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Hydrology and Earth System Sciences Discussions

Interactive comment on "A new method to calibrate aerodynamic roughness over the Tibetan Plateau using Ensemble Kalman Filter" *by* J. H. Lee et al.

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This paper suggests a new approach: sensible heat flux is derived from BREB and employed as EnKF true field, and then aerodynamic roughness length is determined via EnKF together with SEBS model. It can determine time-variant z0m over vegetation growth in this study. However, as I know, there are others studies using multicriteria (MC) methods (eg., Gupta et al., 1999; Xia et al., 2002) to estimate parameters (such as z0m, and so on) with land surface models (eg., BATS model, CHASM), and these land surface models might be more complicated than SEBS model. Therefore, this paper should emphasize what is different from MC methods and what is new in this approach. This paper is also suggested to address the following questions more before

it can be reviewed again.

(1) Heat flux errors and surface energy closure. G0 is calculated by equation (1-3), the errors in kh and Tskin can propagate the error of G0. How to determine the mean kh from 0 to 0.05 m. Sensible heat flux and latent heat flux can be measured by EC method, but surface energy unclosure was addressed in the Tibetan Plateau (closure ratio is about 0.7), maybe convection, advection, some local circulation and other atmospheric activities affect energy closure (part of heat flux cannot be measured by EC method). BREB forces surface energy closure ratio equal to 1, and the derived sensible heat flux is used as EnKF true field. So the error of derived sensible heat flux by BREB should be commented more in the conclusion section.

(2) z0h or κB-1 in equation (2-4) is expressed a function of Re* (Re*=z0m·u*/ν), therefore, z0h is a function of z0m rather than independent from z0m. Some researches (eg., Yang et al., 2008) indicate that thermal parameterization scheme is very important to determine sensible heat flux. It is suggested that authors further select Yang 2008 thermal parameterization scheme to calculate sensible heat flux and then to determine z0m, to see if the selection of thermal parameterization scheme effect the conclusion of this paper.

(3) Figure 6 shows the variation of sensible and latent heat fluxes, and this paper emphasizes that sensible heat flux is always more than latent heat flux and is a dominant energy source. Maybe there are EC dataset in other years (but 2006) in BJ site, which can verify this point if true. I suspect that latent heat flux during monsoon is at least comparable to sensible heat flux or even more. Figure 7 indicates there was relatively abundant precipitation during monsoon.

(4) Symbols in this paper are suggested replaced by recognized symbols. For example: K in equations (2-2) (2-4) (2-10) (3-1) seem confusing. K in equations (2-2) (2-4) (2-10) are suggested as κ. Zom and Zoh are suggested as z0h and z0m. Ψ in equation (2-10) and (4) are Ψm and Ψh respectively.

(5) In figure 4 (to determine z0m), x-axis is suggested to use logarithm axis. In figure 5, how to explain that z0m near Julian day 163 is bigger than it near Julian day 170? It is not agreeable with precipitation in Figure 7. What causes z0m to decrease, or it is just disturbed by the method of determining z0m?

References: Gupta H V, Bastidas L A, Sorooshian S, et al. 1999, Parameter estimation of a land surface scheme using multicriteria methods. J. Geophys. Res., 104(D16), 19491-19504, Doi: 10.1029/1999JD900154 Xia Y, Pitman A J, Gupta H V, et al. 2002, Calibrating a land surface model of varying complexity using multicriteria methods and the cabauw dataset. J. Hydrometeorology, 3: 181-194

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