My second review will largely be in line with the first. I'm still of the opinion that the manuscript is promising and worth publication, but needs significant work to be of the quality expected by the journal. I appreciate the effort put into the second version of the manuscript. The writing has improved in the newly added text (as seen from the blue of the manuscript with tracked changes).

Some of my earlier remarks have not been dealt with satisfactorily. Some responses are fine, but stayed restricted to the rebuttal, and these comments or suggestions did not appear in the manuscript to help the reader. I still think the manuscript needs major revisions for publication.

I start with my general comments, which actually follow the exact same comments provided in my earlier review, with more explanation:

General comments.
G1. The first comment is the same as in my previous review, to which I am not satisfied with the authors' response. No 3D or 2DH results are shown; it is also not mentioned that these are not shown intentionally. The word 3D is even in the title. Given the current writing, as a reader, I cannot be sure the model functions well for 2D bathymetries. Especially as the authors explicitly state that the bedload saturation process is only formulated for a 1D setting. Repeating, I would see either (1) a motivation in the manuscript explaining why showing a 3D model is not necessary, or (2) a reason how the results can be extended to 3D or how this is left for future work, or (3) see model results from a 3D simulation.

G2. The quality of writing still concerns me, with examples highlighted below. In the rebuttal, the authors state they prefer to focus the manuscript as the "paper is already quite long", but consider it worthwhile to leave context to "to keep the seminal works in the presentation of the sediment transport community." I think much redundant information is provided; leaving this out will significantly reduce the length of the paper. Also repeating the statement in my first review, either (1) add the historical framing to the aim of the overall paper in the introduction, or (2) remove the historical context as it does not contribute scientifically. Overall, I leave the decision on the style of writing and providing the reader with all the options that are not implemented to the editor. However, I think the quality of English needs to be improved to increase readability. Please consider using language support or a grammar tool (e.g. Grammarly). See the list of suggestions below.

G3. Model performance has been added, which I appreciate. I think the framing should be more embedded rather than a separate, stand-alone sentence at the end of every paragraph. Furthermore, as stated in my first review, I think a comparison or discussion of the computational speed is valuable. 50 seconds of physical simulation time taking 10h of calculation time seems like a lot to me, similar to the computational time required for the migrating dune. These simulations are all RAS, let alone what the computational time will be for LES. A discussion on whether the provided model is still usable for most engineering applications is fitting.

G4. There is still no discussion. I expect an extensive discussion of the results after Section 5, before the conclusion (not integrated into the conclusion). Especially, as the focus of the paper is to provide in an open-source model alternative, a section with outlook, model improvements, and next steps would be appropriate.

Medium comments
Below are some comments provided that I think require a significant amount of work and can significantly change the overall structure of the report. The numbers below refer to the linenumbers.

- 171-193, rewrite. The order of appearance is incorrect. You claim in 172 that table 2 shows q_b, but table 2 shows phi_b. In 183 you claim table 2 contains $theta_c$, but table 2 shows $theta_c^0$. Consider first introducing $theta_c^0$, and then how it relates to $theta_c$ (eq 12)
- 201 the authors talk about "user", but this section contains the "Mathematical description". To me, as the reader, the code does not exist yet. This also relates to the very technical references in Table 2 like bedloadProperties, which the reader does not yet know what it is. Please consider introducing the overall structure of the code first, which then provides the complete structure of the model setup in section 2. Alternatively, only focus on the mathematical model, and do not show any code-specific terminology yet. I think this requires careful attention.
- 221-224 Here the authors mention that there exists no 2D formulation, how can I now be sure that the model works for 2D bathymetries?
- 390 + 407 The method to deal with non-erodible layers is not embedded in the manuscript well, while this is not trivial. Is this also really a boundary condition or does this change the physical processes? Please reconsider the framing in the manuscript.
- Figure 13 uses a time integration scheme that was shown by Figure 14 to be the best. Re-order the section. First show about the time-integration schemes.
- Section 5 contains only a subsection 5.1, no 5.2. -> Restructure
- Section 5 does not present the used mesh

Specific comments
Below are line-number-specific comments that require careful attention.

