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Interactive comment on "Optimizing the parameterization of deep mixing and internal seiches in one-dimensional hydrodynamic models: a case study with Simstrat" *by* Adrien Gaudard et al.

Anonymous Referee #2

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General Comments

The authors present the fairly straightforward development of a 1D model of water columns in lakes, refined to account for the extent to which wind events excite basin-scale internal waves that play a leading role in mixing at the thermocline. The Introduction covers the key physical processes (Sect. 1.1) and the modelling status quo (Sect. 1.2), justifying the current study. The Methods section (Sect. 2) is well organized, although some additional details would be helpful (see below). The Results section comprises four case studies, for a diverse range of Swiss lakes. A Conclusions section

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Discussion paper

very briefly summarizes key findings and implications. Tables and figures are clear throughout. The manuscript should be suitable for publication in GMD, subject to minor and technical revisions in response to the following comments.

Specific Comments

1. The Abstract is provides clear information of a general nature, but it could be developed to provide specific, quantitative information on the extent of improvements in accuracy of model temperatures and mixed layer depths

2. p.5, l.15: gamma depends on bottom friction and basin geometry – please add some detail on this

3. p.9, l.24: The PEST software is used to calibrate the model; beyond the reference to Doherty (2005), please define the acronym and briefly explain how PEST works

4. p.9, l.26: Two of the three parameters used in model tuning are only mentioned here; please provide details (equations?) to explain the "fit parameter for absorption of solar radiation" and the "fit parameter for the fluxes of sensible and latent heat"

5. pp. 15-16: Sect.4 provides brief conclusions; there is no explicit discussion, although brief reference to applications (p.16, lines 1-2); a more developed Discussion section would be more appropriate

Technical Corrections

1. p.3, l.20: rather then "aquatic systems", why not say "lakes"?

2. p.7, l.8: "in order to smooth the cut-off effect"

3. p.7, l.14: "both oppose excitation of BSIWs"

4. p.11, l.5: "and rather briefly"

5. p.11, lines 5-6: the sentence "A comparison of the filtering for all four lakes is shown in Fig. 3" should be moved to the start of Sect. 3.1

6. p.11, l.13: Equation (12) is hardly an equation – why is it necessary to use two different symbols for the same factor?

7. p.12, l.1: How is “average wind direction” defined?

8. p.15, l.2: “which then remains denser”

9. p.15, l.19: “In winter, however, filtering strongly . . .”

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