Below, we present reviewer's #2 comments and our respective responses in red text.

I reviewed the manuscript of Eyal et al., documenting coarse-grained fluvial and coastal sediment transport around river mouths in the Dead Sea basin, and their connection to atmospheric circulation patterns.

The paper presents new field data about a river delta in an arid environment subjected to base level fall -- conditions which I am not very familiar with. I found it interesting to read, but I noticed I had to go back to the maps a lot to better understand the local geography and the explanations in the text. A map showing the "berm" that is frequently discussed would be helpful.

A map showing the berms that are discussed along the manuscript, appears in Figure 2d; we added to the figure a label highlighting the berms and the silt-clay dark lacustrine sediments on which they are deposited. We improved the referencing to the figure and extended the explanation of the field setup in Sect. 2.1.

I have also some general feedback that I think would me (as a coastal geomorphologist) better understand the paper;

1) I was wondering about the connection between atmospheric circulation patterns and wave transport direction. It seems that, given the location of the delta within the Dead Sea, littoral transport to the North is inevitable and virtually independent of atmospheric circulation. Wave height is determined to a large extent by the fetch, and the only significant fetch is toward the south, which then drives transport to the North. I don't think any other weather types would be visible in the (paleo) record. This does not make it a very good place for paleoclimate reconstructions, but perhaps I am missing something here?

The meteorological analysis shows that both southerlies and northerlies dominate the wind regime along the Dead Sea rift (Figures 3c and S2). However, only the southerlies are of high magnitude and long durations during winter storms (Figure 10e-g), regardless of the fetch available in the study site along the Dead Sea. Thus, although under modern conditions northerlies cannot generate waves contributing to longshore sediment transport because of the limited fetch from the north, they are anyway of lower magnitudes and shorter duration and won't generate significant transport. The inspection of the geometry of abandoned modern and paleo records, strengthens our paleoclimatic conclusions as showing the prevalence of northward unidirectional transport of coarse gravel also during the last glacial period. Then, the lake was larger with a fetch of ~100 km north of the study site. See also the detailed discussion in the end of Sect. 5.3.

The unique configuration of the study site with forced regression, separation between annually formed beach berms, and distinction between the autochthonous muddy lacustrine deposits and allochthonous coarse gravel, enabled to study the modern active environment and then interpret similar hydroclimatic trends in the geomorphology of nearby paleo sediment records.

2) The argument in section 5.1, about coastal berms, I found difficult to understand. The way I read it, it seems to me that the boulder are a tracer of local river-derived sediment. But: the delta geomorphology in this case is a result of river-derived sediment as well as updrift coastal sediment supplied by the waves. This delta seems strongly wave-dominated, such that most of the alongshore transport is updrift rather than river-derived.

A figure could be helpful here to better understand the geography/time evolution of the berms, perhaps also with a mass balance to constrain the fluxes.

We clarified our statements in section 5.1. It is true that the delta is strongly wave dominated and sediment volumes arriving to the coast by the stream are completely transported downdrift alongshore by the waves. Specifically, we added that “coarse sediments are sourced only from the stream with no littoral updrift sediment contribution”.

Sediment fluxes are presented in figure 15b and the geography with time evolution in figure 2d. We better reference these figures now. Furthermore, we improved the description of the field setup in Sect. 2.1 of the regional setting. The study site is unique and enables to directly estimate the annual volume flux of coarse sediments along abandoned beach berms. The stream is an independent source of coarse sediment to the delta and beach berms, according to the following observations: (1) south of the channel mouth there are no coarse-clastic materials and the lacustrine muddy lakebed is exposed, and (2) nearby gullies are local, draining the muddy areas of the shelf and are not connected with a drainage basin upstream, thus unable to transport coarse materials.

