General comments

This paper examines the vegetation effects on the entropy budget at the land surface by analyzing entropy fluxes of radiation, latent and sensible heat, using NOAH land surface model simulations and eddy covariance flux observations at three different sites. Their results suggest that the increase of vegetation fraction increases entropy production by increasing the absorption of solar radiation while decreasing the entropy budget (the rate of change of entropy in the surface layer) slightly. The reviewer finds many parts of this paper interesting, and the method of calculating the entropy budget at the land surface is useful for future related investigations. The overall presentation of the paper is well structured. However, there are several critical issues remaining in the method and results of this paper as stated in specific comments. The reviewer therefore suggests that these issues should be clarified before the publication of this paper.

Specific comments

1. The signs in Eq. (1) are strange.
The negative signs of *LE, G,* ε are inconsistent with Eqs. (6), (7), (8) as well as Fig. 1, and seem to be unnecessary. Also, the negative signs in the right-hand-side of Eq. (9) are confusing; these negative signs may be better included in Eqs. (6), (7), (8) rather than in Eq. (9), when the entropy transfer/exchange is defined as positive inward (e.g., Eq. (11)).

2. Entropy 'production' by absorption of incoming longwave radiation.
The term d_iS_{QL} is calculated to be 0.02–0.03 (J K^{-1}) in both model simulations (Figs. 3c, 6c) and observations (Fig. 10c). However, it should be negative in a usual atmospheric condition when T_{sfc} is higher than T_{atm}. (Of course, the total entropy production due to net longwave radiation transport is positive because $Q_{L,out} > Q_{L,in}$.) Also, the unit J K^{-1} may be wrong, and should be W K^{-1} m^{-2}, instead. (Please check all the entropy terms and values expressed in J K^{-1} since they should be the rates of change/flux of entropy per unit time per unit surface instead of the amounts of entropy.) The notation dS_X is also strange, and should be better expressed as dS_X/dt.

3. Entropy budget (the rate of change of entropy in the land surface layer).

The entropy budget term *dS* (maybe better expressed as *dS*/*dt*; see comment 2) is estimated to be 0.01–0.035 J K^{-1} (probably W K^{-1} m^{-2}; see comment 2) in both model simulations (Figs. 4d, 7d) and observations (Fig. 11d). However, the change rate of entropy in the surface layer should be zero ($dS/dt = 0$) in a steady state. Generally speaking, this rate is positive during daytime when the surface layer is heated up, whereas it is negative during nighttime when the surface layer is cooled down. (And the daily mean should be slightly positive in summer and slightly negative in winter.) This is just a consequence of the definition of entropy: $dS/dt = 1/T\ dQ/dt$, and is irrelevant to the maximum entropy production principle. So if the calculated result does not show this tendency, something seems to be wrong with the calculation. I doubt the excess (?) positive contribution from the term d_iS_{QL} (see comment 2) since it is of the same order of magnitude as that of the calculated *dS*.