

Interactive comment on “Biological and environmental rhythms in (dark) deep-sea hydrothermal ecosystems” by Daphne Cuvelier et al.

Anonymous Referee #2

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GENERAL COMMENTS

This paper is a fine example of new scientific inquiry enabled by deep-sea observatories. Performing paired high-resolution time-series studies is a particularly novel and interesting aspect of the study. Although the technology and methods used are still relatively new (and exciting), I found the authors neglected discussing vent ecology/animal physiology (i.e. mechanisms driving the patterns) to focus on methods and data collected. The data aligns with the scope of BG, but the text requires work addressing specific interactions.

This paper is an important stepping stone to better understanding the deep-sea hydrothermal vent environments. Although the findings are not exactly conclusive, there

is valuable information presented here, about the tools and apparent (and lack of apparent) environmental and ecological temporal patterns.

In general, I found the manuscript was well written, and the language used to be fluent and precise. That said, inconsistencies in formatting were very evident –this was distracting and, at times, outright confusing. The figures and tables also require work.

SPECIFIC COMMENTS

Title and abstract. I found both to be slightly misleading. The majority of the study results yielded no evidence of rhythms. This lack of evidence is still a result and it warrants discussion (e.g. Why aren't the majority of vent animals influenced by tidal rhythms?).

L. 55. "...exact same time span and resolution, have been analysed." Not sure I would say "exact": with the differences in gaps, sizes of images, and data collection durations (at times, continuous vs. punctuated). The first two paragraphs of section "2.3.1. Imagery analysis" are to the contrary.

L. 88. Was the lighting different for the different sites? Were the lights on for different durations? Discuss the effect of any variability in artificial light at the sites.

L. 122. Add text about the analysis of microbial mats and the anhydrite (in Fig. 2). Is there any mineralogical work to support the identification of anhydrite (could it have been sulphur precipitate)? How was the white encrusting mineral ("anhydrite") resolved to be different from the white encrusting bacterial mats?

L. 124. Explain the "gaps". Why are there gaps in the data?

L. 127. What was the resolution of the images from the different sites (sub-centimeter)? Were the resolutions actually comparable? Were the cameras/image sizes/distances from substrate the same?

L. 132. "Sketch" suggests artistic, may be better to refer to it as a "map" (i.e. it is

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a single photo with overlays representing max. occurrences...). How was this map created? Add information regarding the program and method used.

L. 138. Does "Fig. 1" show this? This figure and its caption don't indicate as much.

L. 223-225. and Fig. S1. Confusing. Consider removing at least the "days" from the text? As it reads now, the sentence references a Fig. with an x-axis in periods (which equal 6 hours), 18 hr periods, hours, days, and hours in multiples of 18. This is too much. Also, consider changing "*" to "x".

L. 247. I don't see how Fig. 2 demonstrates this point: it's a 2D schematic with no information about the substrate below the mobile fauna.

L. 399. Add a sentence describing the diversities.

L. 423. The assumption is the same individual is returning every time? Can you really say this?

L. 425. And so?

L. 435. What is the "very distinct spatial distribution in NEP"?

L. 442-443. Unclear what the authors are saying here.

L. 487. How fast do mussels move? Did you expect to see a difference at a frequency of 6 hrs?

L. 594. At vents or everywhere?

L. 607. Review Lau back-arc basin hydrothermal vent studies linking faunal variations with environmental gradients.

Discussion and Conclusion: Explicitly offer at least one mechanism to connect the influence of the tides and temperature, and the influence of tides and the pattern observed in tubeworm appearance.

Discussion and Conclusion: Do the authors believe the tides change the overall tem-

perature of a vent, or just the outflow directionality of the fluid at the point location of the probe?

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Discussion and Conclusion: Were all the tubeworms alive? If not, what effect could this have had on the ecological patterns observed/not observed?

TECHNICAL COMMENTS

L. 56-60. Rewrite “Key questions” sections so that the sentences are grammatically correct. For example, “...put forward are: (i) are tidal...” and “the most? And finally, (iv) do ...”.

At times, I found the writing was too informal for a scientific manuscript. I was not happy with the (repetitive) use of “vs.”, “on one hand...on the other”, and “and/or”, and [L. 422] “...individuals appeared very attached...” The tense of the manuscript jumps around sometimes. For example, L. 134-135.

