Reply to: Interactive comment on GO2OGS: a versatile workflow to integrate complex geological information with fault data into numerical simulation models
Anonymous Referee #2

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Abstract

We would like to thank the reviewer for the thorough review of our manuscript. We tried to address all comments and listed the changes as a summary below.
All edits are also signified in the updated manuscript with colored text. Unless stated otherwise, we will refer to the page and line numbers of the edited document in the way "p #, l #" (p for page, l for line).
Furthermore, we added an edited manuscript without showing the changes.

1 Specific Comments:

1.1 In Algorithm 1, the functionality of step 7 Integrate split nodes into structured grid is clearly shown in Fig.4b, but how it has been exactly accomplished is not clear. The algorithm 1 is recommended to explain more on step 7 instead of listing all the read and write steps.

We revised the Algorithm 1 and hope we could clarify the integration of the split nodes in Step 7 (see p 11). We also added a sketch (Fig. 5 revised manuscript, Fig. 1 of this document) to describe the integration of split nodes (see p 11, l 3ff).

1.2 The verifying case Setup A does not have faults or outcropping layers, after employing Algorithm 1 as stated in the paper, it would be a structured grid and actually does not need step 7 in the conversion, and also there is no simulation conducted on it. The purpose of Setup A is recommended to declare more clearly.

With setup A, we want to show that the workflow is also applicable for less complex setups. During addressing the previous comment, we tried to improve the description of algorithm 1 (step 7). We also tried to clarify the relevance of setup A during restructuring the relevant section of the manuscript (see sections 1.2 and 2.2.1) and hope, that we could eliminate any remaining confusion.

1.3 The mesh quality has been studied and discussed in section 2.3. The interaction between the elements number for reconstruction and element quality are clear (Figure 7), but a sensitivity analysis on how the aspect ratio is changing with the reconstruction resolution (horizontal and vertical) would be preferred, as it would be a good hint on how the resolution could be chosen.

We understand that the choice on the specific resolution is a very important step in numerical modeling; among others, this choice is depending on issues like available computing resources (cpu speed, RAM size) or the processes that are investigated.

The aspect ratio of an element is defined through the ratio of the smallest by the longest line segment (compare equation 2, in section 2.1.1). In our case, the smallest line segment of any element will always be the vertical spacing (thickness of element), while the longest will be given through the horizontal extent.

In our approach, we can specify all resolutions (vertical and horizontal) as arguments of the algorithms (compare Step 1 of Algorithm 2) and are thus able to calculate the aspect ratio of the final elements a priori. Therefore, we think that a sensitivity analysis how the aspect ratio depends on the reconstruction resolution would not add any scientific value here, as the aspect ratio can indirectly be given through the parameters of Algorithm 2.

Yet, we acknowledge that this might very well be different, if one would use tetrahedrons or prisms, where the aspect ratio could not be calculated before the reconstruction.

1.4 In Algorithm 2, how the unstructured grid and faults have been resampled is clear, but whether there would be conflicts existed when resample the cells near the fault zones is not clearly shown. Therefore, a case on reconstruction near the faults would be preferred to be shown as Fig 5.

We added a figure to show how the resampling is done and what the results are near the faults (see Fig. 2, and section 2.2.1).

1.5 In Page 6314, line 2, Petrel is considered as a groundwater flow simulation code, which might not be the case

Thank you for pointing this out - we removed the mentioning of Petrel there (see p 6, l 18).

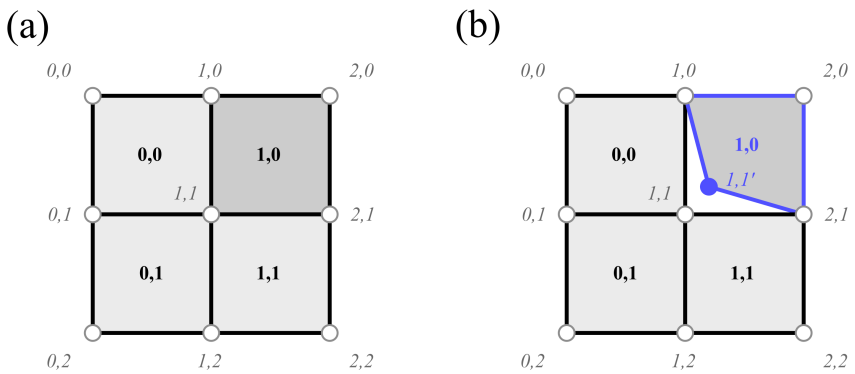

Figure 1: Schematic representation of implementation of split nodes into a structured mesh (a) resulting in an unstructured mesh (b) of quadrahedral elements; grey border hollow dots symbolize element nodes; node indices are represented in italic, element indices are represented in bold.

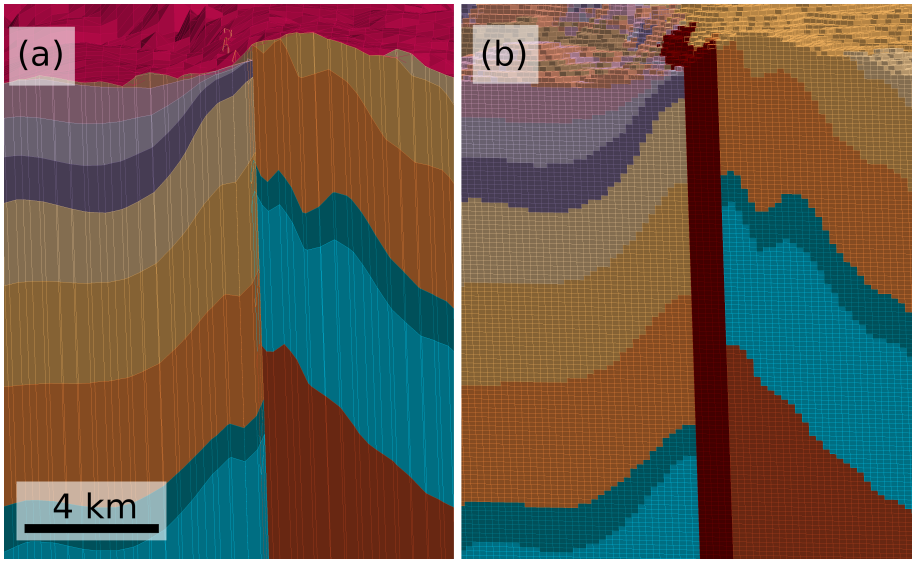

Figure 2: Exemplary comparison of meshes before (a) and after (b) the resampling along a fault; vertical exaggeration 10×, legend given in Fig. **??**, position of viewpoint shown in Fig. **??**.