

Response to Reviewer3's comments (RC3) about the paper: "A practical approach to lake water density from electrical conductivity and temperature"

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MS No.: hess-2016-36

Reviewer 3 (RC3):

The paper could be strengthened by examples of when the improved density prediction matters. Who will benefit from the new formula? For example would numerical modellers of physical processes in lakes see any improvement using the new formula?

EVERYBODY, who uses the more accurate approach will profit from more accurate results. In all presented lakes (not the ocean) the density contribution of solutes is out by 25% to 60% according to UNESCO or Chen&Millero. Hence, ALL investigations of stratification features due to solute gradients will profit from the better approach. We demonstrated that for all lakes in this manuscript; it will be very difficult to find a lake where the situation lies outside our extremely wide band of considered lakes (if the lake water is not dominated by ocean water). On top of it, the lambda approach is much easier to implement.

We admit that the implementation of this better knowledge into numerical models is not provided. This is outside the scope of this paper. Numerical models use salinity to quantify solute concentration, our lambda approach avoids salinity because it is a precarious quantity in limnic waters. We base density directly on el. conductivity. However using el. Conductivity in numerical models is not straight forward (It does not mix linearly at high concentrations).

The writing could be improved in places. Some suggestions are listed below but there are many other places where the grammar could be improved a bit.

- 1. Abstract: Lines 12–13: "... and the conversion of measurements ...". Line 19: 'relative accuracy of 10%' should be 'relative error of less than 10%. Line 20: "which surmounts" should be "which is better than" .*

Done.

- 2. Lake Mono should be Mono Lake throughout the manuscript*

We accept the correction of the reviewer and we will modify all the references the text from "Lake Mono" to "Mono Lake".

3. Page 3, lines 31–33: The sentences "In conclusion ... conductivity" do not flow well with the preceding. Something more is needed to lead into these statements.

We have moved it to the next paragraph.

4. Page 9, lines 17–18: This sentence doesn't make sense to me. In the preceding you say that the equation is only applicable for temperatures up to 24 °C. Why are you now taking about dissolved ions?

We wanted to point out the fact that the error using Bührer and Ambühl (1975) in temperatures higher than 24°C becomes smaller and smaller when the solute concentration increases. We have rephrased the text for clarity.

5. Page 9, Lines 24–25: Delete the last sentence. It repeats the factor of 2 mention in the first couple of sentences of this paragraph.

Done.

6. Page 10, lines 11-12: I don't understand the sentence "Large differences"

Further explanation has been added to the text.

7. Page 10, line 19: "at an accuracy of 10%" is not good - it says the results are not very good. Should say "with an error of less than 10%".

Done.

8. Page 10, lines 25: Do you mean "which can be measured in limnic waters"? What is meant by "delicate quantity"?

We have replaced "verified" by "measured" in the text.

We changed to , "which is badly defined for limnic waters and hence a precarious quantity". ...

NOTE: All the corrections concerning the text previously mentioned will be included in the final version of the manuscript.