

## ***Interactive comment on “Sedapp: a non-linear diffusion-based forward stratigraphic model for shallow marine environments” by Jingzhe Li et al.***

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Dear referee 2, Thank you very much for your careful read and helpful comments. Here below is our reply:

Comment 1: The authors said “Although many advances have been made in the field of forward stratigraphic modelling (FSM), there are still some shortcomings to the existing models.” in the abstract. While I did not find the detailed description in the introduction part. Please modify or rewrite the related part in the manuscript. R1: This part has been re-written as suggested in the new version of the manuscript.

Comment 2: As the authors said in the text that many existing models are not open to the public. The open-source feature of Sedapp is apparently a good aspect for

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its availability. There are actually many alternative programming languages that can satisfy this feature. For example, some other open source models were written in Fortran, C or python. Why did the authors write Sedapp in R? R2: We write the code in R firstly because it is easier to use and easier to make open-source. Also, there is an off-the-shelf FVM solver written in R. For the sake of our research compatibility, we chose to develop the code based on it.

Comment 3: Fig. 7: This figure is interesting whose subplots show different stages of a river-dominated delta. I also noticed that the river is of a curvy shape. Why was the channel shifting like this? Is there any forces made it so? By the way, the initial segment is not very smooth, Is there any special requirement for that? Or the authors could modify it and make it look better. R3: The shape of the river is a kind of predefined information. It is mainly to facilitate to show the influence of a curved channel on the depositional results. The initial segment of these channels has been modified.

Comment 4: The Der settings in the model are very interesting, which could distinguish the depositional and erosional two processes. But what geological knowledge support this setting? Also, which variable name in the code corresponds to it? R4: The introduction of Der is generally to facilitate the result-fitting in downstream and subsequent shallow marine areas for some complex situations. For example, some initial surface is “hardground”, which is very difficult to be eroded. While the overlying deposition process is relatively easy. The value of Der is usually empirically defined and modified based on the stratigraphic record. In the code, this parameter is called “dep.ero.ratio” in the main program.

Comment 5: In the code, I noticed a parameter called isostasy. With the default setting, I could get the same figure as in the text. However, when I switched the value, the results became very different. The left part dropped far below the expected place, while the right part also changed a lot. I think the authors should make a brief introduction in the documents about these parameters. R5: Isostasy is the state of gravitational equilibrium between Earth’s crust (or lithosphere) and mantle such that the crust “floats” at

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an elevation that depends on its thickness and density. A brief introduction about this has been added in the new code documentation as suggested.

Comment 6: Porosity of the strata successions is a very important parameter concerned by resource geologists. The porosity changes at every moment as long as the overlying strata was changed, so does the previously deposited strata. That means whenever a new layer is generated, porosity of both new and old layers would be updated. I wonder how is this process implemented in the code. R6: We use porosity functions to implement the compaction process. The current functions are shown in "phi.r" file of the code. Every previously formed layer is also updated when a new layer is formed with a nested loop. Details can be seen in the "Compaction Process" module of the "Sedapp to be called.R" file.

Comment 7: When I ran the "example.r", I also noticed that, the "fluvial slope" is updated at each step. Like: "Fluvial slope is ...", "Slope angle is ...". What is it? Why is it needed to be monitored here? R7: These angles are monitored because the fluvial slope is a very important parameter for the depositional processes. Also, this is a parameter that is very easy to be measured in modern sedimentary counter-parts. This could provide us with a good opportunity to test the rationality of the simulation.

Comment 8: For the comments of the code, I think the authors should improve them. There are many subroutine files to the main program. However, the comment styles within these files vary from each other. The authors should put them into a uniform manner. R8: These files have been modified as suggested.

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