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Geoscientific Model Development Discussions

Interactive comment on "Understanding the performance of the FLake model over the African Great Lakes" *by* W. Thiery et al.

Anonymous Referee #1

Received and published: 9 December 2013

This manuscript is well written and clearly structured. The results and conclusions give new insight in the performance of FLake in modeling the thermodynamic structure of two lakes in East Africa. Therefore I believe that the manuscript is worth to be published. However, a few minor revisions are necessary.

Observational data have been processed and this was clearly described, but representativity of the data is a weak point. The driving data was measured at other locations than where the lake observations were collected. How representative are the meteorological variables as a forcing term for the lake parameterization and how representative are the lake measurements?

My major point of criticism focuses on the neglect of the fetch which is an important set-up parameter. To run FLake successfully the fetch has to be specified. What kind

of value did you use and why did you not investigate the sensitivity of the fetch?

Another point is that the incoming SW radiation was not considered in the sensitivity study. The reason for this was the poor quality of the data. However, it is a well known fact that the incoming SW radiation is an important variable in the surface energy balance of lakes. Was it is not possible to apply ERA-Interim data instead?

In the description of the lakes nothing is said about the in- and outflow of the lakes. Both lakes provide water to the Congo river system and this affects the circulation in the lakes and thus the temperature. This should at least be mentioned in the Discussion.

Below I give more detailed comments about the manuscript:

The title suggests that all African Great lakes are investigated. In fact there are six great lakes namely Victoria, Tanganyika, Malawi, Albert, Kivu and Edward. In the study only lake Tanganyika and Kiva are considered. So I would like to rephrase the title to something like "Understanding the performance of the Flake model in two large African lakes"

Page 5143 line 6, "enhanced winds due to higher fetch" Wind is not enhanced by a higher fetch, but indeed waves are. Fetch is used in relation to waves.

Page 5145 line 2, ERA-Interim also suffers from sparse observations in Africa. Or is additional data apart from remote-sensing data included in the analysis? What is the grid-box size? Can you comment on this?

Page 5145 line 16, What does DRC mean?

Page 5146 line 1, You are using confusing abbreviations for wind speed and wind direction. Please use the WMO standard abbreviations, e.g. ff and dd.

Page 5146 line 1, AWS data, what is the observation (instrumental) error?

Page 5146 line 21, How can ONE single point be representative for such a large lake? Rephrase please.

Page 5147 line 5, There are also two layers in the bottom sediment.

Page 5147 line 10, Here you explain that incoming SW really matters. In the results the impact of incoming SW radiation is almost neglected.

Page 5148 line 1, oligotrophic refers to environments that offer little (nourishment) to sustain life, for example in caves, so in this context I believe it is the wrong word.

Page 5148 line 3, after “chorophyll” “a” should be erased

Page 5148 lines 14-18, In Fig. 3 you reveal interesting results, but you do not explain the differences of k in the text. Could you comment on the fact that probability curves of k are so different?

Page 5150 lines 10-20 Wind data was corrected to obtain the right mixing regime. But why did you not consider another value for the fetch, an important set-up parameter of FLake (see Mironov 2008).

Page 5152 line 6-7, The sentence “The former three calculated scores.....” is in the wrong place. It should be mentioned earlier, because it belongs to the text of the Taylor diagram.

Page 5154 line 4, not only the radiosonde data, but also other observations (SYNOP, PILOT) are sparse in Africa.

Page 5160 3.5.2 Forcing data In this section the incoming SW radiation is completely ignored, in section 2.1 you describe that SW radiation penetrates in the water and is being absorbed. Why do not you study this important forcing? If data is missing you can use ERA-Interim data, see my previous comment.

Figures

General comment : figures are too small, you need a magnifying glass to interpret them properly. The line spacing is also small.

Fig. 2 What are mixolimnion and monolimnion in terms of Flake variables

Fig. 3 Why is the probability of k so different from Ishung?

Fig. 10 Taylor diagrams are nice, but nothing is said about the bias

Fig. 11 Why does the legend begin at 0?

Fig. 13/14 Mention in the caption also the averaging period, this makes the figs more self-contained.

Interactive comment on Geosci. Model Dev. Discuss., 6, 5141, 2013.