# Responses to Reviewer' Comments

Dear reviewer,

Thank you very much for your valuable suggestions and comments on our manuscript. Those comments are of great assistance to me for improving and revising our manuscript. We have studied comments carefully and have made correction in line with the suggestions made by you. Revised portion are marked in blue in the paper. The main corrections in the paper and the responds to the reviewer's comments and remarks are as flowing.

'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, 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.

Response: Thanks for your patient review. The important work in this study is that the effects of salinity, solar radiation and land cover types to the FDOM in the 63 lakes (Freshwater and brackish) across the Tibet Plateau. These factors could result in different characteristics of FDOM parameters linked with water quality. Then we presented the main results and removed data process details according to your suggestion. The revised abstract as following:

Spatiotemporal variations in the characteristics of fluorescent dissolved organic matter (FDOM) components from 63 lakes across the Tibet Plateau, China, are examined using excitation-emission matrix spectra (EEM) and fluorescence regional integration (FRI) from 2014 to 2017. Freshwater ($N$=135) and brackish water ($N$=109) samples from 63 lakes were grouped according to salinity or electrical conductivity. Chromophoric dissolved organic matter (CDOM) absorption parameters, fluorescence indices, average fluorescence intensities of the five fluorescent components ($\varphi_{i}$, $i$=I, II, III, IV, V) and total fluorescence intensities ($\varphi_T$) differed under spatial variation among brackish and freshwater lakes (ANOVA, $p$<0.05). Principal component analysis (PCA) results showed that microbial protein-like ($\varphi_{IV}$), fulvic-like ($\varphi_{III}$) and humic-like ($\varphi_V$) have positive correlations ($R^2$>0.79, $t$-test, $p$<0.01), indicating that these FDOM components may originate from similar sources. These FDOM characteristic linked with water quality were influenced by special environmental factors and geographical differences in Tibet Plateau. A correlation also existed between normalized $\varphi_i$ ($i$=I, II, III, IV, V) and DOC concentrations with a salinity >10‰ (averaged EC, 23764μs cm $^{-1}$) ($t$-test, $p$<0.01), of which $R^2$ of regression analysis showed a decreasing tendency with EC and salinity. Similar correlations between $a$(254) and DOC concentrations ($t$-test, $p$<0.01) are also evident for sunshine hours > 2900 h. In addition, averaged CDOM spectroscopic indices in each basin related to the land-cover showed that a moderate correlation between DOC and normalized humic-like $\varphi_V$ for 20 basins ($R^2$=0.54, $t$-test, $p$<0.01). A comparatively prolonged hydraulic retention time and terrestrial allochthonous inputs could cause higher DOC production and accumulation in brackish water. These findings showed that strong UV-B radiation has an important effect on CDOM photo-absorption characteristics, and that it contributes to DOC variability and fate. The results of this study are suggesting that new studies on the high-mountain lakes in inland lakes considering the evapoconcentration, ultraviolet irradiance and landscape features within different basins. The FRI technique can be used to evaluate the seasonal dynamics of FDOM components for inland waters to quantify components.'

We hope that these revisions and the improved text will be satisfactory.

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?

Response: Thank you for your comments and concerns. Generally, there are more than 400 lakes in the Tibet Plateau. Most of them are in the depopulated zone in North Tibet, and it is a natural preserve for wild animals and biodiversity. Due to the geographical conditions and harness environment, it is difficult or impossible to sample these lakes without helicopter or other very powerful vehicles that could work of the road. In this study, we selected the representative lakes based on the size, accessibility, the catchment landscape and the gradient of salt. In this study, we focus on the comparison of FDOM from both saline and fresh lakes, thus both saline and fresh water lakes were samples and analyzed. We revised this manuscript according to your suggestion and add these in the portion of materials and methods. Then Zheng et al., (2009) reported that the salinity of the lakes of the plateau has a general trend of decreasing from north and northwest to south and southeast, broadly showing synchronous variations with the annual precipitation and aridity (annual evaporation/annual precipitation) of the modern plateau according to the available data and interpretation of satellite images. Both the brackish lakes and fresh lakes were mentioned in revised manuscript. We hope that these revisions and the improved text will be satisfactory.

