Anonymous Referee #1

Major comments

The authors measured CDOM parameters, i.e., aCDOM(440) and S275-295, of water samples collected from four lakes located at the Mamirauá Sustainable Development, Brazil. The lakes have different geographical settings: two of them are isolated perennial lakes surrounded by flood forests, while the others are lakes connected to the Japurá river. The authors found that levels of aCDOM(440) and values of S275-295 were different between rising and receding periods for the former lakes but not for the latter lakes. The authors found a power trend between aCDOM(440) and S275-295 for all lakes during the receding periods and concluded that S275-295 can be estimated from aCDOM(440) during the receding periods. Additionally, the authors established a model to estimate aCDOM(440) from Rrs determined in stiu by optical sensors. From these results, the authors concluded that "The empirical model relating Rrs and aCDOM (440); aCDOM(440) and S275-295 provided robust statistics indicating the high potential of MSI sensor for estimating S275-295 during the rising water."

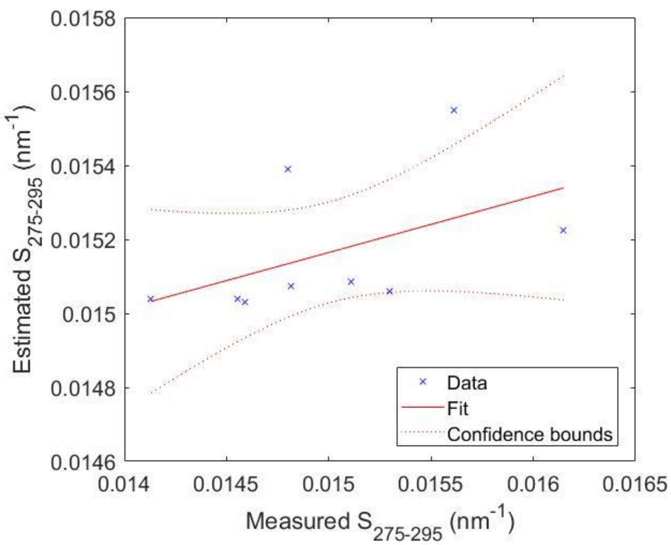
I think the measurements and data analyses in the manuscript were mostly reasonable. However, I could not understand why estimation of S275-295 from Rrs through the relationships with aCDOM(440) was necessary, because the motivation regarding with estimation of S275-295 from Rrs was not described/discussed. The authors referred papers by Fichot et al. (2003) and Vantrepott et al. (2015). Fichot et al. used S275295 for a tracer of terrestrial DOM in the Arctic Ocean. Vantrepott et al. used S275295 as a proxy of ratio of aCDOM to DOC. These previous studies, therefore, clearly mentioned the necessity to estimate the S275-295, in addition to and/or instead of aCDOM, from Rrs. However, in the manuscript, it seemed that the authors estimated S275-295 without clear purpose/motivation. The relationship between S275-295 and aCDOM(440) indicates that possible interpretation about environmental dynamics of CDOM by S275-295 estimated from aCDOM(440) and Rrs are the same with that by aCDOM(440) estimated from Rrs. In other words, the second main objectives of this study "compute S275-295 to examine its potential for distinguishing differences in DOM by comparing them in those two hydrograph phases" can be achieved only from aCDOM(440) without estimation of S275-295 from aCDOM(440). Thus, I think the estimation of S275-295 from aCDOM(440) is not necessary for this study. I think the comparison of aCDOM(440) estimated from Sentinel/MSI imagery and those from in situ measurements, rather than estimation of S275-295 from aCDOM(440), is much important and informative, even though the discussion about the observed relationship between S275-295 and aCDOM(440) is necessary.

Referee#1 Comment 1

The motivation in study $S_{275-295}$ is described in the manuscript (lines 31-37) and is based on the extra information that this parameter gives about DOM. $S_{275-295}$ has being used to estimate DOM molecular weight and sources (Helms et al., 2008; Spencer et al., 2008). Here it was used to understand the DOM dynamic in the four lakes of the floodplain during rising and receding water (lines 242-249).

