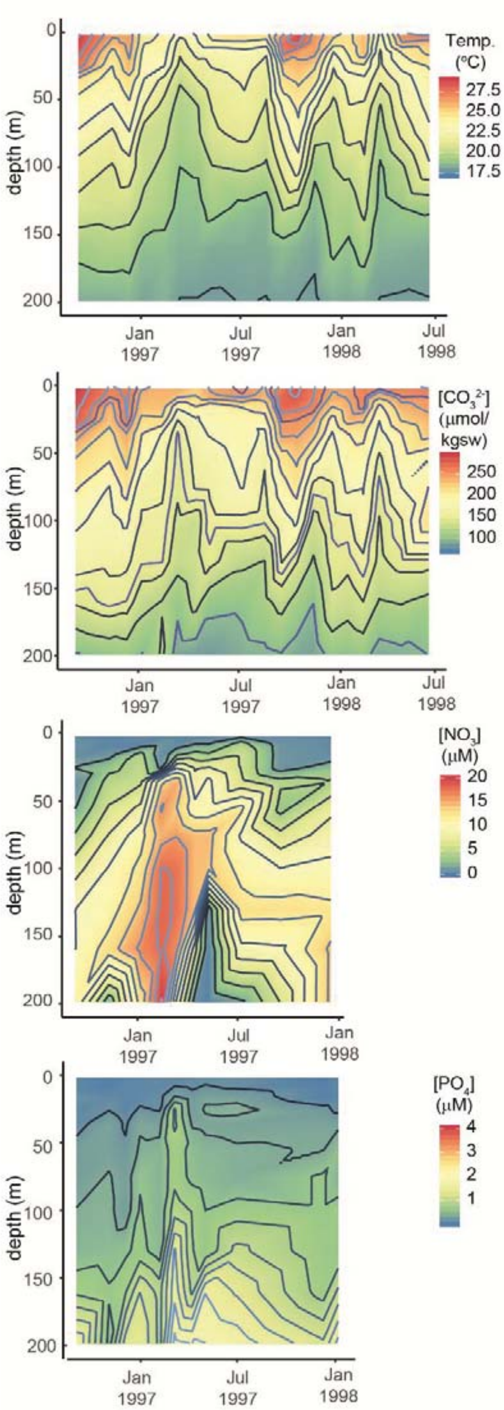
Supplementary Material

Supplementary Figures and Tables

There are seven supplementary figures and five supplementary tables.

Supplementary Figures



Supplementary Figure 1. Changes in water column properties (temperature, the concentration of carbonate ions, the concentration of phosphate, the concentration of nitrate) through the time of this study. Changes in the water chemistry of the Cariaco Basin are caused by the movement of the ITCZ. The graphs of nitrate and phosphate are shorter because of a lack of data at the end of the study.

Supplementary Figure 2. Light microscope images of the 66 sediment trap specimens and 22 core top specimens imaged as part of this study

Specimens from sediment traps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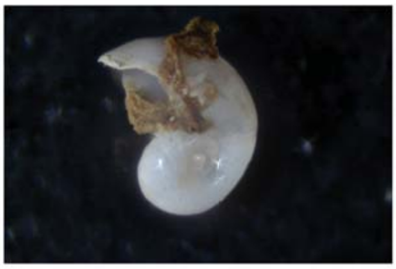
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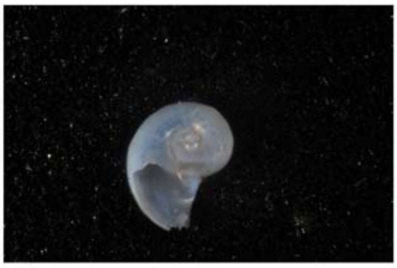
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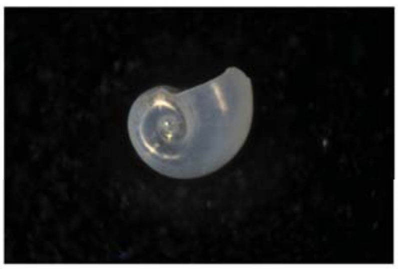
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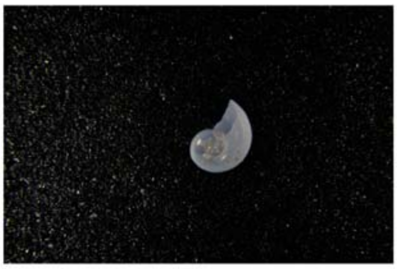
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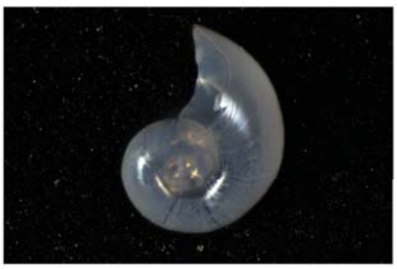
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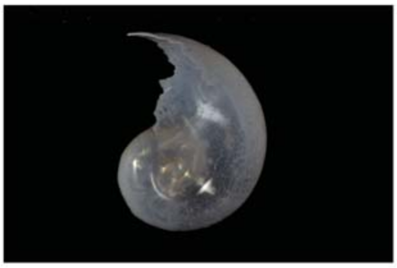