Zheng, M., & Liu, X. (2009). Hydrochemistry of salt lakes of the Qinghai-Tibet Plateau, China. *Aquatic Geochemistry*, *15*(1-2), 293-320.

Line 68-70: Why DOM

Response: Thanks for your concern. We have deleted this sentence. We hope that these revisions and the improved text will be satisfactory.

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?

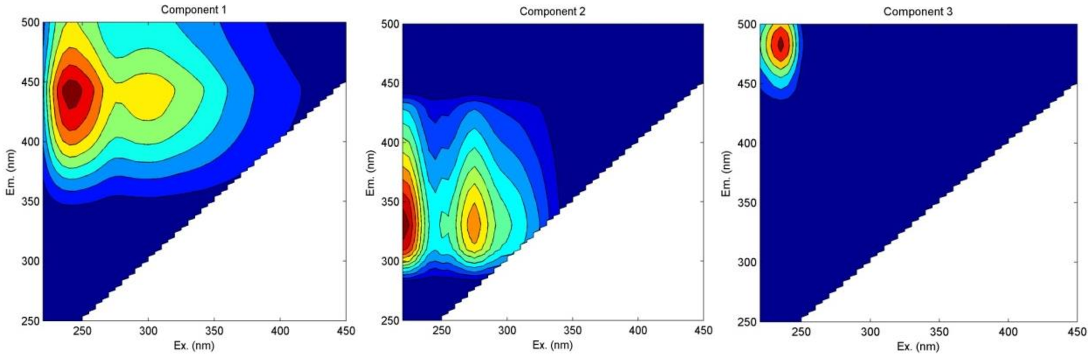
Response: Thanks for your comments. EEM-PARAFAC and EEM-FRI all could be applied to examine changes in CDOM "composition" along flow paths. This type of analysis could aid ecologists in studying CDOM cycling or sources for natural waters, and also could help to track potential wastewater sources in aquatic systems. However, there are some difference between EEM-PARAFAC and EEM-FRI. EEM-PARAFAC analysis can decompose fluorescence EEMs of the complex mixture of CDOM to determine independent source components, without any assumptions about the shape of their spectra, or concentration, or number (Stedmon et al., 2003; Zhang et al., 2010). The data signal is decomposed into a set of three linear terms and a residual array (Stedmon et al. 2003). As for the integrated EEMs dataset, a Raman normalized Milli-Q EEM was subtracted from the data to remove the Raman signal. The size and shape of the Raman scatter peak (excitation wavelength of 350 nm) are dependent on the instrument optics, setup (bandwidths, PMT voltage, etc.) and lamp age. This process may cut some weak fluorescence signal, e.g., soluble microbial by product-like material. EEM-FRI was used to characterize CDOM fractions (acids, bases, neutrals) and, along with model organic compounds, to delineate EEMs into five fixed regions. Quantitative analysis for the FRI technique included integration of the volume beneath each EEM region. Comparison to the EEM-PARAFAC, EEM-FRI could calculate the volumetric interpretation (i.e., $\Phi_{T,n}$) is consistent with the simple emission scans. The FRI technique is more robust because it encompasses the entire EEM region comprising emission scans and not just a single emission scan (Chen et al., 2003).

According to Stedmon and Bro (2008), a similar PARAFAC analysis for the sample dataset in this study is carried out using the DOMFluor toolbox in MATLAB with the "N-way toolbox for MATLAB". To determine the appropriate number of PARAFAC components, the split-half validation procedure was executed to verify whether the model was valid by comparing the emission and excitation loadings from each half (Stedmon and Bro, 2008). The results showed that weak soluble microbial by product-like components have been avoided and weakened by stronger humic-like substances and tryptophan-like fluorescence. Particularly, the CDOM datasets in Tibet were provided low CDOM fluorescence intensity than those in wastewater due to low effect of anthropogenic perturbations. According to your suggestion, we added these discussions about EEM-PARAFAC and EEM-FRI in the line 80~90. We hope that these revisions and the improved text will be satisfactory.

