Author's response
Reviewer #3

Major points on the paper:

1 - Line 47: Why “especially in the shallow marine environments”? There are several published papers about Forward Stratigraphic Modeling in continental and deep marine environments that attest to the applicability of this method in a variety of sedimentary environments. I think it would be better to cut off this statement to avoid the risk of misleading the reader to believe that Forward Stratigraphic Modeling is a method limited to shallow marine environments.
Answer: This place has been modified as suggested.

2 - Line 72: It is unclear to me what the authors meant by “fractal stratigraphic theory” and, unfortunately, I do not have access to the book they cited. Is it somehow related to Schlager’s (2004) scale-invariant fractal model for sequence stratigraphy? If so, I am not sure what would be the use of this citation here in reference to the formation of hardgrounds. I suggest rewriting that sentence to make clear what kind of hardgrounds the authors want to mention or finding a better example for the formation of strata resistant to erosion.
Answer: The fractal stratigraphic theory of Miall (2015) does have some relationships with that of Schlager (2004), while their focuses are different. The fractal conception in Miall (2015) was mainly used to explain the predominance of missing time in the sedimentary record. This indicates that the time gap between two adjacent small layers can be long enough that the underlying layer could become “hard” before the overlying layer starts to form. The “hardground” here means the loose sediments become solid sedimentary rocks due to post sedimentation processes. In order to make it clear, this sentence has been modified in the text.

3 - Lines 72 and 73: By “This is actually a reflection of the efficiency ratio of deposition to erosion. This is less involved in the existing FSM models.” seem to imply that the existing FSM models do not take into consideration the dynamic between deposition and erosion. This would be simply not true as the dynamic between deposition vs. erosion according to the efficiency of sediment transport and sediment supply is part of the fundamental principles of some of the most used FSM tools. I think the authors should rephrase this part to make clear what they mean by “efficiency ratio of deposition to erosion” if they really think that it is something missing in other FSM tools.
Answer: This place has been modified as suggested.

4 - Line 115: What the authors mean by “hydraulic characteristic energy” in terms of oceanographic and sedimentological processes? And how does it differ from the environment energy represented by ε? I think it is important to mention what exactly E and ε were designed to simulate.

Answer: For E in Eq. 9, it is a denominator of an exponent. The corresponding numerator is a transformed distance term, which could be regarded as a proxy to the river injection related hydraulic energy as discussed in the text. In order to make the exponent dimensionless, the denominator and the numerator should have the same dimension. Thus, E was considered as "hydraulic characteristic energy". While for ε, it does not contribute very much to the deposition geometry around the shoreline. Instead, it could significantly affect the sedimentation deep in the basin. This seems to have little thing to do with the transportation capability originated from the river injection. It's more like the energy inherent in the basin that carries the sediments to the basin center. An increasing ε usually leads to an increasing amount of deposition in the interior basin. Thus, ε was considered as the inherent environment energy in the basin.

5 - Line 133: How exactly the model differentiates "hardground" from easily erodible layers? Is it somehow user-defined for cells in the model? Or is it automatically calculated for each cell in the model? If so, how is it calculated for each cell? In subtopic 3.2 the authors mention that a variety of lithological and environmental factors affect erosion rate in Sedapp v2021, but how exactly these factors are taken into consideration? As the "efficiency ratio of deposition to erosion" was mentioned as an innovative aspect of Sedapp v2021, I think it is important to understand how all parameters related to erosion work in Sedapp.
Answer: It is user-defined. As mentioned in part 3.2, many factors could affect the erosion rate. For ancient strata, it is usually very difficult to quantify the rate through the analysis of the factors in geologic time. Instead, the rate can be defined empirically and adjusted through result fitting. Thus, Sedapp just provides this function for the users to easily customize the value.