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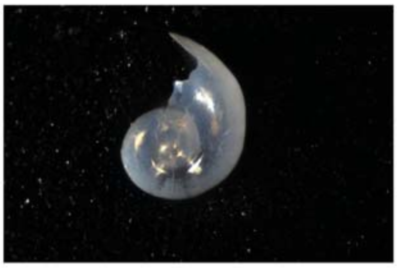

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Specimens from core


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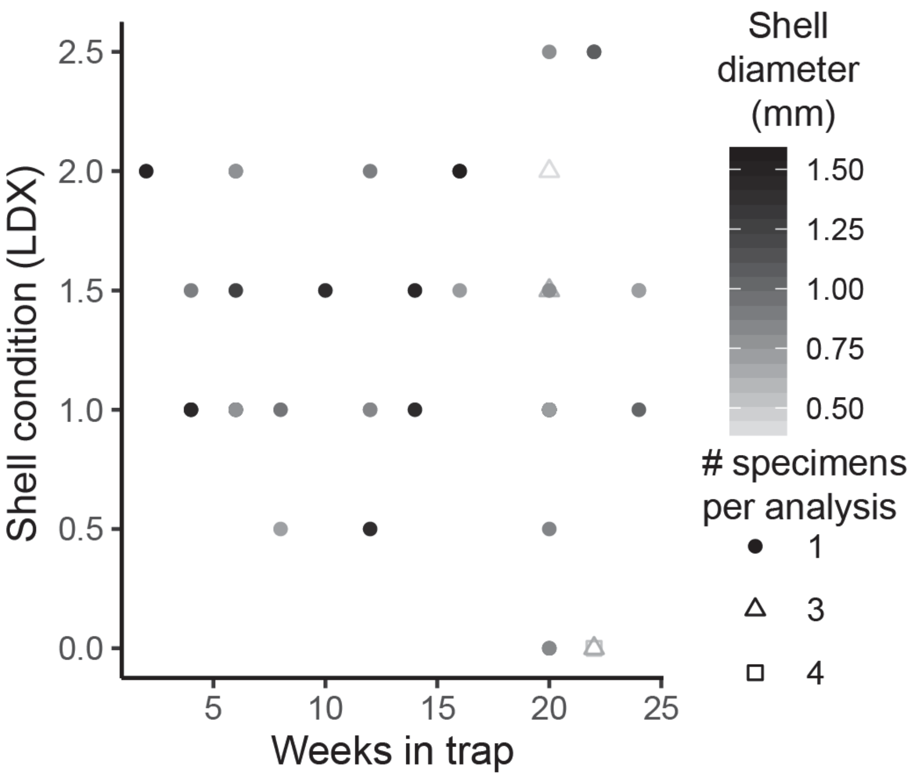
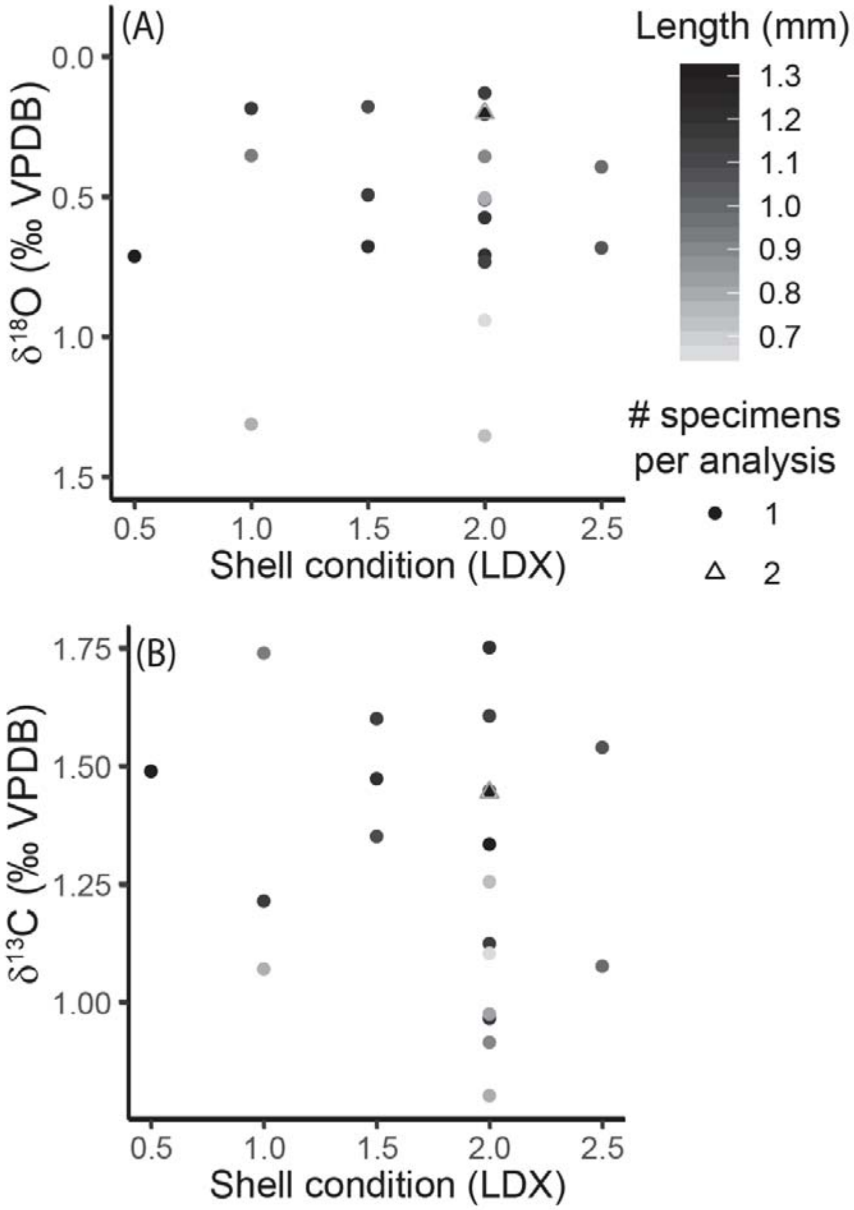
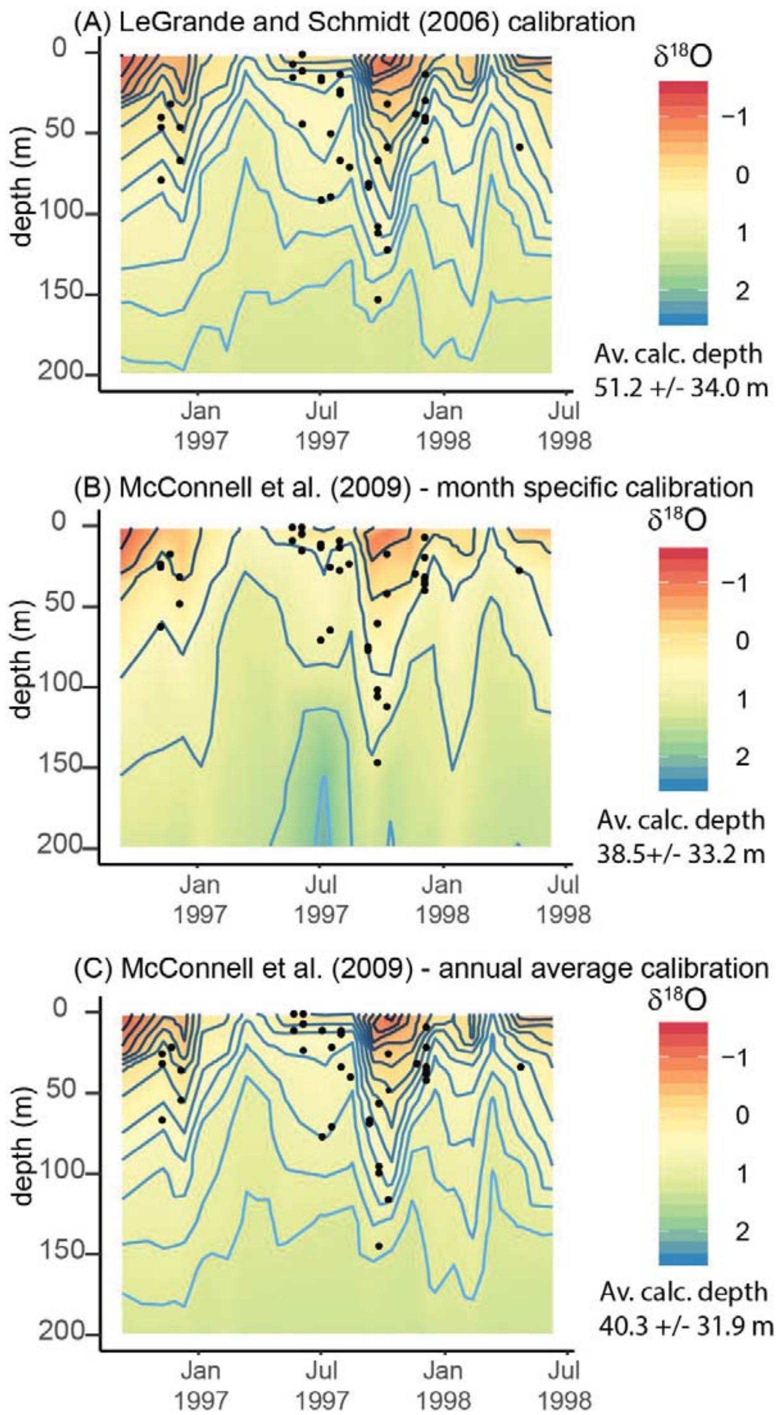


