Anonymous Referee #1 Received and published: 4 December 2018

The paper focuses on the prognosis of suspended matter concentrations in rivers. For this purpose the authors use the program combination of TELEMAC and SISYPHE. Testing area is the Orne river in north-eastern France. The authors state that TELEMAC/SISYPHE in its original version can only handle two sediment classes which is not sufficient in case of the natural grain size distributions. Therefore, the authors enhanced SISYPHE for handling 10 fractions. As a result, the simulated suspended sediment concentration (SSC) is markedly improved when the natural sediment mixture is represented by not only two but 10 fractions.

We thank the reviewer 1 for his comments.

A special problem arises in the Orne River (and so in different other rivers) due to cohesive parts of bed sediments. The authors, on the one hand considered an erosion and transport behavior of the non cohesive sediments parts, not influenced by the cohesives, as long as the latter are less than 30%. On the other hand, beyond 50% cohesives the cohesive regime is assumed. It is recommended to explain this assignment in more detail. Also, a more deeply explanation why it is possible to linearly interpolate between the behavior of cohesionless sediment with that of cohesive parts (page 5, line 18).

We thank reviewer 1 for this remark. We will further explain this assignment in the revised version of our manuscript. The evaluation of erosion and deposition of the sediment mixture "cohesive and non-cohesive" we used is exactly the same as the official version of SISYPHE: it is based on the modelling framework previously proposed by Waeles (2005) inspired by Van Ledden (2002). This empirical approach to evaluate erosion fluxes of the sediment mixture was developed from experimental results (Van Ledden 2002, Torfs 1995, Panagiotopoulos 1997): these experiments clearly show the influence of the mud content on the threshold of movement of sandy bottom. In Panagiotopoulos (1997), for example, it was shown that the threshold for initiating sand motion varies as a function of the mud content (between 0 to 30%), increases substantially between 30 % to 50 % mud contents and finally reaches the mud's critical shear stress for mud content higher than 50%.

As highlighted by Reviewer 1, the main arbitrary choice made in SISYPHE (according to Waeles (2005) and Villaret (2010)) is to linearly interpolate between the erosion behavior of cohesionless sediment and that of cohesive one between 30% and 50% mud contents. Other authors (Mitchener and Torfs (1996) and Jacobs et al. (2011)) suggested to apply cohesive sediment erosion behavior from 30% of mud on. However, one can argue that the linear interpolation may induce a smoother transition between cohesive and non-cohesive sediment behaviours. We agree that testing other approaches that the one implemented in Sisyphe would be of interest in general, but one can argue that other approaches implemented in hydromorphodynamic models are rather similar and we believe that it would go beyond the scope of our paper. Consequently, we decided to use the original equations implemented in Sisyphe to simulate sediment mixture erosion.

However, a main message of this paper is that the TELEMAC / SISYPHE software is now being enhanced for use with 10 sediment fractions instead of just two. This is of interest especially to TELEMAC / SISYPHE users, but not to the wider community. The part describing TELEMAC / SISYPHE covers 1/3 of the paper. The second part leads to the conclusion that in the Orne River a simulation with 10 grain fractions at SSC gives a better result than just two fractions. That was expectable. It must also be noted that there are already other hydromorphodynamic software systems, eg, DELFT and MIKE (and others too) which have been multi-fractional for many years and work with a large number of soil layers. Also hydro-morphodynamic programs for especially fluid mud have been developed.

Before this background, it is recommended to shift the main content of the paper from an enhancement of the software to a better understandig of physical effects/processes. An example could be the interaction and erosion behavior of cohesive and cohesionless sediment within mixtures and their modeling.

We thank reviewer 1 for this remark and we agree that the main objective of the paper is not to show a further development of Sisyphe only. We exposed the developments of SISYPHE in order to allow enable the understanding of the developments that have been carried out. As suggested by reviewer 1, the main objective of our paper is to evaluate how crucial it is to set up a hydromorphodynamic model using a realistic grain size distribution (based on in situ data). We consequently believe that our study is useful for a wider community than the users of TELEMAC. We will consequently edit the manuscript for better highlighting the main objective.