Response to reviewer 1

We would like to thank reviewer 1 for taking the time to review our manuscript and for their useful comments, which will help to shape this into an improved paper. We provide here our responses to each comment made and how we will modify the manuscript as a result. The reviewer's comments are in bold, and our response in normal text.

Row 30: maybe reference to Fig. 1 could be on the row where CC is mentioned for the first time (27)
Yes, we agree - we changed this as suggested. Thank you.

Row 34: increases the carbon stock; does this refer to situation that Cuvette Centrale wouldn't exist? Wouldn't this be easier to say as a proportion of the total carbon stock?
We agree that this would be a better way to express it, and have changed it in the text accordingly. Thank you for the suggestion.

Prior to the Dargie et al. (2017) study, it was understood that there was peat in the Cuvette Centrale, but the extent of it hadn't previously been mapped, and its contribution to the world's tropical peatland carbon stock had been greatly underestimated. Crezee et al. (2022) estimate that it could contribute a total of 29.0 petagrams to the world's belowground tropical peatland carbon stock, equivalent to 28% of the best estimate of tropical peatland total belowground carbon stock. We will replace the reference in row 34 with this proportional reference from Crezee et al. (2022).

Row 91: as Crezee et al. (2022) land classification map is a data of high importance in this paper, it would be fair to describe a bit of how it was constructed (as well as acknowledging its potential sources of error, which may also affect on e.g. detected anomalies)
Agreed, thanks. We will add a further brief description of the random forest regression model they used to classify the land types, and how the accuracy of this map was assessed against ground-based forest inventory data. This will be added to the current row 40, where we first describe how we will use Crezee et al. (2022) data.

We use the Crezee et al. (2022) land type map as the current best representation of the Cuvette Centrale's land type distribution, but it does have inherent errors. They used Balanced Accuracy (BA) as a metric for assessing the accuracy of their derived peatland extent, and calculated a BA of 91.9% (95% CI, 90.2–93.6%). Crezee et al. (2022) estimate their peatland distribution model to have a Matthews correlation coefficient of 80%.
In the current manuscript we mention on line 393 that inherent errors in the land type map may have contributed to the anomalies we observe in our model. We will add quantification of these errors to the manuscript, and make it clearer that these errors will propagate into our model's estimates.

Rows 167-171: I'm not totally convinced of the use of STD in this context; it kind of reflects the uncertainty or inaccuracy of the rainfall estimate, but won't indicate the direction of it. Moreover, high STD may reflect for example a hill or a pit; in the first case it'll probably increase the runoff from the pixel to its neighbours, and in the latter from neighbours to the target pixel. I'm not necessarily suggesting to reject this model term, but use of it is not totally justified, as it won't necessarily indicate any particular tendency per se.
Agreed. The use of this variable cannot indicate the direction of the total amount of water input at any given location in relation to the rainfall amount over that specific location. We used it as a means to account for regions that experience additional in or out-flow of groundwater, as opposed to being directly rainfed. The use of elevation standard deviation was found to be of significance in our model. However, we agree that its use may not be fully clear in this context, and we will therefore remove it from our revised model implementation and recalculate the statistics. This will not impact the interpretation of our results.

Over the RoC sub-basins there is less local variability in the elevation within the 0.05 x 0.1 degree pixels we use than for over the DRC (figure 5), For the DRC sub-basins, the percentage of palm vs. hardwood swamp is strongly correlated with the variation in elevation within the modelled regions (figure 5c). However, for the sub-basins we ran our final model over (labelled RoC and Mixed), the elevation standard deviation was the variable that contributed the least to our model predictions, with a p-value of 0.035, compared with $p << 0.05$ for most other modelled variables (table 1). Removing this variable from our model will not result in a significant impact on the model outputs.

Row 363: what is a "blackwater river"?
We agree that this is not currently made clear within the text. We will add the definition to the manuscript. Rivers, or regions along a river, can be described as black-, white- or clear-water, referring to their colour, the speed at which they flow, and their nutrient content. Blackwater rivers are generally slow moving, dark in colour and low in nutrients due to the leaching of acidic tannins from swamp vegetation into the water. Whitewater rivers are faster flowing, with suspended sediment and higher nutritional content.

Row 419: I'm not sure if "contribute significantly" is the best way to say here; rather, they enable to model the vegetation types at a reasonable accuracy
Agreed, thanks for this suggestion. We will modify this line as suggested.