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Geoscientific Model Development Discussions

Interactive comment on "Implementation of a soil albedo scheme in the CABLEv1.4b land surface model and evaluation against MODIS estimates over Australia" *by* J. Kala et al.

Anonymous Referee #4

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General Comments

This paper raises the problem of implementing soil-moisture-albedo feedbacks in the CABLE land surface model (LSM). However, despite finding that importing a simple (two-line) parameterisation from another LSM significantly degrades model performance and "should be used with caution", no improvements are trialled. The paper in its current form does not represent a significant advance in land surface modelling, but could be made suitable for publication in GMD if an improvement on the parameterisation presented here could be proposed, implemented and tested.

Specific Comments

p.1677, l 11-17: What is the origin of the coefficients in Eq 1, and are they specific to the soil moisture parameterisation in BATS. If so, is it reasonable to transfer the scheme directly to CABLE without re-calibration?

p. 1683, l10. I notice the above issue is touched on here, and a suggestion made to use relative soil moisture instead of absolute soil moisture. A physical or empirical justification for this suggestion would be helpful. Do results improve if the parameters in Eq 1 are re-calibrated using model-(CABLE)-specific relative or absolute soil moisture?

p.1681, l6-10: "The CNTL experiment (with prescribed soil albedo), shows that CABLE simulates albedo well": there is no mention of the significant overestimate of Blue-Sky NIR albedo (by ~ 0.1) over regions of high vegetation cover (eg Tasmania). This is a known problem for "two-stream" type radiation transfer models (of which the CABLE schme is a simplification). For example, Widlowski et al. (2011) found that both ACTS (Ni-Meister et al., 2010) and JRC2S (Pinty et al., 2006) (which both use a clumped two-stream approach) tend to underestimate canopy absorption and overestimate canopy reflectance when compared with a 3-D Monte Carlo reference model. This finding is consistent with Pinty et al. (2011) who state that, in order to correctly account for absorption due to multiple scattering in a structurally heterogeneous canopy, the near infrared (NIR) leaf scattering coefficient in JRC2S had to be lowered relative to its true value.

p. 1680, l12-119: What is the relevance of energy partitioning to the accuracy of albedo simulation? If data from flux sites are to be used, it would be more helpful to look at the radiometric observations, rather than the observations of turbulent fluxes.

Interactive comment on Geosci. Model Dev. Discuss., 7, 1671, 2014.