Our replies to the comments of Referee #1 are given below in Italics.

The topic of the manuscript is relevant for Biogeosciences. I guess, upon acceptance, the paper will a highly citable study. However, I recommend some revisions before final consideration of this paper for publication. All suggestions for revision are minor and this is the reason why section General comments is skipped in my review.

Specific comment:


Firstly, we thank Alexey V. Eliseev, the 1st reviewer of our paper, for very constructive comments. We will improve the text by addressing the work of Yurova et al. (2007) as well as Krupchatnikov and Krylova (2000) in the revised manuscript.

Technical corrections:

— It seems there is a misprint in lines 11 and 12 at page 8 (equations for RL and RS correspondingly). I guess, in both cases it should be $Q(T - T_{ref})/10K$ rather than $QT / T_{ref}$.

The $Q_{10}$ equations were displayed incorrectly. We will change the equation as suggested:

$$Q_{10}^{(T_{soil} - T_{ref})/10K}$$

— Symbol wt in line 8 at page 7 is not explained.

We will explain the symbol wt (water table) in the text and the corresponding table.

— For reader’s convenience, at page 8 it is desirable to indicate that values of parameters sla and Tref are figured in Table 2.

As suggested we will mention that the parameters sla and Tref are shown in table 2.

— I suggest to reorder entries in Table 2 to put them in alphabetic order.
The entries will be thematically grouped and reordered alphabetically within the groups in the revised paper.

— There is a misprint in Table 1. In (Eliseev et al., 2008), methane emission model was coupled to Earth system model.

*We will correct the misprint. For readers convenience we will furthermore ask the illustrator to improve the table to show tick marks and crosses instead of empty boxes.*

<table>
<thead>
<tr>
<th>Model</th>
<th>Rationale</th>
<th>Forcing</th>
<th>Peat acc.</th>
<th>CH₄ emiss.</th>
<th>Coupled to ESM</th>
<th>Coupled to DGVM</th>
<th>Global appr.</th>
<th>Single-site</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eliseev (2008)</td>
<td>Response of CH₄ (wetland) to climate change</td>
<td>Wetland extent, CH₄ emissions</td>
<td>✗</td>
<td>✓</td>
<td>✓</td>
<td>×</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

— In caption to Fig. 4, it is better to use term ‘range’ instead of term ‘amplitude’ to avoid ambiguity.

*As suggested, we will modify the figure caption as follows:*

*Right panel: range of changes in water table between spring season (MAM) and autumn (SON).*