6 - Line 183: The proportions of sediment classes were changed between figures 3a, 3b, and 3c? I think it would be better to keep the same sediment proportions in a, b, and c to illustrate the effect of different depth-porosity curves alone. Might also be interesting to show the effect in compaction of varying the sediment proportions and keeping the same depth-porosity curve. But if for the sake of simplicity, the authors prefer to only show an example where both the depth-porosity curves and sediment proportions change, they must indicate in the figure legend what is the sediment proportion variation between 3a, 3b, and 3c.
Answer: No, it's not. The proportions of sediment classes were kept constant in figures 3a, 3b, and 3c (50% sand and 50% mud). Fig. 3 is used to show the compaction effect in Sedapp. The difference among these 3 sub-figures is the depth scale. Fig. 3a shows the original compaction effect, while 3b and 3c show the magnified compaction effects by scaling depths.

7 - Line 219: I believe there is a missing reference to figure 7 by the end of this phrase.
Answer: This place has been modified as suggested.

8 - Line 221: The way geological time is counted in this paragraph and in figure 7 is very

confusing from the point of view of a geologist. In geology, time is always counted backward as “years ago” or “years before present”. For geologists “Ma” always means “millions of years ago”. Sometimes “Myr” is used to indicate a time span in million years from one moment to another, rather than the “Ma” that is always in reference to the present day. So, in this paragraph and figure 7, it is like all ages are inverted from a geological point of view. I suggest using “Myr” instead of “Ma” if the author prefer to count time forwardly despite of the geological nature of the paper or even better invert all ages and use: t = 0 (10 Ma); t = 4 (8 Ma); t = 8 (6 Ma); t = 12 (4 Ma); t = 18 (2 Ma) and t = 20 (0 Ma). The same is valid for all ages in the following figures and paragraphs mentioning geological time.
Answer: All these places have been modified as suggested.

9 - Line 229: I believe there is a missing reference to figure 8 by the end of this phrase.
Answer: This place has been modified as suggested.

10 - Line 277: I suppose there are things that Sedapp v2021 do better than the Sedpak model used by Li et al., 2018, hence the reason to publish this paper. How do Model 2 presented in this paper compare to the model presented by Li et al., 2018? What is the advantage of using Sedapp v2021? I think there is a good opportunity here to clearly state the contribution of Sedapp v2021 to Forward Stratigraphic Modeling. Please elaborate more.
Answer: Sedpak is a good tool in basin filling simulation. In the case of Gaobei fault basin, both Sedapp and Sedpak can perform well. As for the advantage, I think the physical meaning of the parameters in Sedapp is more clear. In addition, the graphic function in Sedapp is more flexible. For example, sand fraction plots can be easily created by Sedapp, while I didn’t find the corresponding function in Sedpak. The main purpose here is to reflect that Sedapp can do a good job in the simulation of continental fault basins, which can be comparable to the relative mature Sedpak.

11 - Lines 278 to 282: This part seems much more like results that should be presented in the previous section than Discussion. All models shown in figure 12 were made using Sedapp v2021? If so, this part of the text and figure 12 must be moved to the “Verification of Sedapp” section. Furthermore, it must be stated how exactly model 12a differs from 12b and model 12c differs from 12d. Is it only a matter of turning on and off the diffusive transport as a function of distance to shore? Or these models differ between them in another way?
Answer: Yes, all these models shown in Fig. 12 were made using Sedapp. The only difference among these models is the choice of the transport coefficient algorithm. The example here is mainly used to show that Sedapp can avoid some potential problems that water depth models may not overcome. While in order make it more clear, some modifications have been made in the text as well as the caption of Fig. 12.

12 - Lines 282 to 284: The statement about the preservation of shoreface profile angle seems misplaced in this paper. To the extent of my knowledge, the preservation of shoreface profile is always discussed in the context of the action of processes that do not seem to be simulated in Sedapp v2021, such as sediment reworking above the wave base and sediment collapse when a clinoform reaches a critical slope. There are plenty of examples in the literature about varying shoreface profiles during regressive system tracts when processes like these do not affect sediment deposition and preservation significantly. I do not see the point in discussing the preservation of shoreface profile if the processes that allow it are not taken into consideration individually by the models presented in this paper. Suffice to point out that in figure 12d the sigmoidal shape of the deltaic layers persists during the progradation of subsequent stratigraphic layers and that the slope break is never located landward of the shoreline (which is the true issue in figure 12c).
Answer: This place has been modified as suggested.