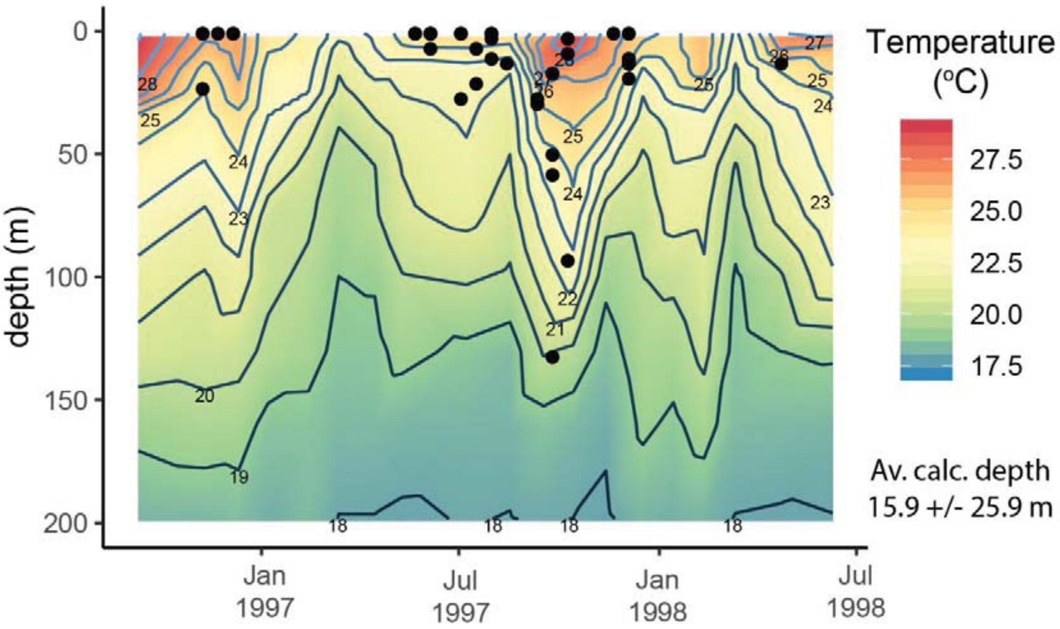
Supplementary Figure 3. A scatter plot showing how the shell condition, assessed using the Limacina Dissolution Index, varied with the number of weeks spent in the trap. Shape of points represents the number of specimens per analysis and the colour represents the shell diameter.



