

Review for the manuscript « Temperature signal in suspended sediment export from an Alpine catchment » by Costa et al.

In the presented study, the increase in suspended sediments in the Rhone river after 1987 is statistically analysed and related to hydroclimatic factors and the authors put much efforts into improving their manuscript. The authors improved their manuscript including a more in-depth analysis of the results and more explanations on the methodology and its limitation (sensitivity analysis, discussion on the ice model, ...), which highly increased the quality of the manuscript. Even if the structure in this new version is clearly improved, it still has some issues, that unfortunately still make the study difficult to follow. My concern is that lot of information is spread around the text making the text often repetitive and difficult to follow, since it is often difficult to know where the information can be found. I list some advices below in order to improve the structure of the manuscript. I would recommend the manuscript for publication after some structural revisions.

I disagree with the authors to put part of the discussion in the results and part of the discussion in the discussion part. It makes on one hand the main message of the manuscript difficult to follow and on the other hand it gives to much wait on the ice melt model and on the anthropogenic effects, which both are not the main part of the analysis. This is confusing for the reader and the main message get lost. I would recommend to clearly distinguish the result part and the discussion part. and then to first briefly explain the ice model (results (figure 11 and 12 should be presented in the result part) and then to give the discussion on the main topics, in order to give it more weight.

The introduction contains a large amount of information but it is not straight forward to me what are the main points and goals listed there. The paragraphs 2 and 3 (p.2 l.15-34) are a good example for my concern as I find the entire paragraphs difficult to follow and especially some information is only half given. For example on line 19 : « --- the seasonal dynamics of ice-melt, also directly affect sediment supply. » How does it affect sediment supply ? this is first later explained, partly in the introduction and partly in the methods (p. 4 l. 18-25). I suggest to move everything to the introduction. It makes sense to clearly explain the importance of the different variables in the introduction, to directly make the choice of the variables clear to the reader.

The introduction also contains several repetitions as for example on p.2, l.37-38 « Alpine regions represent... » that was already said on the same page line 1-3.

The two last paragraphs present the research gaps and the goals of the study. Even if they are better formulated than in the last version, it was still not completely clear to me what was the solution the authors suggested to test in their study since traditional rating-curve analysis does not work in their case (p.3, l.4-9). I find the objectives described at the beginning of the methods (p.4, l.14-25) clearer than in the introduction. I would remove them from the method part (where only the method should be described) and include it to the introduction.

p.6, l.15-16 : « MODIS maps of snow cover are filtered to reduce the impacts of clouds on SCF estimation. » How are they filtered ? This is first explained later in the manuscript.

p.15, l.10-14 : « Although... » move this to the conclusion.

Check throughout the text : snow-free and snow free (decide which one to use)

p.2, l. 41 : avoid the word « much »

p.3, l.2 : « ...at least ...» why at least ? what would be the other variables ? And why are they less important ?

p.4, l.1-2 : already in introduction

p.4, l.9 : from which year is the glacier area ?

p.4, l.12 : for which period do you have discharge measurement at the Massa ?

p.4, l.26 : which variables are from observations or from interpolation ?

p.4, l.35 : Has SCF been defined before ? Please reformulate the entire sentence.

Variable names : There is overall lots of variable names. Are SM and M_snow really different variable or SM be M_snow_mean ? Same for ice. It would make the variable names easier to follow.

p.5, l.30 : $T_{sm}=0^{\circ}\text{C}$, is it the same as in literature ?

Equation 11 : k was already used for melt factor, use another name.

p.8, l.4 : « Results confirm the validity of the original datasets... » Which results ? how do they confirm this ? References ?

p.8, l.18 : what is the resolution of the snow cover maps ?

In the manuscript : The abbreviations GLIMS and FOEN are not explained.

p.8, l.25 : Earlier it was said that glacier covers come from satellite. Why now from GLIMS ? please explain.

Overall : avoid the word very.

p.9, l.33 : with upper, is « over » meant ?

p.9, l.39-40 : I would not use « we recommend » as it is not the result of your analysis.

p.9, l.30 : « In Figure 4,... » reformulate the sentence.

p.10, l.10-15 : $mg\ l^{-1}$ (-1 should be superscript), plus the sentences in this paragraph are too long.

p.10, l.18 : where is this significant change to see ? give the figure number.

p.10, l.26 : these OSCILLATIONS may be caused...

p.10,l.35 : doesn't is spoken language, replace with does not.

p.10, l.40 : delete « (transport capacity) » as it is already said and is confusing.

p.11, l.1-11 : belongs to the methods

p.11, l.13 : « due to poor snow cover » refer to fig.9b

p.11, l.33-36 : belongs to methods.

p.12 , l.12 : ...sediment concentration in those months » refer to figure 6c.

p.12, l.16 : « more than 30% » where is this to see ?

p.12, l.40 -43 : why is glacier melt the main cause and not ER ? Please be more precise.

p.13, l.14-22 : move to methods.

p.14, l.5-9 : end on a positive note otherwise it disqualify your method.

P14, l.30 replace by be.

Figure 9 : (d) should be delta ER (instead of IM) on the y-axis. In the description : mean change in (a) snow melt, (b) snow cover fraction,...