- Use of references is inconcistent, sometimes it is "equation 7", sometimes "Eq. 7", rephrase everywhere. Just like section and Section.
- 54 remove the sentence about scour, the manuscript doesn't do anything with it.
- 73-80 use subsection references as a guide for readers, e.g. "beginning with the hydrodynamics in 2.1"
- 91-92: how does this show? Is the density constant? Please explain in the manuscript.
- 104: "only the ... is used in this work" -> does this mean the others do not work or can the user still use them? Please explain in the manuscript.
- 106 "and was initially derived for aerodynamics study." Not sure why this is relevant

- 104-113 can be combined into a single sentence: "The k-omega SST model employs the strengths of the k-epsilon model (Launder and Spalding, 1983) to accurately capture free shear flows, and k-omega model (Wilcox et al., 1998) to capture adverse pressure gradients and boundary layers, combining them using a blending function (Menter 1994)." This is one of the examples where to my opinion many redundant sentences are used.
- Table 1: parameters d, n and c_s^{max} are not explained in the manuscript yet when this table shows.
- Equation 9, parameter d is not explained.
- Remove figures 2, 3 and 4. You claim your paper is getting long and to me they do not contribute to the story.
- 171-180, properly introduce τ_b the first time you mention it.
- Table 2 contains ϖ, η_b which are not introduced in the text yet when the table is mentioned.
- Table 2 misses fixedvalue in the shields number formulations.
- Table 2 should mention θ_c^0 and ϕ_b in the caption.
- 219 q_{sat} is not boldface, it is 1D.
- 235 "However, this boundary condition is not suitable for cases in which the assumption of local equilibrium at the reference level does not hold." Circular reasoning, rephrase.
- 242 – 248 move to separate discussion.
- Lines 272 and 275 are exactly the same, rephrase the paragraph.
- 299-301 Vague, I do not understand it. Rephrase.
- 302-310 To my knowledge, you have not written or adjusted the PIMPLE algorithm. Please just mention you use it and cite.
- Figure 5 needs more explanation in the caption
- Figure 5 shows q_{sat} as boldface, but you mention that it only exist in 1D formulation. Please explain in the manuscript.
- 319 e_g is already defined in line 136.
- 321 + 547 and elsewhere. Consider whether it shouldn't be "integration" every time you talk about "discretization" in the sense of Exner. For example, "Adam Bashforth 2 integration scheme".
- 326 mentioned 1D cases and 3D cases, what about 2D cases? Or do you mean 2D instead of 3D because the bathymetry is 2D right? Please explain in the manuscript.
- 341 – 344 explain how the interpolation leads to a filter, what kind of filter is this. At this point it is also not clear whether it is desired or an unwanted artefact.
- 370-375 move to a separate discussion. Just mention it is not implemented and refer to the discussion where you discuss the alternatives and implications.
- Figure 7 needs more explanation in the caption
- 406 Morphological acceleration factor is never explained in the manuscript. Explain the reader what it is and how it is used.
- 438 It is not to validate the whole model, only the suspended load part.
- 447 $z+$ is the non-dimensional distance, rephrase.
- 459 qualitatively should be quantitatively right?

- 474 are these hypotheses or assumptions? In line 482 you call them assumptions.
- 481 "They performed a separation of variable and used the Sturm Liouville theory to obtain a solution which only depends on the Rouse number." Not sure why this is relevant. Remove.
- 489 "from the inlet and last the turbulent eddy-viscosity" do not understand the word "last" here
- 511 "for instance by playing with the boundary conditions" playing is informal, rephrase.
- 512 is an "adjustment parameter" not just a calibration parameter?
- 530 – 532 remove "A shock occurs … one negative slope" this is not relevant.
- 563 you explained to me in the rebuttal what linear-upwind is, but to me as a reader it is still not clear. Add it.
- Figure 15 not clear what n_x is.
- Figure 15 I do not understand the top y-axis.
- 600 – 609. Order of presentation needs to change. You first talk about input, then about results "pronounced slopes form", and then you go back to the input parameters.
- 601 + 607 +612 contain the same information: "sediments are injected at the top boundary condition with a constant concentration" and "A constant flux of sediment is injected during 7 seconds" and "At 7 seconds, sediments stop being injected"
- 631 "the dune morphology rapidly changes from an initial conic shape obtained by deposition of sediments in still water" I do not understand this sentence, rephrase.
- Page 31 could you explain me and the reader in the manuscript why you chose to do 2DV modelling and make a source term for the walls instead of just modelling the walls directly with the 3D model?
- 666 "As the dune is transported by the flow", the dune is not transported by the flow. The dune migrates due to a divergence in sediment transport (by the flow), causing bed level changes. Rephrase.
- Figure 20 I don't get why you show the reader this figure. Also in the rebuttal you claim that "OpenFoam has been validated extensively for the flow hydrodynamics in various configurations.", so you don't need to show this right?
- Figure 20 needs more information in the caption
- Figure 22, top y-axis is unclear with only one value shown.
- 752 + 757 contain the same information: "It was also found that the inertia of sediments transported as bedload was essential" + "It was also found that the inertia of the sediments transported as bedload is essential for describing"
- 755 "the turbulence model and the numerical scheme used to discretize the advection term in the fluid momentum equation must be chosen carefully" you did not vary the turbulence model if I understood correctly.
- 767 "Beyond possible future developments, such as the addition of a free surface, accounting for multiple grain sizes or modelling cohesive sediments" This deserves its own section in the discussion, future model development.