**Table.** The PARAFAC modeling output shows the contour plots of the four PARAFAC fluorescent components

| no. | $Ex_{max}$/ $Em_{max}$ | Coble (1996) | Comparison with other studies by PARAFAC | Description and probable source |
|---|---|---|---|---|
| Component1 | 240/437 | A/C | C4=<250(360)/440 [a] C1=<250/448 [a] | **Terrestrial humic substances.** Fulvic acid fluorophore group. DOM exported from agricultural catchments. |
| Component 2 | 230/350 280/350 | T | C7=280/344 [a] C1=230/344 [b] | **Tryptophan-like fluorescence.** Amino acids free or bound in proteins. Correlated to terrestrial fluorescent material in forested catchments or anthropogenic input. |
| Component 3 | 245/498 | A | C5=270/508 [d] | **Soil fulvic like.** Derived from agricultural catchments and exists in fresh water environments. Biogeochemical processing of terrestrial POM. |

[a] Stedmon and Markager (2005 b); [b] Xin Yao (2011); [c] Murphy (2008); [d] Kowalczuk (2010); [e] Williams (2010)




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

Response: Thanks for your patient review. Totally, we collected 244 water samples from 63 lakes in the Tibet Plateau from 2014 to 2017. Then we classified with these lakes into two groups (fresh water and brackish water) according to salinity or electrical conductivity (Table S1). 135 water samples were collected from 32 fresh lakes, and 109 water samples from 31 brackish lakes. We revised this sentence to have a clearer understanding. In addition, more details about the classified information were added in the new revised manuscript. We hope that these revisions and the improved text will be satisfactory.

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?

Response: Thank you for your concerns. In this study, our objectives was aim to characterize the similarities and differences in CDOM absorption and components among the 63 lakes with similar climatic, hydrologic and geological conditions. Then we grouped these lakes into two groups, i.e., fresh lakes and brackish lakes. All the spatial differences were compared with the averaged values of CDOM fluorescence parameters during the sampling period. The important results and discussion may focus on the effects of environmental factors, i.e., salinity, solar radiation and land cover. Generally, we could consider the spatial difference of lakes.

All the samples from different lakes were collected from June to September. These months is the time that the majority of precipitation occurs (June to September). In the winter the climate is dominated by cold and dry westerly winds which are more pronounced with elevation. Owing to high altitude and thin air, this region has less atmospheric counter radiation. Even in summer (June to September), the average temperature is lower than other regions in China. Then we added these descriptions in the materials and methods according your suggestions. We hope that these revisions and the improved text will be satisfactory.

Materials and Methods –

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

Response: Thanks for your patient review. Unfortunately, we have not achieved the solar UV radiation in the Tibet Plateau during the sampling time due to the location limitation and government management. However, there were some previous studies showed the solar UV radiation intensity in Tibet Plateau. Li et al. (2011) reported that Tibet Plateau has abundant solar energy resources, and the average annual solar radiation intensity reaches 6000-8000 $MJ/m^2$, the highest in China and second worldwide after the Sahara Desert. It also has more prolonged sunshine duration and sunny days in summer than other regions in China, e.g., the average annual solar radiation intensity reaches 4609.7-5581.8 $MJ/m^2$ in Hulun Lake (Wen et al., 2016). Ren et al. (1997) reported that there are strong Ultraviolet-B (UV-B) radiation-penetration inhibiting properties due to dry and thin air with a low concentration of ozone in the Tibet Plateau. We added these descriptions in the materials and methods according your suggestions. Then in the supplementary material, the annual total solar radiation intensity of China and annual sunshine hours of China from Physical Geography of China were shown. We hope that these revisions and the improved text will be satisfactory.

