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Discussions

Interactive comment on "Distribution of PAHs and the PAH-degrading bacteria in the deep-sea sediments of the high-latitude Arctic Ocean" *by* C. Dong et al.

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Received and published: 29 October 2014

General comments

This manuscript attempts to identify some of the microorganisms involved in PAH degradation in sediments of the Arctic Ocean. As the authors note, the likely future increases in petroleum exploration in the Arctic mean that understanding the fate of PAHs in sediments is particularly relevant. The authors used a wide variety of analytical techniques in work that was technically competent. With respect to the writing, the manuscript is well-organized and the structure is logical, but there are quite a few superficial grammatical errors that should be fixed. I have a few more substantive com-

ments about a couple of statements in the Introduction and Discussion, but otherwise I see this as a strong manuscript.

Specific comments

* Particularly important comments are marked with a *

P 13986 line 2: change to "tend to accumulate" line 13 change to "The potential degraders including..., with Dietzia as the most abundant, occurred in all sediment samples."

P 13987 line 1 change to "and is almost" line 3 change to "Loading of terriginous organic carbon through rivers into the Arctic Ocean, and the influence of that terriginous organic matter on bacterial diversity in coastal water, have drawn attention". (Keep the same citations). line 16: change to "have increased"

P 13988 line 5: Change to "Biotic and abiotic processes, as well as top-down processes (suspended particle absorption and sinking) and bottom-up processes (thermogenesis below the surface) are all believed to contribute to the accumulation of PAHs (reference)." * Also: I am not aware of biotic processes that are known to produce PAHs. * Also: to me, "top-down" and "bottom-up" processes are ecological terms referring to predator or prey/nutrient control over populations. The authors are using them here to refer to the physical top or bottom of the water column. I encourage them to find different terms. Line 28: Change to "To the best of our knowledge,"

p 13991 * Line 12: Is "consortia" the correct term here? I understand "consortium" to mean a well-defined association of a small number of species species, for instance the association between archaea and sulfate reducers that drives anaerobic methane oxidation. The authors have more complex mixtures of microorganisms in which many of the species are probably involved in PAH degradation, but some may not be and it is possible that none are essential to PAH degradation. For that reason, I prefer a term like "enriched communities".

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p 13992 Line 22: The authors should post this script as a supplemental file as a service to other authors working on similar projects.

p 14000 * Line 22: I do not know what the theory of global distillation effects is. It must be cited, and the authors should briefly explain what it posits.

p 14001 Line 28: Omit "by"

p 14002 Line 2: "must" is too strong. Change this to something like "It seems likely that they play an important role" Line 11: Omit "The" before "Cycloclasticus" Line 29: Change "more kinds of carbon source" to "more distinct carbon compounds"

p 14004 Line 7: Change to "It is worth mentioning that"

Figure 2: Stacked bar graphs such as this one are common, but they are not the best way to display data such as these, because it is very difficult to assess changes in the height of the bars that are in the middle of the plot. A better way would be to make a separate panel for each genus, as, for instance, shown in the "panel bar chart". Examples of such a chart (with code using the open-source statistical platform R) is given here: http://timotheepoisot.fr/2013/02/17/stacked-barcharts/.

* Figure 4: "%" does not make sense as a unit for something labeled "removal rate": a rate needs to have units of something per unit time. Does it mean "% loss over the entire incubation"? Neither the main text nor the figure legend adequately explain this calculation. In any case, better units would be g PAH per liter per hour. Also, change "apt" to "high" in the figure legend.

Interactive comment on Biogeosciences Discuss., 11, 13985, 2014.