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Interactive comment on “Comparing the Ensemble and Extended Kalman Filters for in situ soil moisture assimilation with contrasting soil conditions” by D. Fairbairn et. al.

Anonymous Referee #2

Received and published: 17 September 2015

The paper presents a potentially interesting analysis and comparison of different data assimilation types based on their ability to produce a deterministic soil moisture analysis on the Meteo-France land-surface model. The contribution needs to be more concise and at the same point some of the underlying assumptions needs to be better explained. The authors have explored a large spectrum of experiments and I have some suggestions on how to improve the First, I would definitely include a map of the 12 SMOMANIA sites with a table listing the main characteristic of each site: without a map and some information about for example the climate variability it is difficult to draw conclusion for example on the critical importance of the soil type (clay soils versus

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sandy soils for example). Are there other factors that should be considered? I wonder if there is too much emphasis on the soil type characterization and if its importance is really demonstrated in the paper. At a first glance, I would say not really because there are so many other factors that can be considered. I would suggest a better description of the real and synthetic experiment and which observations have been used in each case and how. A summary on a table would be very helpful. I have some comments about the structure of the paper: I found the chapter with the methods very confused and some of the equations need to be checked. I wonder if having chapter 2.7 before 2.6 would be beneficial to the reader to understand the whole experimental setup. Finally, a summary of pro and cons of each method with the correspondent computational burden can provide the reader with ideas on the feasibility of these methods. Minor suggestions: p. 7361 around line 28: it would be interesting to know what was the RMSE value before calibration. p. 7362, line 1: representivity? p. 7382, line 7: sources of errors, such as?

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 12, 7353, 2015.

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