Dear Thomas Poulet, dear Fabian Walter,

thank you for your comments! The points are discussed below, where changes to the manuscript are highlighted in bold letters. Line numbers refer to the version with highlighted changes.

Best regards,

Stefan Hergarten

Reviewer 2 (Fabian Walter)

The manuscript version by Stefan Hergarten has undergone improvements in clarity and explanations to bring it up to publication quality. At this point, my main remark concerns the extent at which the reader should be presented with background information to understand the paper's findings. My point of view is skewed, since I am not a modeling expert. Nevertheless, I restate those remarks, which the author finds are unnecessary to address below and leave it up to the editor to make a decision. In addition, I list minor comments and corrections.

I want to thank Stefan Hergarten for this accessible contribution and his explanations in the rebuttal letter. I learned a lot!

Nice to hear! I felt a bit bad since you obviously spent much more time than reviewers typically do, but the time was not entirely lost then.

COMMENTS

From the rebuttal letter, I understand that the author does not share my point of view that all stated information including equations that are not straightforward to derive have to be referenced. I still believe that this is essential for technical writing and do not share the view that information can be assumed known if it appears on Wikipedia articles or in the form of similar but not identical equations in the scientific literature. Adhering to this practice makes information tractable and avoids propagation of incorrect assumptions and findings.

I learned that many authors adopt equations and even results with references, but without understanding the context. I honestly believe that this practice contributes more to the propagation of incorrect assumptions and findings than writing fundamental equations without a reference. Since all equations are developed step by step (perhaps sometimes a bit too fast), I guess that the problem is still the shallow-water equations (Eqs. 6 and 7) and the simplest form of the Navier-Stokes equations for an inviscid fluid (Eq. 8). **I added some more details about what can also be found in the book by Vreugdenhil and what is new here (lines 124–133).** Concerning the acceleration term (starting from Eq. 8), it was already stated in line 134 that it is the same as assumed by Savage and Hutter (1989). I simply do not want references to papers which also used the Navier-Stokes equations for justifying such fundamental equations.

Abstract: I find the last sentence unnecessary at this point of the manuscript.

I also do, but I remember that other people from your institution almost forced me to state it each occasion that only RAMMS should be used for operational hazard assessment. **Anyway, I am happy to remove this sentence from the abstract (lines 11-12).**

Lines 59 and 60: A sentence stating why a particle-following coordinate system avoids numerical diffusion would be helpful.

I would already have written such a sentence if it was easy. People who are familiar with the numerics of advection problems already know this, but it takes a full lesson to explain it to students. If a reader wants to go deeper into this topic, a search for the keywords "Lagrange numerical diffusion" already yields good documents beyond the two references to the available Lagrangian models.

Line 89: GIS should be spelled out, especially since this acronym is never used again.

Ok (line 79), although I would not expect that using the acronym without spelling it out would be a problem for any reader.

Line 126: occur → appear

Ok (line 116), although I am not completely sure.

Line 190: Not sure what is meant by "come into play".

I rephrased it (lines 179–180).

Line 210: Versions of what? Perhaps better "expressions of the acceleration a"?

Ok (line 200), indeed better.

If I understand correctly, Figure 6 illustrates Equation 39 as well as an equivalent expression for the original pressure. It does not seem straightforward to derive the latter, so seeing a few mathematical steps or comments would be helpful.

Indeed not straightforward, but requires repeating the steps of Eqs. (37) to (39). **I added one intermediate step and the final result (lines 361–366),** although I find adding more and more information about not very relevant steps rather distracting than helpful.

Line 369: "be the front" → typo

Fixed (line 355), thanks!

Figure 7: I suggest stating the reduced friction coefficient in the figure or its caption.

Ok, I added it to the caption.

Line 408: "is piles up" → typo

Fixed (line 396), thanks!

Figure 8: I have to admit that I still cannot identify the hummocks and striations. To me, neither of the two deposits for $V = 0.5$ km^3 seem more or less hummocky or striated. As a result the discussion is enigmatic to me.

Maybe you are looking for features different from those I think of. **I added two close-ups for illustrations, hoping that it becomes clearer what I think of.**

Concerning the software repository, not all the matlab codes compile (see errors below). It would be helpful if the numbers in the matlab script names (Figure.m) correspond to the figure numbers. Not all figures are represented in the matlab scripts.*
figure5.m: Unable to perform assignment because the size of the left side is 1-by-801 and the size of the right side is 1-by-2. Error in figure5 (line 22) s(i,:) = size(im{i});
figure7.m: Error using load Unable to find file or directory 'paral0001.mat'. Error in figure7 (line 17) load(filename)

I just did not want to create a new version of the repository for each round of reviews. So the codes were still numbered according to the figures in the preprint. **I adjusted the numbers accordingly.** Figures 1 and 3 are, however, not code-generated. **In order to fix the problems you noticed, I added comments to make clear that the data files to be loaded must be either recomputed or unzipped from the file data.zip.**