

Dear reviewer,

We thank you for the kind words and insightful suggestions. Please, find below our response to your questions and comments, which we will include in the revised version of the manuscript.

Your key suggestion is to clarify how the work improves understanding of the basin's facies architecture. We acknowledge that providing a comprehensive description of the various facies would increase our understanding of the basin, but this is beyond the scope of the current structural study. However, as part of the first author's PhD project, a follow-up study is planned to evaluate the facies distribution throughout the Nieuwerkerk Formation using the same seismic dataset as in this study. This coming research intends to provide a more thorough and extensive investigation of the facies architecture than prior studies.

Following your recommendations regarding Figure 7; we totally agree. Our aim was to present a simplified and generic model, "a lesson from" and not "a section of" the West Netherlands Basin. We will clarify that Figure 7 is a toy-model for geothermal exploration and not a simplified section of the West Netherlands Basin.

The suggested figure showing the rates of inversion is a very good idea. We'll improve Figure 6 by adding boundaries showing the rate of inversion in the area. Additionally, we'll highlight the geothermal wells in Figure 1.b. Most of the data regarding geothermal well performance is confidential and therefore difficult to include into the discussion of this study.

Please find below our response to the listed questions and comments:

Question	Response
From the abstract it is not directly clear to me what you are doing: giving a detailed interpretation of the syn and post rift episodes" do you mean more detailed than before, and can you specify already here what new details you discovered?	The key new knowledge is about the two Jurassic rift phases, their extension direction, and their influence on each other and the basin sedimentation. We will clarify it in the abstract.
line 24-26: "This study provides a better understanding of the multi-phase rifting history in the West Netherlands Basin, providing important constraints on the reservoir-seal integrity and with that, the amount of heat that can be safely produced from a geothermal reservoir rock". A few questions on this sentence: (1) why is the seal integrity important in a geothermal reservoir? (2) I don't understand what you mean: you provide a better understanding..., by providing important constraints on the reservoir-seal integrity and the amount of heat that can be produced. that is quite a big step, can you be a bit more concrete?	We agree with the criticism and have removed this sentence from the abstract.
Figure 2: inside mega sequence 5 is a big unconformity, why is this not megasequence boundary? (inside the Northsea Group is a	We agree with the reviewer that such an unconformity is existing within megasequence 5. However, we define megasequences mostly

<p>similar unconformity right, and this is included in your megasequences, or are these different?) How do you define a mega sequence? In this figure it also seems to me as if the entire Nieuwerkerk Formation is Early Cretaceous.</p>	<p>according to the tectonic phases. We are going to better clarify this point and mention this 'intra-megasequence' unconformity in the revised version of the manuscript. Regarding the position of the Nieuwerkerk Formation within the geological timescale, as pointed out by the reviewer, this needs some modification. The Nieuwerkerk Formation is also Late Jurassic. We'll modify Figure 2, thanks for noticing this.</p>
<p>From the intro and geological framework section it is not clear to me what the problem is that you are trying to solve. can you explain that more clearly, please? being the advocate of the devil: exploitation is going quite alright, is it not?</p>	<p>Exploitation is going quite alright, indeed. However, as noted in Willems et al. (2020), the most recent article concerning the Jurassic reservoir rocks of the West Netherlands basin, these geothermal projects also demonstrate that much of the aquifer geology is still not fully understood. According to Willems et al. (2020), there is still a lack of knowledge on (1) regional sedimentary aquifer architecture, (2) sub-seismic structural geology, and (3) aquifer rock properties. We aim that this research will provide a thorough overview of the relevant geological history of the West Netherlands Basin, which is necessary for geothermal development. As a result of this, we provide a better understanding of regional structural and sedimentary aquifer architecture. This will be implemented in the introduction.</p> <p>Willems, C. J. L., Vondrak, A., Mijnlief, H. F., Donselaar, M. E., and van Kempen, B. M. M.: Geology of the Upper Jurassic to Lower Cretaceous geothermal aquifers in the West Netherlands Basin – an overview, <i>Netherlands Journal of Geosciences</i>, 99, e1, https://doi.org/10.1017/njg.2020.1, 2020.</p>
<p>You state that higher N/G is expected in the core of the half grabens, but is that always the case? In these locations there is more accommodation for deposition, but also less erosion, and so more preservation of fines and hence lower N/G could also happen... The ratio of accommodation space increase and sediment supply is key, but we don't quite know that and there is no hard data on this. How should I see this and how is this recognised in data (wells/seismic?)</p>	<p>This is an interesting question that would need further investigation to give an appropriate response. We will tone down this statement.</p>
<p>Line 430: "we can identify areas suitable for further investigation within the L3NAM2012AR seismic 3D cube" : what do you mean with suitable? Are not all areas already being investigated? can you specify what you expect in these areas?</p>	<p>We will rephrase as follows: 'we can identify areas of interest for geothermal exploitation'.</p>
<p>you state that there is difference in degree of inversion between areas, is this reflected in the performance of the 14 active doublets? or in</p>	<p>Unfortunately, the number of doublets and their spatial distribution is not sufficient to carry out</p>