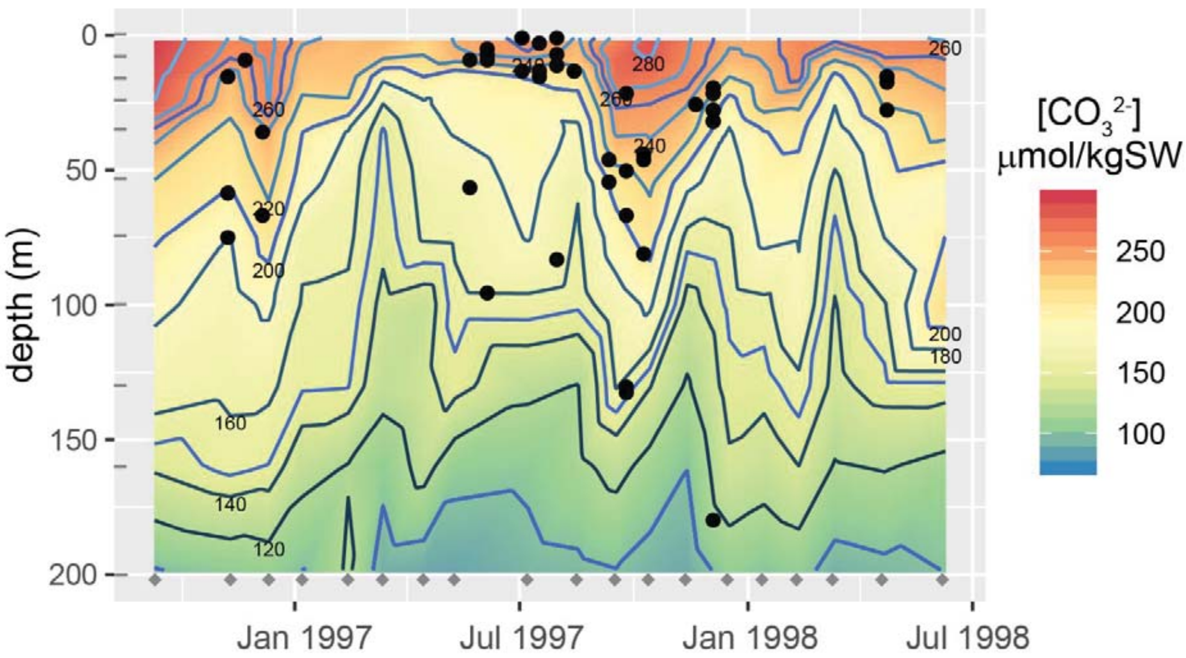
Supplementary Figure 4. Scatter plots of the shell condition of *H. inflatus* shells from the core, assessed using the *Limacina* Dissolution Index (LDX: 0 = pristine, 5 = highly altered), and (A) the $\delta^{18}O$ and (A) the $\delta^{13}C$ of the shells. Following convention, the $\delta^{18}O$ axis is inverted. There is not a significant relationship between shell condition and $\delta^{18}O$ or $\delta^{13}C$ measurements of pteropod shells from the core.



Supplementary Figure 5. Calcification depths of *H. inflatus* determined from $\delta^{18}O$ measurements of shell material relative to water column $\delta^{18}O_{SW}$ calculated from temperature and salinity measurements using three calibrations: (A) LeGrande and Schmidt (2006) Tropical Atlantic, (B) McConnell et al. (2009) monthly calibrations, and (C) McConnell et al. (2009) annual calibration.



