Review of: "Dehalobium species implicated in 2,3,7,8-tetrachloro-p-dioxin dechlorination in the contaminated sediments of Sydney Harbour Estuary"

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Potential competing interests: The author(s) declared that no potential competing interests exist.

In general, nice work was done to combine the results from the field observation and lab experiment. Several issues should be addressed before publication.

1. As stated in the sediment sampling section, sediment core samples were collected from nine locations along the Parramatta river, while we did not see the results along the sampling depth at each location. What was the purpose to collect core samples? Why were there 18 samples? (line 272) These should be well demonstrated.

2. As stated, wet sediment was dried overnight at 70°C, if so, dioxins may have already volatilized, especially for the lower chlorinated congeners. How to consider about this condition?

3. Line 157, as I know, the levels in EDF-5524 ranged from 0.01-1000 ng/mL for the native compounds, and 10-100 ng/mL for the 13C-labeled compounds. The authors should confirm that.

4. In lines 275-279, OCDD and OCDF dominated the levels of PCDD/Fs in the samples. Whereas, less information could be obtained from the figures in the main text. I suggest to reorganize Fig.1 (or some other figures) to show the congener profiles in the samples. Moreover, normalized congener concentrations were utilized when doing PCA analysis (lines 290, 291), why did you do such normalization based on the most abundant congener?

5. Lines 311-327, why did the authors use TEQ values of each congener to evaluate the possible reductive dechlorination? as we know, the measured concentration presents the level of congener in the field condition, and TEQ reflects the toxicity of each congener based on TEF. I recommend to evaluate the dechlorination based on the actual concentrations. Additionally, how to explain the observation in lines 325-328?

6. I did not see the description about analysis of low-chlorinated dioxins (i.e. 2,7,8-triCDD, 2,7-/2,8-DiCDD and so on) in the method section, how to suggest a mechanism of 2,3,7,8-TCDD transformation into low-chlorinated dioxins (Lines 348-354)? Moreover, some other dioxins (123678-HexCDD, 1234678-HpCDD) also presented much lower concentrations in 2017 compared with those in 2007, did that mean a reductive dechlorination? By contrast, how to explain the elevation of some furans (23478-PeCDF, 123678-HexCDF and 1234678-HpCDF) in 2017?

7. Lines 457-464, regarding the experiment for dechlorination of TCDD and OCDD, I suggest to consider

the material balance to get a solid proof. From Fig. 5B, I don't know which represent 1,2,3,4,6,7,8-HpCDD and 1,2,3,4,7,8-HexCDD? From the field observation (Fig. 2), I also cannot see an increase of these two congeners in the real samples, how to relate your finding in the experiment with those in the real samples?

8. The authors provided various results to prove that Dehalobium species may reductively dechlorinate 2,3,7,8-TCDD and OCDD in the contaminated marine sediments, whereas, direct evidence is unfortunately missing. Is it possible to isolate Dehalobium phylotypes in the sediment and do a dechlorination experiment based on such phylotypes?

9. Sentences need to be well polished throughout the main text.