Comment on esurf-2022-45
Oliver Francis (Referee)

Referee comment on "Back to pristine levels: a meta-analysis of suspended sediment transport in large German river channels" by Thomas O. Hoffmann et al., Earth Surf. Dynam. Discuss., https://doi.org/10.5194/esurf-2022-45-RC2, 2022

Review of Hoffmann et al “Back to pristine levels: a meta-analysis of suspended sediment transport in large German river channels”

In this manuscript Hoffmann and colleagues analyse the suspended sediment concentration (SSC) and load of 9 large river catchments in Germany. Over a 20-year period (1990 – 2010) they find that nearly all (49/62) of the measurement stations recorded a continual decline in mean annual SSC. By the end of the measurement period the SSC seems to be closing in on a natural base level previously observed before human activity in the Rhine valley. The authors then analyse multiple possible driving processes for this trend. This analysis is thorough but they are not able to propose a single likely process driving this trend and so instead suggest a combination of smaller factors, such as soil erosion controls and small-scale flood defences may contribute to the observed trend.

I enjoyed reading this manuscript and found it very thought provoking. I thought the analysis on the whole is thorough and well done, but I feel some more comparison between the basins/stations could offer some insight into the proposed controlling factors. For example, catchments with higher arable land use percentages could be more impacted by any change in soil conservation practices while catchments which have seen flooding in the recent past are more likely to be targeted for flood defences such as rainwater retention basins potentially resulting in a greater decline. Comparative analysis between the catchments may offer some more support for the closing arguments which is currently lacking. I believe these changes, and some other line by line comments I make below, would be minor in nature.

Line by line comments:

Line 44: Waterways may need a definition
Line 63: Rainfall erosivity needs a definition here

Line 63: Periode should be period

Line 65: The original area could be included to add some further contextualisation about the impact of this change.

Line 72: It is not immediately clear what is meant by Work-daily. Perhaps a short definition is required.

Line 144: It is not clear why the Mann-Kendall test is being used or what it tests from this description.

Line 145: I also found the description of the Sen’s slope unclear. What is the magnitude of the trend?

Line 145: Calculate should be calculated

Line 171: “identify changes is suspended...” should be identify changes in suspended...

Line 172: Units of these metrics would help to explain them.

Line 173: I am not sure what is meant by “reactivity of river catchments”

Line 180: When is the log-linear regression analysis used?

Line 184: Missing word: "Surface **runoff** generating rain fall events".

Line 202: rainfall erosivity still needs a definition.
Line 231: Why is there no change seen at these 6 stations? Could there be any information derived from these stations? (and again on lines 255 and 260 for the seasonal data).

Line 270: Do these analysis techniques identify the same stations as not changing?

Line 349: “Decreases in suspended loads”

Line 366: “into the Black Sea”

Line 378: TOC needs a definition

Line 419: The reference to Figure 7 should be to figure 9.

Line 423: Is the rate of the decline between 1990 and 2010 worth discussing? It is 10x times faster than what is potentially seen in the stratigraphy.

Line 433: It is not clear what “an increase in rainfall erosivity between April and November by 2.1 % per year or 42 % from 1990 to 2010” means. Is there an increase in erosivity each year between April and November?

Line 438: The acronym USLE is not defined

Line 455: It is not clear where this data can be seen in figure 10.

Figure 3: The points for stations with no significant difference are not always easily visible