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Hydrology and Earth System Sciences
Discussions

Interactive comment on "Technical Note: Reducing the spin-up time of integrated surface water–groundwater models" *by* H. Ajami et al.

Anonymous Referee #2

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The technical note presents a methodology to nudge the predicted groundwater table depth, thereby reducing the number of years required for spin-up of integrated surfacewater-groundwater model Parflow.CLM, based on subsurface storage spin-up criteria. The methodology however does not reduce the real computation time of the model itself, but only reduces the number of years of recursive runs required to initialize the model based on the spin-up criteria. Also, it does not distinguish between the computation time required for each year of spin-up on whether it decreases or it is constant. Although the problem size used in this study cannot be considered to be computationally intensive, which is also a relative term, the idea presented does show some potential to reduce the spin-up period to generate initial soil moisture data. In general, the manuscript is very well written, but at the same time, there are some short-

comings in the paper that needs to be addressed. There are several instances where the content of the paper is intangible, and inadequacy in experiment designs for the proposed methodology. In addition, the figure quality are very poor in terms of the size of figure, fonts and scale, rendering them unreadable. Specific comments are listed below:

1.Benchmark the term "computationally intensive", which is loosely used throughout the mansucript. Eg., in comparisons to . . ..

2.The title "Reducing the spin-up time" appears to be misleading in the sense, whether it is reducing the computation time itself or the number of iterative years required, it needs to be cleared. Eg. "Reducing the spin-up period"...

3.Model description is absent. Which version of the model is being used here, is it the terrain following co-ordinate system or the older version? Are the catchments delineated for the simulation or a box domain is used? This needs to be all clarified. If the terrain following co-ordinate is used, the number of vertical levels can be reduced. In addition, the real computation time can also be reduced using delineated catchments.

4.In both studies, spatially uniform atmospheric forcing is used, could this be possibly one of the reason why the domain mean DTWT function performs well for the relatively flat topography used in this study. How will it effect the empirical DTWT functions, if spatially varying forcing is used? A case study with relatively larger extent, and spatially varying forcing should be presented to prove the presented methodology for its suitability in other applications.

5.Pg. 6977, Ln 1-17, This paragraph is very confusing, show the formulation of calculation of MAE and RMSD in terms of the grid points, and then proceed to discussion, else the figure says otherwise. What does the mean DTWT in y-axis refer to, is it the domain mean or catchment mean? Fig. 3B is addressed before discussion about Fig. 3 itself.

Minor Comments:

1.Ln 6970, Ln. 24 : Rephrase.

2.Pg. 6971, Ln 23: spin-up period

3.Pg. 6971, Ln 27: number of years of spin-up required for

4.Pg. 6972, Ln 4: Confusing statement, Fig. 1 mentions 3 stages, but the paragraph begins with two stages.

5.Pg. 6972, Ln 7: "against the equilibrated initial condition for the subcatchment of . . ..., using the ParFlow.CLM model."

6.Pg. 6972, Ln 20: Mention grid point numbers. Also mention the annual precipitation received and min-max annual temperatures in the text.

7.Pg. 6973, Ln 24: Also mention the annual precipitation received and min-max annual temperatures in the text. Why 400m deep layer here?

8.Pg. 6974, Ln 4: Does these function depend on the initial condition of prescribed groundwater table depth ?

9.Pg. 6975, Ln7-14: Paragraph not comprehensible. Rephrase.

10.Pg.6975, Ln 19: predicted for . . ....

11.Pg. 6976, Ln 20: It has be to discussed clearly, whether the computation domain consists of delineated catchment or a rectangular domain in the experiment description itself.

12.Pg. 6976. Ln 24: A plot showing these oscillations will be illustrative.

13.Pg. 6977, Ln 19: Show the formulation of semi-variograms calculations.

14. Pg. 6979, Ln 2: Is this the result from the simulation using the initial condition from the different methods ?

15.Pg. 6980, Ln 11: Is it the case in reality?

16.Pg. 6980, Ln 17: "simulation year". Is the computation time same for each year of simulation. Does is also exhibit some pattern ?

17.Pg. 6981: Ln 1-7: Far-fetching conclusions. Please remove it.

18.Pg. 6981: Ln 9: "reducing number of years to ..."

19.Pg. 6981: Ln 10: "spin-up years"

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 11, 6969, 2014.