

## ***Interactive comment on “Seasonal characterization of CDOM for lakes in semi-arid regions of Northeast China using excitation-emission matrices fluorescence and parallel factor analysis (EEM-PARAFAC)” by Y. Zhao et al.***

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One key point of this paper that I missed from my earlier comments: When I got the response from author comments, I have been checked once again the research paper. At the same time, I also read the one of the referee comment. My missing point is that author used the Raman Unit ( $\text{cm}^{-1}$ ) that can change the excitation-emission wavelengths and also at the same time the fluorescence intensity of the fluorescence peaks. Such

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effect is problematic for future understanding of the fluorescence spectra of various components. Author can read this issue in the reference paper that I have been provided before. It has been elaborately discussed how the Raman Unit affects the peak wavelengths and also the intensity. I strongly suggest using the arbitrary unit (a.u.) or standard Quinine sulfate unit (QSU) instead of Raman Unit ( $\text{cm}^{-1}$ ) and then rewrite the sections which are needed throughout the manuscript. Response: Thank you very much for recommending the reference “Mostofa KMG, Liu CQ, Yoshioka T, Vione D, Zhang YL, Sakugawa H (2013) Fluorescent dissolved organic matter in natural waters. In: MostofaKMG, Yoshioka T, Mottaleb A, Vione D (Eds), Photobiogeochemistry of Organic Matter: Principles and Practices in Water Environments, Springer, New York, Chapter 6, pp472-475.” The authors have read this reference carefully. To compare the fluorescence data with the results from different fluorescence spectrometers, the fluorescence intensity calibration have been used, which has been expressed by three methods in the published reports: 1) Quinine sulfate (QS) calibration method is usually used in fluorescence spectroscopy. But different QS concentrations and solvents have established different scaling units, such as millifluorescence (mFI), the fluorescence unit (flu) and the quinine sulfate unit (QSU). This method requires separate measurement daily for each instrument and makes it difficult to produce a unified fluorescence standard as an absolute calibration (Determann et al., 1994. Fluorescent matter in the eastern Atlantic Ocean. Part 1: methods of measurement and near-surface distribution; Determann et al., 1996. Fluorescent matter in the eastern Atlantic Ocean. Part 2: vertical profiles and relation to water masses ). Because a number of investigators have used QSU to calibrate the fluorescence data (Coble, 1996; Zhang et al., 2010, 2011), QS solution will be measured daily in our future study. 2) The integrated area of water Raman peak is a rapid and simple method for fluorescence intensity across different instruments expressed by Raman units ( $\text{nm}^{-1}$ ), which makes this quantification without no need of fluorescence standards (Lawaetz and Stedmon, 2009). The Raman scattering of water shows a signal included in each seawater spectra with a bandwidths related to the excitation line, which have been reported by Determann et al., 1994 and

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1996 (Determann et al., 1994. Fluorescent matter in the eastern Atlantic Ocean. Part 1: methods of measurement and near-surface distribution; Determann et al., 1996. Fluorescent matter in the eastern Atlantic Ocean. Part 2: vertical profiles and relation to water masses). Compared with the Quinine sulfate (QS) calibration, this method would require no separate measurement for each instrument and has been widely used in the earlier studies (Stedmon et al., 2003; Stedmon and Markager, 2005; Stedmon and Bro 2008; Jaffe' et al., 2008. Spatial and temporal variations in DOM composition in ecosystems: The importance of long-term monitoring of optical properties; Fellman et al., 2010; Guo et al., 2011. Assessing the dynamics of chromophoric dissolved organic matter in a subtropical estuary using parallel factor analysis; Seredyn'ska-Sobecka et al., 2011. Monitoring organic loading to swimming pools by fluorescence excitation-emission matrix with parallel factor analysis (PARAFAC)). 3) The fluorescence intensity is given in arbitrary units (A.U.). This direct method makes it difficult to compare the difference across different instruments (Lawaetz and Stedmon, 2009). Since the reference "Mostofa KMG, Liu CQ, Yoshioka T, Vione D, Zhang YL, Sakugawa H (2013) Fluorescent dissolved organic matter in natural waters. In: Mostofa KMG, Yoshioka T, Mottaleb A, Vione D (Eds), Photobiogeochemistry of Organic Matter: Principles and Practices in Water Environments, Springer, New York, Chapter 6, pp472-475." has pointed out that the RU calibration may produce unusual fluorescent components which is not shown in the original EEMs, we will use standard Quinine sulfate unit (QSU) instead of Raman Unit (nm<sup>-1</sup>) in future study. In our papers, the Raman scatter peak of water has been measured daily as fluorescence intensity calibration. This method is expressed by Raman Units (R.U) .

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