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Reply to a comment by Watras et al. (2014) on temperature compensation method for field measurements of CDOM fluorescence

Submitted as a Comment to *Limnology and Oceanography: Methods*

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Abstract

The recent comment by Watras et al. (2014) clarifies the calculation of the temperature correction coefficient (ρ) in Watras et al. (2011). Based on this clarification, we accept that the equation to compensate for temperature quenching of chromophoric dissolved organic matter (CDOM) fluorescence presented in Ryder et al. (2012) and the equation proposed in Watras et al. (2011) are mathematically equivalent.

Comment

In our recently published paper Ryder et al. (2012), we showed that the degree of temperature quenching of chromophoric dissolved organic matter (CDOM) fluorescence differed between sites and over time. In addition, we proposed a temperature compensation method for field measurements of CDOM fluorescence. We also compared the performance of our temperature compensation method to that proposed in Watras et al. (2011) and stated that our equation produced a more successful temperature correction. Watras et al. (2014) have now defined ρ in an equation as follows:

$$\rho = m/(m \cdot T_{ref} + C) \quad (1)$$

where ρ is the temperature correction coefficient, m is the slope and C is the intercept for the regression of CDOM fluorescence intensity on temperature (T), and T_{ref} is the reference temperature. We now realize that we misinterpreted the calculation of the temperature correction factor ρ as described in Watras et al. (2011). Based on equation 1, the two equations are mathematically equivalent.

This misunderstanding arose from the fact that ρ was defined in two ways within the same paragraph on p. 297/298 in Watras et al. (2011). In the first definition, and following reference to the slope and intercept of linear regressions of fluorescence intensity as a function of temperature, the temperature coefficient ρ was described as 'the quotient slope/intercept at a given reference temperature'. Here no mathematical equation was provided for ρ. We interpreted the term intercept in this definition as the point where the regression line intercepted the y axis, as it is defined for all linear regressions. From Equation 1 above and as defined in Watras et al. (2014), it is now clear that ρ is the quotient of the slope divided by the regression equation solved for the reference temperature. Watras et al. (2011) then provided a second definition for ρ within the same paragraph, again as the quotient of the slope/intercept, but for the regression of CDOM(c) on (T_m–T_r) where m and r were subscripts for measured and reference respectively and was where c is the concentration between 0 and 1.

We regret that there was misinterpretation in our understanding of the text in Watras et al. (2011) on the calculation of the ρ value. We agree this invalidates the comparisons presented in Tables 1 and 3 and Figures 3 and 4 in Ryder *et al.* (2012). We accept that the compensation for temperature quenching of CDOM fluorescence proposed in Ryder et al. (2012) and Watras et al. (2011) are mathematically equivalent. However, we hope that this correspondence clarifies the calculation of the temperature correction coefficient for future use, and we reiterate the need for the spatial

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and temporal variability in that coefficient be taken into account as highlighted in Ryder et al. (2012).

References

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