There are many inconsistencies in the text formatting: *“Hours” was written as “hours”, “hr”, and “h”, with a space or with no space between the number and the shorthand “hr” or “h”. This inconsistency was even more confusing because the UTC time was also reported using “h” (again, with either a space or no space between the number and the “h”) or UTC was reported with “AM” or with no units. *In-text citations are inconsistently formatted: “et al.” is often missing a comma; both “and” and “” are used for 2 author papers; multi-paper citations were not always listed chronologically [L. 406]; author’s initials included [L. 164]; and missing a comma after authors [L. 186]

*Values with units are reported with and without spaces. For example, m vs. m. *The shorthand for “Figure” is written with and without punctuation, within the text and the figure captions (i.e. “Fig.” and “Fig”). *Section numbers are written with and without “.” at the end (in the section titles, as well as when referred to in the text). **“Oxygen” or “oxygen”. *Text jumps between “iron” and “Fe” in same paragraph. *Formatting the title of a subsection varied between: title in the text (e.g. L. 253 and title on a separate line (e.g. L. 341); indented or not; followed by a long/short/bolded/no dash. *Mean and

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stdev written: \pm units, \pm units, and \pm units. *Within the same paragraph, reporting a date range changes from "date to date" and "date - date". *The Reference section requires some attention. For example, "Year" vs. "(Years)"; ending the authors list with a ","; inconsistent formatting of the volume number, issue number, and page text; inconsistent spacing; inconsistent punctuation; different color text [L. 839-840]?; etc.

L. 165-166. Insert space

L. 177. Remove "()".

L. 198-200. Poorly written. Rewrite sentence.

L. 237. Change "featuring" to "with".

L. 272-273. (as one example) Watch the p-value sig. figs.; at times, they vary within the same sentence. Personal preference: never report $p = 0$ (or in this example, "0.00"), report it as $p < 0.001$.

L. 305. Reference Fig. 5 somewhere in the paragraph.

General: Write out values less than 10 (e.g. 9 months \rightarrow nine months)

L. 339. Repetitive.

L. 344. Use "...was already.." or "...as well", but not both.

L. 430. Correct. "...abundant on to areas..."

L. 432. Correct. "...both species [are] considered..."

L. 474. "...feeding [activity]...?"

L. 494. Open bracket with no closing bracket.

L. 496. Delete "Until now", because it still has not been established.

L. 508. "...by a [longer] study..."

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- L. 510. "...as they [become] more..."
- L. 522. "...in a single taxon..."
- L. 545. "...for both [temperature] probes..."
- L. 567. "...were close to..."
- L. 572. "...Tunnicliffe et al., 1997)."...
- L. 614. What is meant by "harshness"?
- L. 617. "...and [piloting] skills..."?
- L. 629. "This is [likely] due..."?
- L. 635. Capitalize "automated". Do they "need" to, or would it be helpful? Suggestion: "faunal abundances [in] images."

Figures (in general): Consider (i) standardizing graph formatting throughout the manuscript, (ii) removing repetitive information in graph titles (e.g., Fig. 6: use the probe name only vs. "T-MAR for imagery duration - hourly average"; that information is in the caption), (iii) clean up the axis ticks, labelling, and titles, and (iv) move footnotes (denoted by an asterisks, **) at the end of a Fig. caption.

Fig.1. This figure is missing some key information. The text for the scale bars is too small. Why is there text and colour bars in the lower right-hand corner of the NEP bottom inset? Label Canada and/or USA? Label the oceans? In the caption, explain or refer to the 4 insets. What are we looking at here? Consider providing larger photos? Add punctuation for "Fig. 1." and "Matabos et al.".

Fig. 2. Is it necessary to retain some transparency (the key colours really do not match the colours overlaid as semi-transparent)? Change to "Microbial [c]over" (in key). Why is the text "Ifremer" in the bottom right corner and why is it coloured in as "Pycnogonida" (in yellow)? The hatching in the MAR image (for "Mussel background"

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is difficult to resolve. Add punctuation for "Fig. 2.". Move footnote to the end of the caption?

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Fig. 3. Graphs and text are grainy. Consider deleting "densities" from the 10 individual titles (repetitive), and just list the taxa. Reduce the number of x-axis ticks (I can't tell which line is associated to the values listed). Add y-axis title. The Crab graph is missing the number "10" on the y-axis. Shorten the number format of the y-axis for the MAR Pyncognoid and Shrimp graphs (i.e. 0, 1, 2... vs. 0.0, 1.0, 2.0...). Mention "23 days" in the caption. Change to "...with an ***" OR "Taxa with significant trends."

