

Interactive comment on “Reconstructing bottom water temperatures from measurements of temperature and thermal diffusivity in marine sediments” by F. Miesner et al.

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Thank you Dr. Morales Maqueda for your helpful comments. We will adapt your input in the review. Short answers to the comments are given below.

Comment 1: 2392 7. I expect that the steady state heat flow would be the time-independent component of the total vertical heat flux. Therefore, it should be in principle possible to determine this flow by averaging over long enough periods of time. I fail to see why the bottom water temperature itself needs to be constant in order to calculate the geothermal heat flow.

Answer: You are right with the averaging, however, averaging is not possible with only
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one measurement. Also heat flow determination is possible when the measurement device penetrates to deep enough regions where the seasonal influence is negligible.

Comment 2: 2392 12. Reconstruct temperatures where?

Answer: This would be the German North Sea. We will add the region in the review.

Comments 3-4: 2392 18-19. This statement is irrelevant here. 24-ff. These statements are entirely uninformative. Either provide quantitative information or say nothing. Your hopes for future work have no place in an abstract.

Answer: Yes, that will be part of the review of the abstract.

Comment 5: 2394 6. I thought you were interested in the bottom temperatures.

Answer: Yes, this is a mistake. The surface of the sediment is of course the bottom of the sea.

Comment 6: 2396 23. You must define T_{total} and $u(x,t)$ before line 4, so that your reference to zero-flow condition at the lower boundary makes sense.

Answer: Yes, that will be changed.

Comment 7: 2396 26. $h=150 \text{ W/m}^2$? The units of h according to (3) are simply $1/\text{m}$.

Answer: That is actually a mistake in both (3), where the thermal conductivity is missing, and the units. The units of h are $\text{W/m}^2 \text{ K}$. This will be changed.

Comment 8: 2398 2. Please provide a reference for this figure.

Answer: This figure comes from Ribergaard (2008), we will make this clear in the review.

Comment 9: 2398 5. What is the heatflow value for this example?

Answer: We used a literature value, as the measurement is not deep enough to determine the heat flow. We will add this with a reference to the global heat flow data

base.

Comment 10: 2399 11. "can then be calculated".

Answer: We will be more specific.

Comment 11: 2402 25-ff. For real data, it is not clear what an "exact", noise-free solution would be. What criterion do you use for stopping when using real data?

Answer: The discrepancy principle is explained in the same paragraph. We will make clearer what this means for real data.

Comment 12: 2403 3. Explain what a "regularization scheme" is.

Answer: Okay, we will do that in the review.

Comment 13: 2403 7. Replace "øchapter" by "section".

Answer: Yes.

Comment 14: 2404 13. You need to be more specific here. What changed from one execution of the algorithm to the next? The noise in the data?

Answer: Yes, we will specify that.

Comment 15: 2421-2422 In these figures, the model thermal diffusivity is obtained by linearly inter- polating between measured data points, correct? There is no actual model for the diffusivities.

Answer: Yes, we used the term "modelled diffusivities" for "interpolated values, used for the modelling process". We will think about renaming that for clarity.

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