Supplementary Figure 6. Calcification depths of *H. inflatus* plotted according to calcification temperature calculated using the $\delta^{18}O$ calibration from Keul et al. (2017). Water column temperatures are from CTD measurements. Using this temperature calibration, pteropod calcification depths are 15.9 m ± 25.9 m.



Supplementary Figure 7. Calcification depths of *H. inflatus* plotted according to carbonate ion concentration using the $\delta^{13}C$ calibration from Keul et al. (2017). Note, Keul et al. (2017) recommend that the calibration only be used for $\delta^{13}C < 1‰$ so we have applied it outside of its recommended bounds. Using this calibration, the ACD is 38 m ± 38 m.

Supplementary Tables

Supplementary Table 1. Shell condition of specimens from the sediment trap assessed using the *Limacina* Dissolution Index (LDX).

Trap deployment	Cup #	Date (mm/dd/yyyy)	Sample #	LDX
3A	1	11/08/1996	1	1
3A	1	11/08/1996	02a	1.5
3A	1	11/08/1996	02b	1.5
3A	2	11/22/1996	1	2.5
3A	3	12/06/1996	1	0
3A	3	12/06/1996	2	0
4A	2	05/22/1997	11	0
4A	2	05/22/1997	4	0
4A	3	06/05/1997	1	2.5
4A	3	06/05/1997	2	1
4A	3	06/05/1997	3	1
4A	3	06/05/1997	7	2
4A	5	07/03/1997	1	1.5
4A	5	07/03/1997	2	2
4A	5	07/03/1997	3	2
4A	6	07/17/1997	1	1.5
4A	6	07/17/1997	2	1
4A	7	07/31/1997	1	2
4A	7	07/31/1997	2	0.5
4A	7	07/31/1997	3	1
4A	7	07/31/1997	4	1
4A	8	08/14/1997	1	1.5
4A	10	09/11/1997	1	0.5
4A	10	09/11/1997	2	1
4A	11	09/25/1997	1	1
4A	11	09/25/1997	2	1.5
4A	11	09/25/1997	3	2
4A	11	09/25/1997	4	1
4A	11	09/25/1997	5	2
4A	12	10/09/1997	1	1
4A	12	10/09/1997	2	1
4A	12	10/09/1997	5	1.5
5A	2	11/20/1997	1	2
5A	3	12/04/1997	10	2.5
5A	3	12/04/1997	1	1.5
5A	3	12/04/1997	2	0.5
5A	3	12/04/1997	3	1

5A	3	12/04/1997	4	1
5A	3	12/04/1997	5	1
5A	3	12/04/1997	6	1.5
5A	3	12/04/1997	7	1
5A	13	04/23/1998	1	1

Supplementary Table 2. Shell condition of specimens from the core assessed using the *Limacina* Dissolution Index (LDX).

Core	Core depth (cm)	Specimen	LDX
MC-2	0.5 - 1.0	01	0.5
MC-2	0.5 - 1.0	02	1.5
MC-2	0.5 - 1.0	03	2
MC-2	0.5 - 1.0	04	2
MC-2	0.5 - 1.0	05	2.5
MC-2	0.5 - 1.0	06	2
MC-2	0.5 - 1.0	07	1
MC-2	0.5 - 1.0	08	2
MC-2	0.5 - 1.0	09	2
MC-2	0.5 - 1.0	10	2.5
MC-2	0.5 - 1.0	11	2
MC-2	0.5 - 1.0	12	1.5
MC-2	0.5 - 1.0	13	1.5
MC-2	0.5 - 1.0	14	1
MC-2	0.5 - 1.0	15	1
MC-2	0.5 - 1.0	16	2
MC-2	0.5 - 1.0	17	2
MC-2	0.5 - 1.0	18	2
MC-2	0.5 - 1.0	19	2
MC-2	0.5 - 1.0	20	2
MC-2	0.5 - 1.0	21	2
MC-2	0.5 - 1.0	23	2

Supplementary Table 3. Month and year dates of the CTD measurements used in this study, and the corresponding monthly calibration equations from McConnell et al. (2009) used to convert salinity measurements to $\delta^{18}O$ where $\delta^{18}O_{sw}$ = m (salinity + b). In the cases where a month didn't have a calibration, the nearest month was selected.