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

Response: Thank you for your comments. All the samples from different lakes were collected from June to September. In this period, there were more most of the precipitation occurs in a year, and this would bring more terrestrial inputs to lakes have introduced the difference between summer and winter was described here. Due to thin air in the highest plateau in the world, it is very hard and sometime even dangerous to collect samples in winter on the Tibet Plateau. We did not collect samples in winter for the current study.

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?

Response: The authors really thank for your comments and concerns. According to your suggestion, we added some statements about sample locations with GPS information. A total of 244 water samples were collected in summer (June to September) from 63 lakes across the Tibet Plateau from 2014 to 2017, and more details could be found in Table S1.

The total covered area is calculated from each lake area ($km^2$) from the satellite images. There are more than 400 lakes in the Tibet Plateau. Most of them are in the depopulated zone in North Tibet, and it is a natural preserve for wild animals. Due to the geographical conditions and government management, it is difficult to get there or not permitted to reach these lakes. As for the retention time for each lake, we derived the information from a reference book (Wang and Dou, 1997), we added the reference in the note of the Table S1. In this study, we selected the representative lakes based on the size, accessibility, the gradient of salinity, catchment landscape features. Then we added these descriptions in the materials and methods according your suggestions. We hope that these revisions and the improved text will be satisfactory. As you may see from Figure 1, that most of the lakes sampled are large in terms of surface area, the lake area is accumulative to 31824 $km^2$ (total lake area: 49388$km^2$), which is about 64% of the total area. Further, the sampled lakes also exhibited a large variability with respect to salinity gradient, thus the sampled lakes are well representative to all the lakes in the region.

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.

Response: Thanks for your patient review. The filtering process was conducted in the field, and these filtered samples were filled into brown plastic bottles every day. They were kept with portable cooler filled with ice pack, and then shipped back to the laboratory by air express as soon as possible. These filtered samples were stored at 4°C until analysis within 2 days in the laboratory.

CDOM of water samples could be filtered through a pre-rinsed 25 mm Millipore membrane cellulose filter (0.22 μm). Generally, for the inland waters and coastal waters, there were suspended matter with fine particles in the bulk samples. These suspended matter in the bulk samples may bring more errors and disturb the CDOM measurement of absorption and fluorescence directly. Referred to the previous studies (Zhang et al., 2011; Zhao et al., 2016; Zhou et al., 2016), We first filter the samples with 0.45 μm pore size to remove suspended matter, and then further filter the filtrate samples with 0.22 μm pore size filters, aiming to achieve the CDOM samples for measuring the absorption and fluorescence. Then we added these descriptions in the materials and methods according your suggestions. We hope that these revisions and the improved text will be satisfactory.

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.
Response: The authors really thank for your comments and concerns. Water turbidity was determined using the Shimadzu UV-2600 PC spectrophotometer with matching 3 cm quartz cells at room temperature (20℃±2) with Milli-Q water as the reference (UV Talk Letter, 2013; Zhao et al., 2016). According to your suggestion, we added these descriptions in the new revised manuscript. We are sorry for our careless mistake about pH in the manuscript. Unfortunately, we do not have pH data for the Tibet Plateau lakes. According to your suggestion, we will add the pH in future field work for CDOM fluorescence. We hope that these revisions and the improved text will be satisfactory.

Line 162: Describe $SUVA_{254}$, Slope ratios, and HIX in more details.
Response: Thanks for your comments and suggestions. According to your suggestion, we described CDOM absorption and fluorescence in new revised manuscript with the 2.6 section CDOM absorption parameters and fluorescence indices. We hope that these revisions and the improved text will be satisfactory.

Line 176~184: Use a table to present the criteria ratios for the different sources. Include appropriate references to cite from.
Response: Thanks for your patient review. According to your suggestion, we presented criteria ratios for the different sources including the references in the Table S2. We hope that these revisions and the improved text will be satisfactory.

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.
Response: Thanks for your patient review. According to your suggestion, we showed the positions of the fluorescence maximum peaks for the major components in the Table S3. We hope that these revisions and the improved text will be satisfactory.

