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Interactive comment on "Improved representations of coupled soil-canopy processes in the CABLE land surface" *by* V. Haverd et al.

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Pleas see "figure1-pdf" for revised manuscript.

Please also note the supplement to this comment:
http://www.geosci-model-dev-discuss.net/gmd-2016-37/gmd-2016-37-AC1-supplement.pdf

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Discussion paper

Improved representations of coupled soil-canopy processes in the CABLE land surface model

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Abstract. CABLE is a global land surface model, which has been used extensively in offline and coupled simulations. While CABLE performs well in comparison with other land surface models, results are impacted by decoupling of transpiration and photosynthesis fluxes under drying soil conditions, often leading to implausibly high water use efficiencies. Here we present a solution to this problem, ensuring that modeled transpiration is always consistent with modeled photosynthesis, while introducing a parsimonious single-parameter drought response function which is coupled to root water uptake. We further improve CABLE's simulation of coupled soil-canopy processes by introducing an alternative hydrology model with a physically accurate representation of coupled energy and water fluxes at the soil/air interface, including a more realistic formulation of transfer under atmospherically stable conditions within the canopy and in the presence of leaf litter. The effects of these model developments are assessed using data from 18 stations from the global eddy-covariance FLUX NETwork, selected to span a large climatic range. Marked improvements are demonstrated, with root-mean-squared errors for monthly latent heat fluxes and water use efficiencies being reduced by 40%. Results highlight the important roles of deep soil moisture in mediating drought response and litter in dampening soil evaporation.

Fig. 1.

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