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Geoscientific Model Development Discussions

Interactive comment on "Comparison of Different Sequential Assimilation Algorithms for Satellite-derived Leaf Area Index Using the Data Assimilation Research Testbed (Ianai)" *by* Xiao-Lu Ling et al.

Anonymous Referee #1

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The submitted paper uses four assimilation methods (KF, EnKF, EAKF and PF) and CLM4CN to assimilate LAI, and chooses a best assimilation method by comparing with MODIS LAI. MODIS satellite remote sensing data can obtain LAI products with long time series. However, due to the impacts of cloud cover, aerosols, snow cover, and sensor failure, MODIS LAI products are characterized by high noise, low accuracy, and large fluctuations in the time series. Therefore, MODIS LAI data with better quality should be selected as observations based on quality control (QC) information. The research objective is reasonable and the review portion and figures need to be

improved.

1. what does the letter represent in formula (2)? It is not clear. 2. Line 13-15 in page 6, What method is used to solve the particle degradation problem in PF? 3. In section 2.4, time period of the atmospheric datasets is 1998-2010 in DA, why the time of LAI in the result is 2002? 4. What does "Observation Proportion" mean in Table? 5. Which version of MODIS LAI collection did you use? 6. There is no legend in Figure 1. Please add. 7. Due to the impacts of cloud cover, aerosols, snow cover, and sensor failure, MODIS LAI products are characterized by high noise, low accuracy, and large fluctuations in the time series. By calculating the RMSE of assimilation/simulation LAI and MODIS LAI, can this paper really choose a better assimilation algorithm? 8. Lines 2-3 in page 11, "assimilated observation" is mean "assimilated LAI"? 9. The legend and coordinate axis numbers are blurred in Figure 6. 10. "the distribution characteristics of both innovations and residuals are identical for the algorithms of KF and PF, which means that these two algorithms are not very efficient for LAI assimilation." Why innovations and residuals are identical, KF and PF are invalid. However, both innovations and residuals are not exactly the same for the algorithms of KF and PF ((g) and (h), (o) and (p) in Figure 6). 11. How to calculate the proportion of accepted LAI observations? 12. lines 3-4 in page 13, what are the conditions that observations are rejected during data assimilation. 13. lines 13-14 in page13, is RMSE calculated by EAKF_noreject/EAKF_reject and MODIS LAI?

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