Results –
Line 217: TSM, pH were missing in Table 1.
Response: Thanks for your very patient reviews and comments. We are sorry for our careless mistakes in the manuscript. Unfortunately, we do not have pH data for the Tibet lakes. We will continue to improve them in future work. In addition, we added the TSM data of lakes in revised manuscript. We hope that these revisions and the improved text will be satisfactory.

Line 220: average values and standard deviation or range?
Response: The authors really thank for your concerns and comments. According to your suggestion, we have revised this sentence as following ‘The average values and

standard deviation of all water quality parameters in each lake were calculated and selected to represent overall water quality of the lake.' We hope that these revisions and the improved text will be satisfactory.

Line 224: Turbidity in freshwater lakes are not lower than those of brackish lakes.
Response: Thank you for your very valuable comments. We are sorry for our careless mistakes in the manuscript. According to your suggestion, we have revised this sentence in a new revised manuscript. We hope that these revisions and the improved text will be satisfactory.

Line 228: trophic states?
Response: The authors really thank you for the very careful review. We are sorry for our careless mistakes in the manuscript. According to your suggestion, we deleted this sentence. We hope that these revisions and the improved text will be satisfactory.

Line 240~241: Add lake abbreviation name and numbers to corresponding to the lake numbers in Figure 2. Replace "Fig. S1" with "Table 1".
Response: The author thank for the very valuable comments. According to your suggestion, we added lake abbreviation name and numbers in Figure 2. Then the Fig.S1 replaced Table 1. We hope that these revisions and the improved text will be satisfactory.

Line 248: There was no clear trend between DOC and elevation.
Response: Thanks for your comment and concern. The tendency linear equation of average DOC concentration showed a decreased trend (Slope of the trendline is -0.24) with increasing elevation (Fig. 2a). Then we revised and added the slope in the new revised manuscript. We hope that these revisions and the improved text will be satisfactory.

Line 270: Fig. 3 rather than Fig. 2
Response: Thanks for your patient review. We are sorry for our careless mistakes in the manuscript. We corrected this mistake in the revised manuscript.

Line 278~279: Move to discussion. Need more explanation. For example, the brackish lakes are located in higher elevation areas, resulting in more significant photodegradation, and lower SUVA254.
Response: Thanks for your patient review and valuable comments. According to your suggestion, we moved it to discussion and add more explanation in the new revised manuscript. We hope that these revisions and the improved text will be satisfactory.

Line 280~281: Add lake abbreviation name and numbers to corresponding to the lake numbers in Table S1.
Response: Thanks for your patient review. According to your suggestion, we added lake abbreviation name and numbers in a new revised manuscript. We hope that these

revisions and the improved text will be satisfactory.

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.

Response: Thanks for your patient review and concerns. We added more descriptions about the M ($E_{250}$ : $E_{365}$) in 2.6 section. The ratio of absorption at 250 to 365 nm is used to track changes CDOM molecular weight. Increasing M ($E_{250}$:$E_{365}$) values indicate a decrease in aromaticity and molecular weight of CDOM (Helms et al., 2008; Wen et al., 2016). We are sorry for this mistake. All the water samples from brackish lakes and fresh lakes were conducted to compare the difference with One-way ANOVA analysis. Then there was a significant difference (ANOVA, $p<0.05$) between fresh and brackish waters in M ($E_{250}$:$E_{365}$). With your suggestion, we moved some of the statements to discussion section. The revised sections could be found in a new revised manuscript. We hope that these revisions and the improved text will be satisfactory.

Line 308: Fig. 4a

Response: Thanks for pointing out the typo. We are sorry for our careless mistakes in the manuscript. According to your suggestion, we revised this mistake. We hope that these revisions and the improved text will be satisfactory.

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

Response: Thanks for your patient review. According to your suggestion, we shortened the EEM-FRI results to keep a concise style. We hope that these revisions and the improved text will be satisfactory.

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.

