

## ***Interactive comment on “Characterization of chromophoric dissolved organic matter in lakes on the Tibet Plateau, China, using spectroscopic analysis” by Kaishan Song et al.***

### **Anonymous Referee #2**

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#### **General comments:**

Song et al. spent three years to sample and investigate the variability of chromophoric dissolved organic matter (CDOM) from a substantial amount of lakes (total 63) across the Tibet Plateau in China. The lakes were separated into two groups: low salinity freshwater and high salinity brackish water. Samples were analyzed using adsorption and fluorescence spectroscopy resulting in specific indices for comparison. The differences among samples were correlated with water quality parameters, salinity, solar radiation and land cover. This work sustains a better understanding of CDOM composition and its relation to solar radiation in the lakes across the Tibet Plateau. However,

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the manuscript is mainly a data report in the current version. There are too many methodological details but lacking appropriate discussion of the results. Depending on how the authors address the following comments and questions, the manuscript will need to be re-considered whether suitable for publication or not.

#### **Specific comments:**

Abstract – what's the importance of this work? Present the main results in a more concise manner. Remove data process details. Add more statements in the end to highlight the implication and conclusions from this study.

#### **Introduction –**

Line 49~67: How representative are the 63 lakes studied in this work, considering that there are more than 400 lakes in the Tibet Plateau? Only brackish lakes in the Tibet Plateau was mentioned. What about freshwater lakes? Were the percentages of freshwater and brackish lakes reported in previous studies?

Line 68-70: Why DOM <0.45 um, and CDOM <0.22 um? Terrestrial DOM can contribute high molecular weight CDOM to aquatic environments.

Line 80~90: Regarding the identification of major components from EEMs data, what is the difference between EEM-PARAFAC and EEM-FRI data analysis? Why EEM-FRI rather than EEM-PARAFAC was chosen in this study?

Line 102~103: saline lakes (32 lakes) or freshwater lakes (32 lakes)?

Line 106: Only spatial dynamic changes were evaluated in this study. What about seasonal changes? Were all the samples collected in the same season? If not from the same season, how comparable and how representative are the samples to be used for investigation of spatial dynamic changes?

#### **Materials and Methods –**

Line 122~124: How is the solar UV radiation in the Tibet Plateau? Any numbers to

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describe it? How many magnitudes higher than other well studied areas, such as the Amazon River, Hulun Lake, and lakes in the Northeast of China?

Line 121~127: The difference between summer and winter was described here. Was this difference considered in the sampling plan?

Line 134~135: Describe the sample locations in more details. Sampling season – summer or winter or both? How was the retention time of each lake determined? What is the total covered area? How representative are they among the more than 400 lakes in the Tibet Plateau?

Line 135~141: Was the filtering process conducted in the field? If not, how were the samples stored and transported to lab? It is confusing why different size of filters were applied. What parameters were measured in each filtrate? Why repeating 0.45 um filtering after 0.22 um filtering? This section needs to be revised seriously.

Line 144: How was turbidity determined? Where is pH data? Table 1 did not include pH data. Actually pH has a significant impact on CDOM and FDOM measurement. If the pH variability was significant, the samples need to be adjusted to a similar pH prior to measurement.

Line 162: Describe SUVA254, Slope ratios, and HIX in more details.

Line 176~184: Use a table to present the criteria ratios for the different sources. Include appropriate references to cite from.

Line 186~193: Use a table to present the positions of the fluorescence maximum peaks for the major components. Include appropriate references to cite from.

Results –

Line 217: TSM, pH were missing in Table 1.

Line 220: average values and standard deviation or range?

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Line 224: Turbidity in freshwater lakes are not lower than those of brackish lakes.

Line 228: trophic states?

Line 240~241: Add lake abbreviation name and numbers to corresponding to the lake numbers in Figure 2. Replace “Fig. S1” with “Table 1”.

Line 248: There was no clear trend between DOC and elevation.

Line 270: Fig. 3 rather than Fig. 2

Line 278~279: Move to discussion. Need more explanation. For example, the brackish lakes are located in higher elevation areas, resulting in more significant photo-degradation, and lower SUVA254...

Line 280~281: Add lake abbreviation name and numbers to corresponding to the lake numbers in Table S1.

Line 280~297: What does M (E250 : E 365) implicate? The authors claimed significant differences between brackish and freshwater lakes for the slope ratios. However, the average values did not show dramatic differences. How was the ANOVA test conducted? Some of the statements need to be moved to discussion section.

Line 308: Fig. 4a

Line 300~337: Shorten the EEM-FRI results to be concise. There was repeated information.

Line 360~371: Move to discussion section. I disagree with the authors regarding the interpretation of EEM-FRI results. It is too simplified to only consider the DOM sources (allochthonous vs. autochthonous and microbial) as the explanation of the differences between brackish and freshwater lakes. It is arguable that photo-degradation could alter DOM structure and shape the EEM spectra.

Line 373~386: No significant difference was observed.

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Line 404~416: The differences in PCA results could be attributed to both source differences and photo-degradation process.

Line 466: negative or positive?

Discussions –

Line 475: what are the major results to be discussed?

Line 497: what tendency? Decreasing?

Line 546: Fig. 4 and 5

Line 555: 2600 h

Line 630~631: The differences of CDOM between brackish and freshwater lakes were not that significant.

Technical corrections:

Table S1: 64 or 63 lakes?

Table 1: Mean  $\pm$  S.D.? (or range?); Min-Max; where is pH data?

Figure 8 c: axis titles

Figure 9: where are c and d?

End.

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