13 - Line 352: Missing year of publication?
Answer: The year has been added as suggested.

14 - Figure 7: What are the min and max values of the color scale? It should be at least mentioned in the figure's legend if not plotted on the figure.
Answer: The max and min values of the color scale have been added on the figure as suggested.

Suggestions about minor points:
1 – Line 31: The word "archive" is used three times in the first paragraph to describe sedimentary deposits. I find the use of this word very unusual in this context. The meaning is clear, so I suppose that there is no problem in using the word "archive" there, but I would rather say something like: The sedimentary successions formed in these areas are an important record of the past interactions. In addition, shallow marine stratigraphic record itself can be an ideal hydrocarbon accumulation place. From this record, many theoretical and field studies have made great achievements and accumulated a wealth of data in the past decades.
Answer: These places have been modified as suggested.

2 – Line 43: I think there is a missing reference here. In my opinion, it would be appropriate to include here at least one citation about Dionisos. It is free for academic use and it pioneered the field of Forward Stratigraphic Modeling with a considerable contribution through dozens of published scientific works during the last 20 years. I suggest adding to the references either Granjeon and Joseph (1999) or Granjeon (2014) as these papers are more methodological.
Answer: This place has been modified as suggested.

3 – Line 76: This phrase seems a little too bold to me. Forward Stratigraphic Modeling has been evolving significantly in the last two decades, but it is true that the existing FSM tools still have

many shortcomings. That said, although Sedapp v2021 appears to propose some clever solutions, it surely will not overcome all shortcomings of the existing models. I think "… is expected to overcome some of the shortcomings of the existing models" would be more appropriate.
Answer: This place has been modified as suggested.

3 – Lines 86; 104: I suppose the authors meant "class of sediment" instead of "class of lithology".
Answer: This place has been modified as suggested.

4 – Line 153: What is "c"? I suppose c is the variable used in equation 9 in the previous topic to differentiate the characteristics of different sediment types, but this chapter is too far from the last mention of c. I had to go back in the text to understand what it was. I think it would be a good idea to reference equation 9 here to help a reader like me find where c was described.
Answer: A reference has been added for "c" as suggested.

5 – Line 160: I think "underlying strata" would be more appropriate than "lower strata".
Answer: This place has been modified as suggested.

6 – Line 206: It would be nice to add a line in figures 5a and 5b representing the boundary between these two cycles as a visual reference for readers that are not used to analyze this kind of results. It would make it easier to identify the aspects of figure 5 mentioned in this paragraph.
Answer: The boundary lines have been added as suggested.

7 – Line 263: What do the authors mean by "guide us to keep the general direction"? Validate the previously proposed conceptual model? This sentence is not clear. I suggest rewriting it.
Answer: This place has been modified as suggested.

8 - Line 264: This information is repeated in the following discussion section. I believe the comparison between the results presented in the present paper and previously published models should be left to the discussion section.
Answer: The repeated sentence here has been deleted as suggested.

9 - Figures 8 and 9: Why there are blank spaces between layers? Is it a choice for displaying the model? If so, why is it presented like that? What were the criteria to display intervals with filled colors or as blank intervals? Why the blank intervals are sometimes thick in relation to the adjacent colored intervals and sometimes this relation is inverted?
Answer: The blank spaces are the dividing lines of the same time intervals. The density of the spaces here are mainly used to imply the sedimentation rate. When the blank space is thick, it generally means the sedimentation rate is relatively high. When the blank space is narrow, it means the sedimentation rate is relatively low.