Technical

Below are purely textual comments.

- 41: 3D models -> 3D hydrodynamic models
- 46 integration -> implementation / consideration
- 101 two-equations models
- 155, vague, rephrase
- 165 remove "in their article"
- 165 Felix Exner -> Exner
- 180 Albert Shields – Shields
- 228 remove "in his work"
- 245 need -> needs
- 245 a bad -> bad
- 255 non physical -> non-physical
- 255 "important" vague and informal, rephrase
- 255 remove "in their work
- 334 faces -> face
- 351 "The mesh vertices new coordinates" unclear, should be " vertices' "?
- 370 remove "in their work"
- 382 "main folders." -> "main folders, further explained below."
- 388 k -> k (k)
- 420 "Then" -> "Next,"
- 428 results -> results
- 487 hypothesis -> hypotheses or assumptions
- Figure 9 pseudo-analytical
- 520 considered -> assumed
- 512 remove "the"
- 528 bed form -> bedform
- 534 top of the dune -> dune crest
- 537 "it is needed to" informal, rephrase
- 551 "becomes important" informal rephrase.
- 554 "brings up" rephrase
- 557 filter, however -> filter. However
- 573 z_b^n -> $z\_b^n |\_f$
- 617 "verified" inappropriate use of the word, rephrase.
- 630 "Sandoungout and called" -> Sandoungout, called
- 631 "first one", no idea what this means
- 636 "the top by a rigid lid and is entirely filled with water." -> "the top by a rigid lid" (by definition of the rigid lid)
- 636 "sphericity. Their" -> "sphericity, with"
- 640 compare – compared
- 662 remove m_0, has no purpose
- 672 – 673 regarding … domain. Awkward sentence, rephrase
- 675 boundary. It corresponds -> boundary, corresponding
- 680 remove "accelerate and"
- 685 "tunes", again a different word for calibrate?

- 693 under estimate -> underestimate
- 705 "A last key parameter is the formula chosen to calculate the bedload transport" a formula is not a parameter, rephrase
- 712 "a last", rephrase, 705 already mentioned a "last" point.
- 727 unchanged and regarding -> unchanged. Regarding
- 730 n the case -> In the case
- 694 unclear what "wall unit" is.
- 733 experience -> experiment
- 762 Using the -> The

Commas :

More commas are required to improve the readability and proper English of the manuscript. Below are some examples. Please critically go over the entire manuscript to find cases I missed.

- 87 (LES),
- 102 TKE, respectively.
- 138 fall,
- 144 fluid, respectively.
- 149 one,
- 182 literature,
- 182 Renolds-dependent,
- 215 water,
- 238 cells,
- 245 regions,
- 256 0.3, which
- 274 fine,
- 278 equation 7,
- 296 problems,
- 311 computed,
- 312 Lastly,
- 384 names 0,
- 418 presented,
- 428 gravity,
- 429 w_s,
- 449 instead,
- 486 identical,
- 499 inlet,
- 505 inlet,
- Figure 9 enforced,
- 512 level,
- 548 solution,
- 549 time,
- 554 prediction,
- 558 instabilities,

- 564 instabilities,
- 611 1.14s,
- 637 7.67cm.s−1,
- 639 2.78cm.s−1,
- 659 improved,
- 666 flow,
- 667 increases,
- 671 one,
- 693 and,
- 702 table 2,
- 703 dune,
- 723 x_h,
- 727 velocity,
- 729 load, respectively
- 695 surprisingly,
- 733 and,