Regarding the models proposed, we chose to use a_{CDOM} as a proxy for $S_{275-295}$ once a_{CDOM} is a parameter that is usually estimated when studying optical properties of water and, the main reason, because Vantrepotte et al. (2015) proved that their proposed method to estimate $S_{275-295}$ using a_{CDOM} as proxy works better for water with different optical quality (e.g. influence of other optical active components greater than CDOM response) better than directly estimation of it from Rrs. More details about

Vantrepotte et al. (2015) method will be given in the method section as described in the reply to the comment 3. Also, testing the estimation of $S_{275-295}$ from Rrs in our dataset, the validation results are not good in our study area as well. The variation in $S_{275-295}$ does not result in variation in the Rrs.



Unfortunately, no images for the dates that we've the field data are available without cloud cover. Thus, we didn't apply the model to a Sentinel-2 image because the validation of estimated and measured a_{CDOM} wouldn't be possible.

Minor comments Line 15: Please do not use abbreviation (MSI) for the first use.

Referee#1 Comment 2

Change will be incorporated as proposed:" The Rrs was applied to simulate visible bands of Multi-Spectral Instrument (MSI) and used in the proposed models."

Lines 46-48: I could not understand how Vantrepotte et al. (2015) circumvent assumptions in Fichot e tal. (2013), namely CDOM optical dominance in water and co-variation between CDOM and other particulate matter. Please explain the circumventor in detail with more logical manner.

Referee#1 Comment 3

According to Vantrepotte et al. (2015) the reflectance in visible bands is not fully related to changes in CDOM spectral slope in UV domain. These authors also found that the relationship between CDOM and $S_{275-295}$ is strong dependent of water optical quality being particularly conditioned by the dominant contribution of CDOM to the "water absorption budget as well as to a strong co-variation between dissolved and particulate matter dynamics". This conclusion was made based on the application of the model proposed by Fichot et al. (2012) in their broader data set, including different areas with different CDOM quality. On the other hand, their new model could estimate $S_{275-295}$ with better accuracy even when applied to another data set (not used in the parametrization of the model).

The sentence will be changed in the manuscript to: "…marine reflectance. However, the reflectance of water in the visible bands may not reflect changes in the spectral slope of CDOM in the UV domain as shown by Vantrepotte et al. (2015) applying the model in three coastal water regions. Then, these authors proposed the use of a_{CDOM} as a proxy for $S_{275-295}$ as it proved to be less affected by water optical quality and atmospheric correction."

Line84: Please add more explanations about the methods by Mobley (1999) and Jorge et al. (2017b) for readers' convenience.

Referee#1 Comment 4

The radiometric measurements to derive remote sensing reflectance were carried out for all sampling points, using three intercalibrated RAMSES–Trios sensors. The sensors measured above water radiance (L_w, $W \cdot m^{-2} \cdot sr^{-1} \cdot nm^{-1}$), sky radiance ($L_{SKY}$, $W \cdot m^{-2} \cdot sr^{-1} \cdot nm^{-1}$), and water surface irradiance (E_s, $W \cdot m^{-2} \cdot sr^{-1}$), between 350 and 900 nm. During the measurements, the sensors were positioned with azimuth angles between 90^0 and 135^0 in relation to the sun and a Zenith angle of 45^0 to avoid sun glint effects (Mueller and Fargion, 2002). The measurement framework followed Mobley (1999). All of the measurements were made between 10:00 and 13:00 and at least 15 samples were obtained for each measured depth. The dataset was processed using MSDA_XE (TRIOS, 2018) and Matlab. The R_{rs} estimate followed Mobley (1999), with sun glint correction based on each sampling point.

Line 93: How long the authors kept samples in the refrigerator?

Each field mission lasted around 12 days, with 8 days of sampling and the remaining days in transit. Considering that all samples were processed up to 4 days after returning to the lab, the samples were kept in the refrigerator for up to 14 days (8 samplings days + 2 days in transit + up to 4 days to be processed). During this time, water samples for CDOM absorption determination were kept in polypropylene bottles wrapped with black tape.

Referee#1 Comment 5

Line 98: Lambda(ref) and Lambda(0) are usually the same in the equation described in spectral slope parameter (e.g., Bricaud et al., 1981).

