We would first like to thank Kory Konsoer for their thoughtful review. In the below document, the reviewers comments are in black; our responses are in blue italics.

In "Estimating Sand Bedload in Rivers by Tracking Dunes: a comparison of methods based on bed elevation time-series", the authors present a systematic comparison for different approaches for estimating bedload transport based on dune migration. The methods compared rely on repeat multibeam echo sounding surveys from a reach of the Colorado River during two different field campaigns that exhibit different discharges. The multibeam surveys provide the base data, and three different subsets from the data are selected. The three datasets used in the comparison are, 1) longitudinal transects of bed elevation from the full multibeam surveys, which provide spatial data series, 2) extraction of bed elevation at a single point over time (temporal), and 3) extraction of bed elevation at multiple points over time (temporal). The authors also include synthetic sinusoidal signals that are used to evaluate bedform dynamic of growing/shrinking size that would occur during unsteady flows.

Overall the paper is well written and organized, and the presentation of the results is very clear. The topic of this paper is also of great importance as river scientists still struggle with determining best practices for quantifying bedload transport rates. However, I would recommend addressing a few issues related to the methods and discussion before the manuscript should be accepted for final publication. I outline these below.

Although the data are measured using a multibeam echo sounder, the dataset is not fully utilized and instead only bed elevation profiles are extracted. Thus, the comparisons are essentially spatial series of single beam, stationary single beam, and stationary multi-single beam. It is stated that the reason for this is to account for anisotropy among the different methods equally (page 4, lines 11-14), which is understandable. However, as is stated more than twice throughout the manuscript, multibeam surveys are considered the most accurate due to the high spatiotemporal resolution, yet are not being used to their full potential.

Why have you decided not to include the full three- dimensionality of the multibeam survey when considering sediment transport? If you consider this to be most accurate, then you could conceivably have a fourth method using the repeat multibeam surveys as two dimensional differencing compared to the three "single beam" methods presented in the paper. *This is essentially the ISDOT method (Abraham et al., 2011), which requires there to be conservation of mass over the survey area (all sediment eroded from the area is deposited in the same area). Additionally, this method is designed for bedforms moving at a constant speed, with little to no deformation, and little to no suspended sediment. In our field data, the dunes change speed throughout the day, change shape significantly, and suspended sediment is available. Although the ISDOT method works well in a flume setting, we don't feel that it is applicable to our field data.*

Similarly, it appears as though all the repeat multibeam bed elevation profiles have been averaged into a single value for the area of interest. Why not keep these separate and evaluate the comparisons spatially? *The repeat multibeam profiles are only averaged at each location, so within the area of interest there are 40 daily bedload transport estimates. We compute a daily average at each location because it is directly comparable to the measurements made by single beam and multiple-single beam echosounders. The CDFs in this paper illustrate the distribution of daily average bedload transport estimates for the entire area of interest.*

From the bed elevation raster shown in figure 1 there appears to be quite a difference in elevation and bedform size from the left bank (higher bed elevation) to right bank (lower bed elevation). Is there a systematic difference in the comparisons from left to right? If so, is it related to bedform dimensions? *We have added a section to the results to address this point. Please see section 3.5 in the updated manuscript.*

This spatial information would be extremely relevant for the discussion section. In particular, one of the topics I felt was missing from the discussion was how the findings of this study can be used to provide insight on where stationary single beam sensors could be installed. My understanding is that most single beam sonars are attached to bridge piers or off banks/docks. If a spatial component of comparison is included in this paper, it would be possible to inform deployments in future studies. Do your comparisons show less agreement between the methods closer to the bank? These are questions easily answered from your dataset without much additional analyses. *We have added a paragraph to the discussion section to address this point. Please see page 10, line X6*

Could you provide more information on how the cumulative density plots are prepared? It is stated on page 4 line 30 that Eq. 1 is averaged over a dune field. There is no mention of how the CDF are prepared. How many bed elevation profiles are needed before a 'stationary' average bedload transport rate is obtained? How far apart do the lines need to be? Answers to these questions could help guide surveys using boat- mounted single beam sonars. (it is stated that this is not of concern for the paper, however the extracted profiles from the multibeam survey is essential that). *Equation 1 produces a bedload transport estimate that is the average for the entire bed elevation profile. This is because we are using an average bedform height and average dune celerity. Therefore, each timestep at each location has one bedload transport estimate. We then average all timesteps at each location for a daily average bedload transport rate. Thus CDFs for*

repeat multibeam July data contain 20 estimates of daily bedload transport while repeat multibeam CDFs for March contain 40 daily bedload transport estimate. Single beam CDFs contain 20 and 40 bedload transport estimates for July and March data respectively.

There is reference to a figure 5 and figure 6 on page 6, but figures are only 1-4. I have attached an annotated pdf with other technical issues. Please see for grammar and other comments.
Thank you and apologies for the confusion. Those figure references were for a previous version and were mistakenly left in this version.

Please also note the supplement to this comment: https://www.earth-surf-dynam-discuss.net/esurf-2019-38/esurf-2019-38-RC3- supplement.pdf
We have corrected the grammatical and spelling errors highlighted in this supplement.