

Interactive comment on "Variational Assimilation of Land Surface Temperature within the ORCHIDEE Land Surface Model Version 1.2.6" by H. S. Benavides Pinjosovsky et al.

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Summary — The paper present a variational assimilation of the LST within the SECHIBA module of ORCHIDEE. The YAO software was used to compute the adjoint model than to implement the 4D-VAR assimilation. Experiments show the accuracy of the model. However, the authors do not explain how they simulate a priori and noise on LST data.

General comments ———— You said in section 3.1 that you use the Gradient algorithm but you do not explain what kind of algorithm it is exactly: is it "Levenberg-Marquardt algorithm" ?

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You do not explain well how to estimate the actual control parameter values given the a priori. Indeed, the relationship prior value/actual value determines the covariance matrix B in Eq. (4)

In your experiments you do not add noise to observation so in this case R is 0 and Eq. (4) is not well defined (division by 0). For that I suggest to add noise to observation an study the robustness of the developed approach as a function of the noise level.

- Page 2: It is well known that both approaches pro-Detailed comments vide the same solution at the end of the assimilation period, for perfect and linear models. - -> It is well known that both approaches provide the same solution at the end of the assimilation period, for Gaussian variables, and perfect and linear models. Page 5, Line 23: index i is forgotten in epsilon Paga 8, line 32: you said "the second approach was used". I do not understand what is it "the second approach". Page 9, line 11: you said "the initial model". Same problem, I do not understand. Page 9, line 25: "the parameter prior values were retrieved successfully." In general, we estimate the actual values and not the prior. The prior is what we know initially before observation. Page 12, line 24: more difficult it is to find local minima that correspond to the initial control parameters values - -> more difficult it is to find global minima that correspond to the initial control parameters values Page 12, line 25: It is difficult to retrieved parameters - -> It is difficult to retrieve parameters Page 12, line 26: the assimilation of this variable in order to optimize these parameters is not optimal - -> the assimilation of this variable in order to optimize these parameters is not efficient

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