Referee#1 Comment 6

We agree. We apologize for the mistake. This will be changed in the manuscript as follow:"

$$a_{cdom}(\lambda) = a_{cdom}(\lambda_{ref}) \cdot e^{-S(\lambda-\lambda_{ref})}, \quad (3)$$

where S is the spectral slope parameter (nm^{-1}) between the wavelength interval of $\lambda - \lambda_{ref}$ and λ_{ref} is a reference wavelength (nm)."

Line 122: Line 84: Please add more explanations about the methods by Vantrepott et al. (2015) for readers' convenience.

Referee#1 Comment 7

This will be changed in the manuscript: "The model proposed by Vantrepotte et al. (2015) based on the ratio of a_{CDOM} (412) and parameterized according to three coastal zones was tested to our data set using a_{CDOM} (440), once Sentinel doesn't have a band in 412 nm. A simple power function (Equation 4) was also tested."

Line 145: “cw” should be defined before use of the abbreviation.

Referee#1 Comment 8

We agree. We apologize for the mistake. This will be changed in the manuscript as follow: “Thus, to determine a_{CDOM} (440), the exponential of the ratio between bands 6 (λcentral wavelength (λcw) =740 nm) and 5 (λcw =705 nm)…”

Figure 2: It seemed that Figure 2 was not appeared (referred) in the text.

Referee#1 Comment 9

We apologize for the mistake. The figure will be addressed in the section “2.3.2 Model calibration and validation”.

Figure 4: In addition to present Figure 4, addition of a figure having log scale of absorption coefficients on Y-axis may help readers’ understanding.

Referee#1 Comment 10

The Figure will be change in the manuscript.

Figure 5: I could not understand how the authors averaged the data. Please explain it.

Referee#1 Comment 11

Samples were collected during four field campaigns (March, April, July and August – Table 1) and two hydrograph phases. Figure 5 shows a comparison between $S_{275-295}$ during the rising and receding hydrograph phases in the four lakes. To be able to compare these two phases, we average $S_{275-295}$ (from the same sampling point) in March and April to plot the $S_{275-295}$ for the rising period and $S_{275-295}$ from July and August (from the same sampling point) to plot $S_{275-295}$ for the receding period. As example, $S_{275-295}$ for Buabua_1 was 0.0145 nm^{-1} in March and 0.0148 nm^{-1} in April, so for the rising period $S_{275-295}$ for Buabua_1 was computed as 0.01465 nm^{-1}. The same method was applied to compute $S_{275-295}$ during receding water: Buabua_1 was 0.0159 nm^{-1} in July and 0.0164 nm^{-1} in August, the resulting $S_{275-295}$ is 0.01615 nm^{-1}.

Line 184: I could not understand the meaning of “high relationship”. Please rephrase it.

Referee#1 Comment 12

The sentence will be rewritten. In the manuscript it will addressed as “significant relationship”.

Lines 213-220: I basically agree with the authors’ discussion about differences in behaviors of CDOM parameters with rising/receding of the water between two types of the lakes. However, it may be possible to explain that the deviated behaviors observed in Buabuá and Mamirauá during the receding periods were simply due to the contribution of water from the Solimões River in which CDOM characteristics are largely different from the Japurá River and around the study region. Figure 1 clearly showed that colors, possibly affected by CDOM and particles, were largely different between the Solimões River and the Japurá River. Thus, I think it’s better to explain/discuss possible differences in

CDOM parameters between two rivers and possible effects by the rivers, in particular the Solimões River, to CDOM parameters in the lakes during the rising/receding periods. In addition, it's better to discuss why CDOM parameters in the lakes affected by the Japurá River were not changed during the rising period.

Referee#1 Comment 13

We agree that the two main rivers (Solimoes and Japura) play an important role in the behavior of CDOM in the lakes and this was discussed in the manuscript (lines 215-241). However, besides the differences in water quality between rivers, we cannot exclude the impacts of water paths through the lakes, once the rivers' water overbank flooding though the forest during the rising phase of the hydrograph. An indicative of the forest as an important source of DOM is the DOC concentration. DOC concentration of Solimoes river is about 5.8 mg/L (Morreira-Turq et al., 2003), while DOC in the lakes is around 9 mg/L. Also, $S_{275-295}$ indicates high-molecular weight DOM present during rising period at Buabua and Mamiraua lakes, while DOM in rivers is expected to have low-molecular weight (Massicotte et al., 2017), indicating that additional DOM is being carry out to the lakes.

References

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