

Responses to Review Comments

In the following, review comments are in *blue italic* font, while responses are in **black normal** font.

Associated editor (Tom Coulthard)

Hello - we have two good reviews from the second round and the first reviewer is happy - and the second would like some minor changes made. I think these should be able to be carried out pretty quickly as seem to require no new data/analysis and amount to some minor text changes and a couple of new sentences. Therefore the manuscript can proceed subject to minor revisions (reviewed by the editor) with no need for further review.

I think reviewer 2's instructions are clear - and will improve the quality of the manuscript - though I appreciate this is an additional step.

Reply: We thank the associate editor's positive feedback and suggestions. Our responses to each question raised by Reviewer #2 are listed below.

Reviewer #2 (Laura Henrika Bührig)

Dear Authors,

I have read with great interest your revised manuscript "Evolution of submarine canyon-fan systems in fault-controlled margins: Insights from physical experiments".

From the present form of the manuscript and your replies to all three reviewers it is clear that you have addressed and implemented the suggested changes, which have contributed to delivering the topic, purpose and results of the study more clearly to the audience.

I already found the initial version of the manuscript generally well written and the figures well conceptualised. After the edits, the manuscript is overall improved in terms of presentation of the results and their discussion. The present version of the manuscript also now better integrates the existing literature relevant to the topic of the study in both the introduction and discussion sections and utilises published data as part of the analyses.

There are still a few issues I find with the current version of the manuscript which I suggest need addressing, but these are of minor to moderate nature. Please find them listed below and see also my annotations in the PDF file of the manuscript in the uploaded attachment.

Reply: We thank the reviewer for thorough assessment of our manuscript and for providing us constructive comments and suggestions. In the revised version, all the comments and suggestions have been considered and changes have been made to improve the manuscript. We added a point-by-point reply in the following.

Moderate points:

(1) Introduction: By expanding the content linking to various studies of deep-water sedimentary systems and their insights regarding the role of tectonic influence as a control on deep-water systems, the introduction section is significantly improved. That being said, I found that in several instances the phrasing lacks clarity and although selected results of some of the studies are cited, the information provided by the original authors linking their findings to processes and controls is

missing in the text (see my comments in the annotated PDF file of the manuscript).

Reply: We have modified the texts according to the reviewer's suggestions in the annotated PDF file.

(2) Currently, I find that there is a disconnect between most of the newly included information in the introduction section and their relevance as an incentive for the aim and objectives stated in lines 110 ff. Because there are various ways to solve this which is not up to me to decide but up to the authors, I will only include two suggestions here:

You could add a sentence or more that establishes a link between the findings from your literature review and your study – as you have done by addressing the paucity in experimental studies that have investigated the long-term evolution of submarine canyons and fans as a function of the combined influence of tectonics and gravity flow processes in lines 110 & 111. You do this later in your manuscript at the beginning of section 4.3 in lines 453 to 456 with regard to metastudies of deep-water systems.

Also, the framing of the study in context of the existing literature might be enhanced by restructuring some of the paragraphs in the introduction section.

Because above points are important for placing the study in context of the literature, knowledge and research gaps, I have listed them under moderate revisions. However, I think they can be easily fixed given that most of the information is already contained in the text.

Reply: We have moved the sentences (Line 453 to 456) from Section 4.3 to Introduction for highlighting the research gaps.

(3) Section 3.4, lines 333 ff.: Based on the text alone it is not clear to the reader whether “we compared the laboratory data with field data (Fig. 12)” and “the obtained results” means that in your Figure 12 you have replotted data that has previously been presented as plots in other publications or whether you have conducted new analyses by utilising published datasets. If/where you refer to analyses conducted by other authors who have plotted their length vs. area data points, it would be useful to also include the figure number in their publication after the reference (“see their Figure X”) to make this clear.

Additionally, in lines 334-336 you write that your results are “consistent with the field-scale submarine canyon length to fluvial drainage area analysed in S2S studies (n=9477, Harris and Whiteway, 2011)”. Please re-check which reference(s) you intend to cite here; the canyon dataset with 9477 submarine canyons is published in Harris et al. (2014). And it is not clear to me to which paper you refer to that has quantitatively analysed scaling relationships between canyon length and fluvial drainage area? The majority of the 9477 submarine canyons in the Harris et al. (2014) paper are slope-confined canyons, and in the Harris & Whiteway (2011) paper only a small number of canyons were classified as Type 1 with a present-day bathymetric connection to a fluvial system.

Reply: We conducted new analyses by utilising the published datasets from different sources (Harris et al., 2014; Lazarus, 2016; Bührig et al., 2022a, see their Fig. 8). We have changed the reference to Harris et al. (2014) in both Figure 12 and the text.

Minor points:

(i) Figure 12: Change “Harris & Whiteway (2011)” to “Harris et al. (2014)."

Reply: We have changed the reference to Harris et al. (2014) in Figure 12.

(ii) There are a few grammatical issues that I have noticed throughout the manuscript. Because I am not a native English speaker there might be more that I am not aware of, but I have highlighted those that I came across in the annotated PDF file that I have attached.

Reply: We have modified the relevant texts according to the reviewer’s suggestions in the annotated PDF file.