

## ***Interactive comment on “Increasing turbidity in the North Sea during the 20<sup>th</sup> century due to changing wave climate” by Robert J. Wilson and Michael R. Heath***

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We again thank all of the reviewers for their helpful comments. The responses helped us clarify certain weaknesses in the text, especially in the figures. We have therefore modified two of the figures to provide greater clarity about the model results.

The first figure shows 1) an annual climatology of bed shear stress and b) the ratio of wave-only to combined wave and tide bed shear stress. The first version of the manuscript showed a seasonal climatology of bed shear stress. However, we agree with the reviewers that the seasonal pattern is not easily visible. We have therefore switched to a simpler annual climatology. The reviewers' comments made us realize

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that a key part of the story was missing from the original manuscript. The long-term influence of waves on bed shear stress is not simply down to how much waves change, but whether a region is wave or tide dominated. For example, in tide dominated areas, changes in waves will make little difference. We have therefore added a panel showing a climatology of the ratio between wave-only bed shear stress and combined wave and tide bed shear stress. This shows that regions such as the English Channel will experience little change due to waves, while in the North Sea there is a strong east-west difference in the relative influence of waves. This helps explain some of the geographic patterns in 20th century shear stress.

The second modified figure combines the 20th century changes in bed shear stress with that of significant wave height. Again, this was prompted by the comments of the reviewers. This shows, in combination with the previously mentioned figure, that the geographic pattern in changes in bed shear stress are due to both changes in waves and whether how wave-dominated a region is.

The figures are attached as a supplementary pdf.

Please also note the supplement to this comment:

<https://www.ocean-sci-discuss.net/os-2019-52/os-2019-52-AC4-supplement.pdf>

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