

Response to Reviewer 2

We thank the reviewer for their positive and constructive comments, and hope that the amendments outlined below address them

Comment: Page 5 line 5. What is the reference for “over decadal to millennial timescales...into account.

Response: *We will remove this statement since it is not relevant to the manuscript*

Comment: Page 5 line 21-22. “Three terrestrial location ...catchment” This sentence needs to be modified because the three sites can not represent what is coming from the catchment. Even though this is clarified later, it should be stated here as well.

Response: *We will make this clarification, thank you for bringing it to our attention*

Comment: Page 5 line 23-25. Each terrestrial location has three samples analyzed. How different are they on those parameter? Only averages are shown in the supplementary data. Vertical difference could be very significant in permafrost cores.

Response: At each terrestrial location, the three samples were very similar.

We will make sure that this is clear in the manuscript or data tables.

Comment: Page 6 Figure 1. It would be nice to have ICD distribution on this map.

Response: We do not have access to a suitable dataset to show ICD distribution. As a proxy for this, areas of high coastal erosion are likely to be ICD areas, since the weakness of ICD contributes to rapid erosion rates.

Comment: Page 8 Table 1. In the table statement, Tmin and Tmax were not mentioned. Even though T is related to R2 and RA2 ratio, it is still better to keep consistence in statement and table content.

Response: *We will alter the table caption to read “Parameters for classifying Raman spectra into four groups based on their metamorphic temperature (determined from the R2 or RA2 peak area ratio; see Sparkes et al., 2013), and Total width parameter (G+ D1 + D2).*

Comment: Page 9 section 3.2. List of grouping is not in the sample order as the figure 2. It would make more sense to keep the same order.

Response: *We will make sure the list is in the same order as in Figure 1, and update the in-text reference to refer to the correct figure.*

Comment: Page 11. Table 2. I think it would be better to put the three terrestrial sites separately so that it would be easier to compare with individual river outflow.

Response: *We will adjust the table and include the three sites separately.*

Comment: Page 16 line 19-20. “are mostly sourced from coastal erosion”. This may be true. But can you give some grain-size evidence to better support this? What is the difference between coastal inputs and riverine inputs? Which one has higher amount of fine particles?

Response: Geochemical studies have shown that distal sediments are dominated by coastal erosion material (see Sparkes et al., 2016, Bischoff et al., 2016, Vonk et al., 2012). Grain size distributions, coupled with organic analyses, have been measured by Tesi et al., 2016, and

We will reference Tesi et al., 2016, to support our assertion.

Comment: Line 21. “noticeable that YS-102...distal ESASsamples”. Please highlight those dots if you want to talk about them. I did not see three dots that are distinguisingly different from others.

Response: *We will remove this observation, it is not relevant to the discussion in this paragraph.*

Comment: Technical corrections:

Page 2, line5. Period is missing prior to Deepening.

Page 3, line 25. Superscript for -1 Line 29. Delete “and” after power.

Page 5 line 5. Add “than” after “This is a much larger system”.

Figure 5 b: The two colors are too hard to distinguish.

Response: *We will change the text accordingly*