3) The relation between transport and orbital velocities is not very clear (around L568). Alongshore transport of sediment is commonly calculated with the CERC formula, or its equivalent. There is a dependence on wave height and wave approach angle. An increasing river flux (from a steepening channel bed) would change the shoreline orientation and thereby also the wave approach angle. An asymmetric wave climate would steer the delta in a downdrift direction (see a study of mine about this for some better explanations: Nienhuis et al., EPSL 2016).

Thanks for this comment. We extended the discussion in the end of Sect. 5.1 dealing with the processes described in Nienhuis et al., 2016 compared with the setup of the Dead Sea. The main differences are the effect of lake level fall and absence of updrift littoral transport in our study site. Although river flux increases with time, the shoreline orientation doesn’t change as waves energy is sufficient to transport the annual flux of coarse sediment along the shore preventing delta grow up\progradation in the channel mouth.

Orbital velocities of the waves\breaking waves are mentioned in the discussion of ‘why would annually increasing sediment volumes travel farther along the shore under a similar wave climate?’. We suggest that larger sediment volume accumulate up to shallower water depth and are subjected to higher near-surface wave\breaking-wave orbital velocities, relative to smaller sediment volumes on which lower fluid velocities are exerted at deeper water depth. Thus, the potential of gravels to travel longer distances along the shore is higher for larger sediment volumes.

Some small additional comments:

L19: "rise" and fall?

We prefer to stay with only ‘fall’ as in this manuscript we deal with the response of streams and coasts to Dead Sea continuous level fall, i.e., the case of geomorphic response to forced regression. Geomorphic responses to lake level rise are related to less frequent rainy winters as we present and discuss in a recent paper by Enzel et al., 2022.

L23: "perpendicular" sounds odd to me. Up, down, left, right? Perhaps write cross-shore vs alongshore, or fluvial vs. alongcoast etc.

We rephrased the sentence.

L29: "dominates"-> dominate

Corrected.

L32: this is the first time you mention that you studied paleo records as well; perhaps include that in your list of methods in L19-20?

We try to be concise as much as possible in the abstract preferring to focus the list of methods to the reach dataset we collected in the past years. Then, we present the extension and implications of the analysis dealing with paleo records a few sentences later.

L40: "also"? as opposed to what?

‘also’ was omitted and the sentence was rephrased.

L43: "jointly" refers to basin and terrestrial controls?

‘Jointly’ refers to the fluvial and coastal conveyers. The paragraph was rephrased. And now it should be clearer.

L58: there is a lot of literature on beach change and climate signals (nao, enso) so I'd be careful with a statement like this if you're not citing every study.

The sentence is written more accurately now: “a large body of research deals with global-scale climate signals and beach change (e.g., Masselink et al., 2023). However, only a small number of studies have associated synoptic-scale CPs with wave climates along the shores of oceans or lakes…”.

L79: inferred

Corrected.

L172: what are ARSTs?

ARSTs = Active Red Sea Troughs. Now it is defined in the right place.

L196: these are very steep waves.

That is true. The word ‘steep’ was added to the description of the properties of the waves along with the sentence: ‘the high viscosity\density of the brine (Weisbrod et al., 2016) may explain the steepness of the observed wave.’

References:

Enzel, Y., Mushkin, A., Groisman, M., Calvo, R., Eyal, H., and Lensky, N.: The modern wave-induced coastal staircase morphology along the western shores of the Dead Sea, Geomorphology, 408, 108237, https://doi.org/10.1016/j.geomorph.2022.108237, 2022.

Masselink, G., Scott, T., Poate, T., Stokes, C., Wiggins, M., Valiente, N., and Konstantinou, A.: Tale of two beaches: correlation between decadal beach dynamics and climate indices, in: Coastal Sediments 2023: The Proceedings of the Coastal Sediments 2023, World Scientific, 337–350, https://doi.org/https://doi.org/10.1142/9789811275135_0031, 2023.

Nienhuis, J. H., Ashton, A. D., and Giosan, L.: Littoral steering of deltaic channels, Earth Planet. Sci. Lett., 453, 204–214, 2016.

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