· The authors use an ANN to derive a nonlinear relationship between several river hydraulic variables and sediment transport rate. This machine learning technique and many others have been extensively tested in the last twenty years in many similar studies that the authors overlooked. Thus, I do not think that this study adds something new to the existing literature and I suggest rejection of the paper.

Thank you for your feedback. We did a thorough literature review for this work which is presented in the Introduction. We would like to highlight that there are numerous studies that have used machine learning (ML) to predict sediment load for a specific site such as the work by Asheghi & Hosseini (2020). However, to our knowledge, there are three key studies (Bhattacharya et al., 2007; Kitsikoudis et al., 2014 & 2015) that presented a model for fluvial sediment transport, potentially applicable to other sites and comparable to this work. This is reflected in the paper within the introduction. The work by Kitsikoudis et al. (2015) is limited to sand bed rivers. An advantage of this manuscript is that the large number of field sites includes sand, gravel, and mixed bedded sites and is therefore broadly applicable. The work by Kitsikoudis et al. (2014) focuses on bedload transport within gravel-bed rivers, however the dataset is primarily drawn from a limited geographic region of the United States (Idaho, King et al., 2004). These data are generally of high-quality, however they occupy a limited portion of the river parameter space and tend to be steeper, coarser grained, and shallower than average which limits relations derived on these data to similar geographic locations (see Phillips & Jerolmack, 2019). A significant advancement of the current manuscript is the larger parameter space of river variables which allows for a significantly broader application of the model. Further, the work by Bhattacharya (2007) is limited to only 407 data points while the input to their model are derived parameters rather than direct measured values as noted within the manuscript which may reduce the broader applicability of the manuscript. There simply is not a large body of literature on the application of machine learning models to bedload transport and, to the best of our knowledge, it does not stretch back 20 years. There are a handful of site-specific studies which we will incorporate into a revised manuscript, however site-specific analysis is not the goal or advancement of this study.

A goal of this manuscript is not to have the most cutting-edge machine learning model, but a tool that can be used for prediction in the absence of long-term monitoring of bedload transport measurements. A significant strength of this manuscript that is absent in the previous literature is that the current ANN model achieves strong predictions using primarily static variables that describe the river reach alongside the river discharge which is monitored at a significantly larger number of sites across much of the United States and Europe where these data were measured. The ability to compute bedload transport for sites within the bounds of the testing data parameter space based on channel measurements that can be made at low flow and a hydrograph represents an important step forward for estimating bedload transport.

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