*We thank Referee #1 for the valuable comments. Our answers are given below each comment.*

1. The parametrisation of energy is introduced out of context of the original model. By reading the preceding paper I am able to see where these parameters fit in, and I understand the desire by the authors to be concise and not to repeat previously published work, however the paper should also stand on its own. I suggest that a more appropriate balance in this case would be to write out the full equation set being solved (which is not long) and then point readers at the previous paper for the details of the discretisation. This would make understanding the parametrisation presented much easier.

> *We agree with Referee #1 that the context of the new parametrisation was insufficiently explained in the manuscript, and that it is important that the present paper stands on its own. However, we think that presenting the full set of equations, which would then also require explaining the full set of parameters used in these equations, would distract too much from the main focus of the manuscript. Both are fully developed in Goudsmit et al. 2002. Instead, we propose adding a more detailed explanation in text form about the meaning and relevance of the modified parameter ($P_{seiche}$) in the Simstrat model (i.e., as one of the source terms for both TKE and TKE dissipation).*

1.a. As a minor point, it is conventional to typeset subscripts and superscripts which are English words in upright text. f_{stab} conventionally means f_{s*t*a*b} while f_{\textrm{stab}} means what the authors intend here.

> *We agree and will change the syntax accordingly throughout the manuscript.*

2. Verification. There is no verification of the model: the manuscript jumps straight from explaining the parametrisation to validation (ie testing the model's effectiveness on a real problem). Given that the validation exercise involves significant calibration, it is not really possible for the reader to conclude from the paper that the implementation presented is actually correct. One would usually expect as an intermediate step, some very idealised cases where the model error is demonstrated to converge at the predicted rate. In the absence of such evidence, how is the reader supposed to conclude that the implementation is correct? Admittedly, the validation exercise provides evidence that the implementation is not disastrously wrong, but minor bugs which nonetheless affect solution quality are very common.

> *We agree with Referee #1 that model verification would be useful to prevent the occurrence of bugs. We propose adding an idealized case where wind is a periodic rectangular function of variable frequency affecting a two-layer basin. We can then show that, depending on the frequency of the wind function, filtering is correctly performed and transmitted to the model and that BSIW excitation occurs as expected. There is however to our knowledge no analytical solution or other method that could predict the exact output of the model running such an idealized case.*

3. Independence of calibration and validation. If I understand the last paragraph of page 9 correctly, the same data period was used to calibrate the models as is then used to assess the model performance. If I am mistaken in this, then the relationship between the data used for the two phases should be made much more explicit. If it is indeed the case that the same data was used for calibration and assessment, this would appear to significantly undermine the results in the paper. Using disjoint data sets for this purpose is surely necessary to demonstrate the predictive power of the model.

> *Our work aims at explaining the importance of an overlooked physical process and including it into the model. In our case, we propose external processing of the wind time series to improve BSIW parametrisation. We therefore want to highlight the improvement that the proposed*

*modification brings in comparison to the original parametrisation, rather than demonstrate the performance and predictive power of a new model. The single difference between the models is that the "modified version" takes a different time series of wind as input into Equation (3). As a measure of the improvement, we compare the results for the new model version with those for the original model version. Both model versions are calibrated in exactly the same way. Because the revised model does not include any additional calibration parameters compared to the original version, we don't think that separating the data in a calibration and a validation period would yield additional information concerning the usefulness of the new parametrisation.*

4. Model code availability and reproducibility.

I set out to attempt to reproduce the results in this paper using the code provided. I failed completely. There is a litany of issues:

a. Plain GitHub URL. This is not a safe archive for model code. This is for two reasons. First, the code might disappear from GitHub tomorrow, second, it is not at all clear which version of the repository was used to create the results in this paper - and as the model is developed into the future, the current version of the code at any given time will no longer be the version in this paper. Please use the GitHub Zenodo integration, or similar, to archive the precise version of the code used in this paper in a permanent location with a DOI. See: https://guides.github.com/activities/citable-code/

*We agree that there must be a safe archive for model code and related files. Simstrat was only recently transferred to version control. As suggested, we will archive the code in a permanent location with a DOI.*

b. Code does not build. The provided .exe file is clearly not going to be of any use on my Linux workstation, so I set out to build the code. The user manual provides no information on how to do this. The developer manual is clearly incomplete but does at least say something.

i. The first surprise is that I need FABM. This rather important dependency isn't cited in the paper. One would rather think it would be and that what FABM provides to the model would be documented somewhere. FABM did not build for me, this may be my fault although the amount of manual intervention in the build process which the instructions appear to require makes this inherently error-prone.

*We address this comment in the next answer.*

ii. Apparently there is a dependency on NetCDF and HDF5, however since this section is only a header, with a single sentence body indicating that the author failed at this point, I have no indication of what I am supposed to do.

*The manual provided on the GitHub, although it is not a final version, covers a larger scope than required for the model used in the manuscript. Neither FABM, nor NetCDF nor HDF5 are required to compile the code provided on the GitHub or run the simulations presented in the manuscript. We are sorry if this was not clear and will clarify the manual accordingly. We will also update the Readme file on the GitHub with simple instructions on how to run the model and visualize the results.*

iii. I then attempted to compile kepsmodel_2016.F90 using gfortran 5.4.0, knowing that there would probably be a linker problem due to the missing libraries. However, the code does not compile due to missing keps_utilities_clean.f90. Presumably this means that keps_utilities.f90 needs to be preprocessed in some way, but no instructions to end are provided.

*Using gfortran, compilation of the source code should work independently of the platform, as no extra library is required. However, as Referee #1 rightly highlighted, a typo prevented compilation: at the end of the main file kepsmodel_2016.f90, the suffix "_clean" should be removed from the two include filenames. We will correct the code accordingly.*

c. Scripts are not provided. None of the namelists, parameter files or Matlab scripts referred to in the user manual are actually present in the repository. This despite the manuscript explicitly claiming they are there. In particular, all the code required to drive PEST appears to be absent.

*For the sake of simplicity, the authors decided not to provide the files that were not strictly needed to compile the model. However, we agree that the parameter files and the processing scripts should be provided, and we will add them to the repository. We will also provide the code used to run calibration through PEST, and update the Readme file on the GitHub with simple instructions on how to calibrate the model.*

d. Data is not identifiable. Neither the paper nor the repository provides enough information for the user to obtain the data used from the original sources, since no identification is provided for the datasets. The fact that the data is not publicly available further underlines the need for verification tests based on ideal synthetic data, so that a future user can establish that the code works without depending on data to which he or she may never have access. In short, the model code does not appear to have been published in a usable way, and the information required to reproduce the results in this paper (even assuming access to data) does not appear to be present. Indeed, the GitHub commit record appears to suggest that some code was just thrown together and committed on one day in November. It seems unlikely that the code in the repository was actually used in ist current form to produce the paper. This does not conform with either the spirit or the letter of GMDs guidance on code and data availability and needs to be fixed.

*We agree with this point and will provide information allowing better identification of the data. In addition, in order to allow for testing of the model, we will provide an excerpt of the data we used. As the authors are not the data owners, we don't have the right to make the complete datasets used in the model freely available. These are available upon request from the data owners listed in the "Code and data availability" section of the manuscript.*