Dear Reviewer,

Thank you very much for your constructive comments. Below please find our responses to your comments.

Reviewer's comments	Replies
The manuscript presents a sediment source tracking approach using several techniques; most notable are newer spectrophotometric approaches. I have included an annotated pdf with comments and editorial marks. Identifying your approach that you use as "truth" in your analysis to compare other analyses too is critical here. I think you missed an opportunity here to convince the reader what truth is. Your Geochem approach appears to be the best approach alone; your two tables convince me of that alone.	We also consider that the sediment tracing carried out with the geochemistry approach provides excellent results. It is also true that when comparing Tables 4 and 5, the differences between the results obtained with the geochemistry and geochemistry + colour approaches are very limited (around 5 % on average). These excellent results may be explained by the fact that most of the mining contributions estimated by the models are above 60 % for these two events in 2015 and 2017. Above 60 % of the mining contributions estimated by the models, the estimations of mining contributions have been experimentally validated through the analysis of artificial mixtures (7% of error range for both models). Below 60 % of the mining contributions estimated by the models, the geochemistry approach proved to be less efficient, less stable with a higher risk of error (~15%) than for the "geochemistry + colour" approach (~7%) (Figures 3.a and 3.b). If one wants to be able to claim to analyze variable events with mining contributions that may be lower, it is important to specify this limit of the geochemistry approach and to move more towards a more efficient geochemistry + colour approach.
I would check for normality and run a two sample test on your Geochem versus Geochem and color result. Second, I think much more could be done to use element to element comparisons with tributaries and sources noted on scatter plots (different colors or symbols). Table 2 begs for such an approach. Element rations can also be useful here too. A Kruskal Wallace or ANOVA (depends on normality) of elements by trib or land use could id significant differences too. It is not clear how your Mann Whitney test was used?	The objective of the article was to compare two distinct sediment tracing approaches, i.e. the 'conventional' approach proposed by Collins et al. 1996 (i.e. statistical analysis and use of a mixing model) and a more alternative approach based on partial least-square regression models. The statistical analysis as proposed by Collins et al. (1996) is composed of (1) a range test, (2) the Mann-Whitney U test and (3) a stepwise discriminant function analysis (DFA). Our objective here is not to improve the existing approach but rather to compare it with a recent alternative approach. Nevertheless, the suggestions that you make are very meaningful, In the practice, the normality of two populations is rarely verified, which is why sediment tracing

	approaches are mostly based on the use of non-parametric tests. In this case, normality is not verified at the level of the two source samples (i.e. mining and non-mining sources) of our study. The other condition that would eventually allow us to get rid of the non-normality of our source samples and that would allow us to use parametric tests (t-test, ANOVA, ...), i.e. n≥20 is not verified (n = 16 for mining sources, n = 7 for non-mining sources). The use of Mann-Whitney U test (α = 0.05), non-parametric tests, is therefore relevant in the current research, as it allows us to verify that the two source samples are statistically different. As far as elemental ratios are concerned, tests have already been carried out on several elemental ratios to see whether they provide stronger discrimination than elementary contents, but the results obtained with these ratios are not conclusive.
I worry your data is suffering from some multicollinearity, especially with the Stepwise approach. How was this handled/addressed?	In our study, DFA was carried out with the *Statistica* software that automatically eliminates the collinear variables at the time of the analysis.
Can you use linear discriminant analysis with cross validation to predict membership in a trib or land use?	The use of a linear discriminant analysis with cross validation is quite feasible in the study. Nevertheless, here again, the objective of the article was to compare two distinct sediment tracing approaches and not to improve the existing approaches. Moreover, we study a relatively simple sediment tracing case with two sediment sources. DFA alone already provides excellent results. Furthermore, and although this may be a point to consider in future research, it would probably be useful to analyze more samples (≥24) in order to be able to carry out linear discriminant analysis **with cross validation**.

References

Collins, A., Walling, D., Leeks, G. J. L. (1996). Composite fingerprinting of the spatial source of fluvial suspended sediment: a case study of the Exe and Severn River basins, United Kingdom. Géomorphologie: relief, processus, environnement, 2(2), 41-53.