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Fig. 4. When printing in black and white, it is impossible to tell the difference between light blue and light gray. In Fig. 5, NEP is black and MAR is light gray (which can be distinguished in black and white print). To standardize the figures, and for printing purposes, consider changing NEP to black and MAR to gray for Fig. 4. Consider rewriting caption and/or changing the x-axis title. I'm not sure what the value is supposed to be, hours or periods? Reorganize so the sentence doesn't start with "

Fig. 5. To save space, consider adding a 2nd axis to the temperature graph (to display both NEP probe temperatures, instead of repeating the MAR data. Remove "short-term" for graph titles? If not, change to "NTU short-[t]erm". Is it necessary to repeat the same key for 3 of the 4 graphs? Although this is not the only time the figures include stacked graphs, this is the only time the x-axis is included.

Fig. 6. Shorten the y-axis labels to represent a count of the days (e.g., day "1", "2"..."23" vs. "2011-10-07", "2011-10-08"...). Add titles for the x- and y-axis (e.g., "day" and "hour"). Indicate somewhere in the figure or caption: temperature in °C.

Fig. 7. More information is required for the caption. Are there gray and black vertical lines (appear to be)? If so, what do they represent? What are the 2 blue dashed horizontal lines on each graph? Change "X-axis" and "Y-axis" to "x-axis" and y-axis (to be consistent with text).

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Fig. 8. Label and mention: one graph is MAR and the other is NEP. Change text and vector lines to black (vs. blue). Difficult to read the text on the graph, increase the size? Define RDA? There is a noticeable difference in the size and quality of text in the left and right graphs. Standardize?

Fig. 9. Is the x-axis in hours? Include "Temperature (°C)", not just "°C" for y-axis. Remove redundancy in the graph titles and consider adding this information to the figure captions, e.g. "...over six and nine months".

Fig. 10. Confused again by the x-axis title and the caption. This data is for a one-week period equalling 200 hours, but the x-axis title is "Period", not "Hours", and plus, 1 week = 168 hours. Please clarify. Change the lines to black (no need to be coloured red).

Fig. S1. Include the information for the white vs. black symbols. Why change the x-axis intervals? If each period = 6 hrs, and there are 45 periods, the graph represents 270 hrs or 11.25 days. Include this easy to understand temporal reference (and why this length of time)? Change the lines to black (no need to be coloured red).

Fig. S2. Similar concerns to Fig. S1. Why change the x-axis intervals? Remove the repetition of the x-axis title (i.e. only include "Period" once). Change the lines to black (no need to be coloured red).

Fig. S3. Change to "...(a) MAR and (b) NEP...". Are the "random" data consecutive? Why not report the specific month and year (even if it was selected randomly)? Use the same style quotation marks at start and end of the quote -or in this case, consider not using quotation marks at all. Many of the same comments and concerns as expressed for Fig. 6.

Tables (in general): Consider (i) reducing the number of lines (vertical and horizontal) for each table, (ii) removing repetitive information (e.g. "2011-2012"), (iii) condensing the area of each table (there is often a lot of blank space between rows), (iv) use either "Table :" or "Table .", but be consistent, and (iv) move footnotes (denoted by an

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asterisks, **) below a Table.

Table 1. "[o]xygen". "[T]wice". Use "NA" instead of "/" (or define "/"). Be consistent, "min" or "min.". If minutes = "min", seconds could = "sec". As in the text, include "at" when listing the sample times (e.g., at 2h, 6h...UTC). Be consistent with apostrophe symbols for the coordinates (styles change between MAR and NEP). Explain/include row title for "Wireless" and "Cabled".

Table 2. Move footnote to below table (or at least the end of the caption). "[A]re visiting...". Fix: "see fig. X"? Reverse how the gap range is reported ("9 to 93 gaps" and "5 to 93 gaps")? For surface filmed and surface analyzed, be consistent with sig. figs. and with the information provided (why list the ca. dimensions 2 out of 4 times?). Reported frequency as "6hr" and "12 h" in the same table (use a consistent format). Check citation formatting (missing punctuation). Use "NA" instead of "/" (or define "/"). The lines of this table are bolded, why?

Table 3. n = ? (photos?) Missing "h" after "553" twice. Add a space to "(2 days)".

Table 4. Include "°C" in the table caption and remove it from each record. "[S]tdev"?

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