We would like to thank Referee #2 for the useful comments which helped us further improve the manuscript. Our response is as follows.
For easier referring to the each comment we also include the full Referee #2 review in black, together with our answers in blue.

The authors presented a detailed response to the comments suggesting the study would have been deeply revised. In particular, a comparison with other lake models is to be added, which would certainly add a value to the manuscript and would provide the reader with necessary information on the model performance and usability. The numerous changes described in the response imply the results differ significantly from what was presented in the original version, and the discussion assumed to be focused on the model performance compared to other lake models. After reworked in such a form, the study might provide a significant contribution to GMD and would find an appropriate readership among modelers. One remaining general question on my side is whether the proposed model has sufficient novelty compared to that of Sun et al. (2007).

Compared to the model presented in Sun et al. (2007), the present model does not neglect the turbulent diffusion for small lakes. Also we forgot to stress it uses different light attenuation approach (this will be addressed in more detail in special remarks later).
Additionally, what we consider as most important, is the fact that Sun et al. (2007), as well as number of similar papers, do not present details on determining the input data. Here we provide carefully chosen parametrizations and approximations, and incorporate them in the code itself so that the input data include only easily available meteorological variables. The text in the introduction is further refined to point this out more clearly.

Conversely, other lake-temperature models that are forced with observational data (e.g., Bell et al., 2006; Sun et al., 2007; Martynov et al., 2010; MacKay, 2012, 2017) require both shortwave and longwave radiation component data and do not provide further details on determining them. The proposed model employs carefully chosen parameterizations of longwave and shortwave radiation. Although these parametrizations are well known, in the present study they are for the first time built into a lake temperature model, allowing the input data to include only easily available meteorological variables. Furthermore, in comparison with the model of Sun et al. (2007), the present model does not neglect the turbulent diffusion for small lakes and uses different approach for calculating the light attenuation with depth.

Below are also remarks on the Authors' responses to the first round of comments:

[11] The shortwave radiation model of Henderson-Sellers appears to be too complex for the case when no data on the light extinction properties of the lakes are available. A one-band exponential Beer Law or the two-band Jerlov's model would provide more robust alternatives, where the value(s) of the extinction coefficient(s) might be carefully adjusted based on the comparison of the model results against observations. It is an important issue, since shortwave radiation absorption will strongly affect the final modeling results in terms of the vertical stratification as well as surface temperatures.

As suggested by Henderson-Sellers (1986), the arctangent model doesn't show significant difference to the simple model using the Beer Law as shown in the figure below (except in the surface layer).

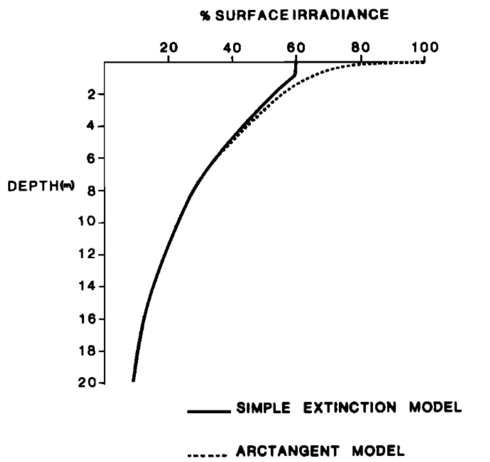

Fig. 8. Depth profiles of near-surface downward irradiance in percent of surface irradiance for arctangent model and simple extinction model.

The reason for choosing the arctangent model over the Beer Law is the simplicity for implementing in a model being a single expression. Also, we believe it gives better representation of the light attenuation in the shallow layers which are usually a lot thinner than the deeper ones.
Furthermore, the arctangent model basically uses the same input as the Beer Law as the K_1 and K_2 coefficients are calculated based on the λ_e, β and z_A. The only additional coefficient is the K_3 coefficient (a measure of the rapidity of falloff with depth within the upper layers of the water body). Suggested value K_3=4 is used, while we also note that the sensitivity of the light attenuation to this parameter is much lower than to the remaining parameters.
The text has been expanded to include this explanation:

The net shortwave radiation reaching a particular depth is calculated using the arctangent model, which was chosen for its simplicity for implementation as suggested by Henderson-Sellers (1986), but also for its better representation of the light attenuation in the shallow layers which are usually a lot thinner than the deeper ones

[12] Longwave radiation balance on the lake surface: note that r=\epsilon only in thermodynamic equilibrium, which is generally not the case for the lake surface. Better use more careful formulations here.

Thank you for this comment. The text has been corrected to:

In Eq. 22 we assume the relation $r + \varepsilon = 1$, although it strictly holds only in case of thermodynamic equilibrium (which is generally not the case for the lake surface).