This study		*Calibration from McConnell et al., 2009*		
Month	**Year**	**Month**	**m**	**b**
September	1996	Sep-96	0.11	-3.14
October	1996	Oct-96	0.17	-5.12
November	1996	Nov-96	0.53	-18.42
December	1996	Dec-96	0.21	-6.64
January	1997	Jan-97	0.62	-21.9
February	1997	Feb-97	0.53	-18.36
March	1997	Feb-97	0.53	-18.36
April	1997	Apr-06	0.37	-12.44
May	1997	May-96	0.36	-12.04
June	1997	Jun-96	0.41	-13.97
July	1997	Jul-96	-1.2	45.41
August	1997	Aug-96	0.31	-10.24
September	1997	Sep-96	0.11	-3.14
October	1997	Oct-96	0.17	-5.12
November	1997	Nov-96	0.53	-18.42
December	1997	Dec-96	0.53	-18.42
January	1998	Jan-97	0.62	-21.9
February	1998	Feb-97	0.53	-18.36
March	1998	Feb-97	0.53	-18.36
April	1998	Apr-06	0.37	-12.44
May	1998	May-96	0.36	-12.04
June	1998	Jun-96	0.41	-13.97

Supplementary Table 4. Summary of the minimum, maximum, and range of apparent calcification depths (ACD) of *H. inflatus* in this study. No range is given when only one specimen is measured per sediment trap cup.

Date	Min ACD (m)	Max ACD (m)	Range ACD (m)
8/11/1996	40.0	79.1	39.0
11/22/1996	31.8	31.8	-
6/12/1996	46.2	66.8	20.5
05/22/1997	7.2	15.4	8.2
5/6/1997	1.0	44.2	43.2
3/7/1997	15.4	91.4	76.0
07/17/1997	13.3	89.4	76.0
07/31/1997	13.3	66.8	53.4
08/14/1997	70.9	70.9	-
11/9/1997	81.1	83.2	2.1
09/25/1997	66.8	153.1	86.3
10/19/1997	31.8	122.2	90.4
11/20/1197	38.0	38.0	-
4/12/1997	13.3	54.4	41.1
04/23/1998	11.3	64.7	53.4

Supplementary Table 5. Carbon and oxygen isotope measurements of pteropod shells from the core.

Core	Depth (cm)	Specimen	# specimens/ analysis	Sample Weight (µg)	Vial Weight (µg)	$\delta^{13}C$ (‰VPDB)	$\delta^{18}O$ (‰VPDB)
MC-2	0.5 - 1.0	1	1	86	86	1.488	0.715
MC-2	0.5 - 1.0	2	1	61	61	1.472	0.68
MC-2	0.5 - 1.0	3	1	71	71	1.446	0.208
MC-2	0.5 - 1.0	4	1	56	56	0.965	0.577
MC-2	0.5 - 1.0	5	1	50	50	1.538	0.685
MC-2	0.5 - 1.0	6	1	50	50	1.75	0.711
MC-2	0.5 - 1.0	7	1	63	63	1.213	0.187
MC-2	0.5 - 1.0	8	1	85	85	1.333	0.513
MC-2	0.5 - 1.0	9	1	70	70	1.123	0.132
MC-2	0.5 - 1.0	10	1	20	20	1.075	0.396
MC-2	0.5 - 1.0	11	1	55	55	1.605	0.735
MC-2	0.5 - 1.0	12	1	53	53	1.35	0.181
MC-2	0.5 - 1.0	13	1	84	84	1.599	0.496
MC-2	0.5 - 1.0	14	1	22	22	1.069	1.314
MC-2	0.5 - 1.0	15	1	36	36	1.738	0.356
MC-2	0.5 - 1.0	16 and 19	2	11	22	1.443	0.204
MC-2	0.5 - 1.0	17	1	25	25	0.914	0.359
MC-2	0.5 - 1.0	18	1	21	21	1.254	1.356
MC-2	0.5 - 1.0	20	1	26	26	0.974	0.51
MC-2	0.5 - 1.0	21	1	18	18	0.801	0.507
MC-2	0.5 - 1.0	23	1	13	13	1.102	0.944