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Hydrology and Earth System Sciences
Discussions

Interactive comment on "Upgraded global mapping information for earth system modelling: an application to surface water depth at ECMWF" *by* Margarita Choulga et al.

Anonymous Referee #1

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Comments to the manuscript of Margarita Choulga et al. "Upgraded mapping information for earth system modeling: an application to surface water depth at ECMWF"

Topicality. The present paper is devoted to the highly topical theme of the interaction between atmosphere and the underlying surface. Namely, the study concerns methodology of accounting for the influence of inland water bodies on the local weather and climatic conditions. This problem was raised relatively recently, but very quickly became one of the main in improving the numerical weather prediction. Thus, the problem discussed in the article is important and relevant.

Abstract. Should be rewritten. First 7 lines contain information about previous results.

Moreover, the FLake scheme is described in detail in the Introduction. In my opinion, the abstract should contain a brief, but close to complete information on new results obtained in the current study. In addition, it seems that the use of acronyms in the abstract is not the best idea.

Introduction.

Line 20. Authors wrote: ". . . thaw area are rich in nutrients, which affect the CO2 budget (Walter et 20 al., 2006;. . ."

I didn't find any mention of CO2 in Walter et al, 2006. In the study cited, CO2 is found only in the list of references, and the article itself is devoted to methane emission. Indeed, both gases are greenhouse gases and are formed by the decomposition of organic matter. But the conditions of their formation differ radically. Carbon dioxide is formed in aerobic conditions and methane in the complete absence of dissolved oxygen in water. In addition, these greenhouse gases are formed as a result of the activity of completely different microorganisms. Maybe the authors meant that due to the abundance of organic matter in the lakes of Siberia lakes produce a large amount of greenhouse gases? Moreover, the term "nutrients" in respect to lakes usually is applying to so-called "biogenic" elements, such as phosphorus and nitrogen. Suitable corrections are needed.

Data

No comments, just a question concerning the fourth distinction between GLDBv3 and GLDBv1.What are the "analytical equations to define the lake mean depth from the lakes' area and boreal zones climate type"? How they were derived, how to look at them or where they can be found? Please, add few words.

Methods

3.2 Updates

Lines 5 – 10 and Fig. 4, second from the left plot.

The authors can hang me, but I couldn't find any lake in this plot - neither lake Moondarra nor lake area Machattie. Even at 400% image magnification. I trust to the authors and their respected Australian experts, but something should be done to improve the Figure. .

Page 11. Lines 15, 17 and 21. Please, clarify: "on Fig. 7" or " in Fig. 7"

Verification and discussion

Page 14. Lines 30 – 31. The third and the fourth seasons are marked identically – (iii)

Actually the freshwater lakes have five main seasons at least. The fifth is the period of winter lake cooling between the temperature of maximal density and start of ice formation. During this period cooling takes place under so-called inverse stable density stratification conditions. Corrections are needed.

4.2 Model verification results

All the authors' explanations of the large values of errors in dates of ice-on and ice-off have the right to exist. Nevertheless, I'd like to put their attention to such parameter as ice albedo. The point is as follows. During melting the value of ice albedo radically decreases, that leads to the essential increase of the ice melting rate. If the ice albedo in numerical experiments was constant for the whole period of calculations that can lead to large mistakes in dates of ice melting at least. My advice to the authors: Add a few phrases about it.

Discussion No comments.

Conclusion No comments

Data availability

Please change the site of FLake model link to http://www.lakemodel.net

Summary The manuscript can be published after minor revision.

Please also note the supplement to this comment:
https://www.hydrol-earth-syst-sci-discuss.net/hess-2019-234/hess-2019-234-RC1-supplement.pdf

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