future seismic risk or is there any other potential practical impact? explaining this would enhance practical use and impact of your work. (I asked this before, so ignore if you already address this above)	any robust correlation between well performance and structural position. The main practical use of our structural template is that in areas of strong inversion the synclinal traps could be breached. We will stress this point in the revised version of the manuscript.
Line 426: could fracturing not also enhance performance of the reservoir?	Being a siliciclastic reservoir, the permeability in the Nieuwerkerk Fm. is mainly controlled by the sedimentary architecture.
Final sentence of the discussion: you suggest that a new deep attribute analysis could disclose information on facies architecture. Can you be more specific? It would be great if there is a suitable attribute, but if no-one did this yet, I think that the big question is on how to image these things and then this statement deserves a bit more speculation/discussion.	We will remove the sentence.
Figure 7: how do you explain the high N/G oil/gas reservoirs at the structural highs with this model? Other models that people presented before include one where a single high N/G sand layer (the Delft Sst) is deposited on top of the lower N/G Alblasserdam Mbr, probably also covering the highs.(Out of curiosity: why did you not differentiate between the Delft and Alblasserdam Mbrs?) how do other models describe regional sandstone distribution?	We totally agree with the reviewer. Our aim was to present a simplified and generic model, 'a lesson from' and not 'a section of' the West Netherlands Basin. We will clarify that Figure 7 is a toy-model for geothermal exploration not a simplified section of the West Netherlands Basin.
you describe the main faults in the basin: I was curious if you have any ideas on sub-seismic structures around these major faults?	We haven't looked into the sub-seismic structures in enough detail yet to provide a full solution.

Comment/corrections	Response
start of intro: perhaps slightly rephrase into a structure like this: <i>tectonic evolution is important and explain why. Then introduce the problem you are trying to solve: something is lacking, and then: in this framework this study did that... this is a more logical order. (hopefully this is clear)</i>	Yes it is clear, thank you for the suggestion. We will rephrase the latter accordingly.
line21: <i>'...the rifting produced the geothermal target'</i> . I'm not sure if this is the correct way to phrase this. The target is formed by sedimentary processes, the rifting compartmentalised it, affected properties maybe, but didn't create it, right?	Yes, you're right. Rifting merely created the accommodation space in which the target is deposited and caused the compartmentalization of the area's principal producing geothermal target, the Nieuwerkerk Formation. This section will be rewritten accordingly.
Line 20: can you already state whether it's when in the Cretaceous, I was curious straightaway.	The Late Cretaceous, we will add it to the text.
Line 21: 'yet' suggests a contradiction, but which one is not clear to me.	That's right, there shouldn't be a contradiction. Something like 'accordingly' would be more fitting.

<p>Line 22: “<i>subsequent inversion... a potential risk.</i>” is this a new problem statement. Or one of your new insights, or a hypothesis? And is breaching the right word? And perhaps explain why this is a potential risk.</p>	<p>This statement should be rewritten. Inversion could have caused fractures within the sealing unit, resulting in reservoir/aquifer leakage, which is clearly a problem for geothermal development. We will update this in the text.</p>
<p>Line 24: second time that you state that the study gives more insight in tectonic evolution of the basin.</p>	<p>Ok, we’ll remove this.</p>
<p>Maybe also good to explain briefly why you focus on the Jurassic-Cretaceous for readers that are not familiar with this basin. Final sentence is also quite repetitive.</p>	<p>Ok, good point. We’ll add this.</p>
<p>Line 53-55: you state that inversion and the rifting history could have controlled the architecture of the rift phase. What do you mean with that rift phase, structural architecture/structural setting? Or sedimentary architecture of the Jurassic tectono-sedimentary sequence?</p>	<p>We thank the reviewer for the comment. The sentence, indeed, is not clear and we have removed it.</p>
<p>Line57: could you add a statement before the listing of your focus on what is missing in current knowledge more clearly. You had something on it in the abstract, but it makes sense to make that extra clear here.</p>	<p>Yes, good point. We’ll add this.</p>
<p>Line123: why is it relevant to mention that you used a guided approach, and even more specifically name the Petrel terminology? Do you doubt accuracy, otherwise maybe loose it to make it more generic.</p>	<p>It is a matter of reproducibility of the results.</p>