Response: Thanks for your patient review. According to your suggestion, we have moved to the discussion section. As you mentioned, the photo-degradation could alter DOM structure and shape the EEM spectra. The possible driver of this CDOM characteristic in plateau lake is coupled evapoconcentration, photodegradation, and photobleaching, with strong plateau ultraviolet radiation (Wen et al., 2016). The photochemical processing could remove the colored fractions of DOM (Berggren et al., 2018), and three wavebands of solar radiation (UVB, UVA, and PAR) had photobleaching effect on DOM (Reche et al., 2000). In saline lakes with the prolongation of hydraulic retention time and irradiation, the change of molecular structure in high MW CDOM, caused by bond cleavage, may result in its transformation to a low MW pool (Spencer et al., 2012). This would ultimately lead to the difference of the EEM spectra of CDOM.

Berggren, M., Klaus, M., Selvam, B. P., Strom, L., Laudon, H., Jansson, M., Karlsson, J.: Quality transformation of dissolved organic carbon during water transit through lakes: contrasting controls by photochemical and biological processes, Biogeosciences, 15(2), 457-470, 2018.

Reche, I., Pace, M. L., Cole, J. J.: Modeled effects of dissolved organic carbon and solar spectra on photobleaching in lake ecosystems, Ecosystems, 3(5), 419-432, 2000.

Spencer, R. G. M., Butler, K. D., Aiken, G. R.: Dissolved organic carbon and chromophoric dissolved organic matter properties of rivers in the USA, J. Geophys. Res. - Biogeosci., 117, 2012.

Wen, Z. D., Song, K. S., Zhao, Y., Du, J., Ma, J. H.: Influence of environmental factors on spectral characteristics of chromophoric dissolved organic matter (CDOM) in Inner Mongolia Plateau, China, Hydrol. Earth Syst. Sci. , 20(2), 787-801, 2016.

Line 373~386: No significant difference was observed.

Response: Thanks for your patient review. According to your suggestion, we revised this section. ANOVA analysis indicated that there were no differences between $FI_{310}$ and $FI_{370}$ between brackish and fresh lakes.

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

Response: The authors thank you for the concerns and valuable comments. According to your suggestion, we revised this section. We hope that these revisions and the improved text will be satisfactory.

Line 466: negative or positive?

Response: Thanks for your concerns. We are sorry for our careless mistakes in the manuscript. According to your suggestion, we revised this mistake. We hope that these revisions and the improved text will be satisfactory.

Discussions –

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

Response: Thanks for your patient review. The discussion focus on influence factors of the different CDOM fluorescence between brackish lakes and fresh lakes in Tibet. The factors included salinity/solar radiation and land-cover around lakes. Then we revised these sections to make it read more clearly.

Line 497: what tendency? Decreasing?

Response: The authors really thank for your comments. The tendency linear equation of average DOC concentration showed a decreasing trend (Slope of the trendline is -0.24) with increasing elevation (Fig. 2a).

Line 546: Fig. 4 and 5

Response: Thanks for your patient and very careful review. We are sorry for our careless mistakes in the manuscript, and corrected it in the revised manuscript.

Line 555: 2600 h

Response: We are sorry for our careless mistakes in the manuscript. According to your suggestion, we corrected this mistake.

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

Response: The authors really thank for your comments. There are some indices for CDOM absorption or fluorescence, and according to our analyzing results, especially the results presented in Figure 3, CDOM absorption, and spectral slope between brackish and fresh waters are statistically different. Our statements or discussion were mainly based on the statistics between brackish and fresh waters.

Technical corrections:

Table S1: 64 or 63 lakes?

Response: Thanks for your patient review. We are sorry for our careless mistakes in the manuscript. According to your suggestion, we corrected this mistake.

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

Response: Thanks for your patient review. According to your suggestion, we modified this table. Unfortunately, we do not have pH data for the Tibet Plateau lakes. According to your suggestion, we will add the pH in future field work for CDOM fluorescence studies.

Figure 8 c: axis titles

Response: Thanks for your patient review. According to your suggestion, we reproduced the figure, and axis titles were added.

Figure 9: where are c and d?

Response: The authors really thank for your very value comments. According to your suggestions, we revised this section and corrected the improperly statement.