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Geoscientific Model Development Discussions

Interactive comment on "WRFv3.2-SPAv2: development and validation of a coupled ecosystem-atmosphere model, scaling from surface fluxes of CO_2 and energy to atmospheric profiles" *by* T. L. Smallman et al.

Anonymous Referee #2

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Smallman, Moncrieff and Williams couple the SPA model to the WRF model and study the dynamics of the coupled model using observations. The justification for the approach is excellent; coupling surface and atmospheric models is of major interest across academic disciplines. The study is well-designed and comprehensive. I recommend that it be accepted for publication by GMDD after considering the following minor revisions.

'extensively validated' in line 8 of the abstract could be replaced with more concrete findings and/or statistics. The entire abstract could benefit from some specific results

to make the paper more citeable.

'Land use and land use change' between pages 1560 and 1561 is usually referred to as land use and land cover change (LULCC)

Page 1563 line 24 still may strike some as subjective despite rigorous tests. The passage 'often considered.' can be deleted without compromising the meaning of the sentence.

I have a question about the use of CarbonTracker. It's just a model product itself whose prior is just a multi-model estimate. Is it being used here for prior data or as a validation product?

What does 'example Scottish meteorology' mean on page 1566?

'Reduced emissivity' on page 1567 was a bit confusing to me because whereas building materials often have lower emissivities than natural vegetation, this isn't always the case (see e.g. http://www.monarchserver.com/TableofEmissivity.pdf). Albedo and roughness are also often different. Have these properties been changed in the model as well?

There are unnecessary parentheses in equation 13.

Eddy diffusivity within the canopy follows dynamics that are a bit more complicated than exponential decay (e.g. http://www.nicholas.duke.edu/people/faculty/katul/blm_poggi_2004_1.pdf), but for the present study this should be sufficient; it is not the major theme of the investigation.

Spell out 'two' on page 1576.

On page 1578, improving ground heat flux seems like an easy thing to do for a model with a multi-layer canopy where radiation attenuation by the canopy is (hopefully) represented quite well. Are soil heat flux observations available for any of the sites? This could be an easy fix.

On page 1579, the underestimation of fluxes could just as likely be overestimation by the flux measurements due to the nighttime (low ustar) flux observation challenge. Likewise for the overestimation of latent heat flux by the model. . .this may be underestimation by the measurements due to the energy balance closure problem.

The last sentence on page 1580 is a fragment. On that note, should a different MODIS land cover map (UMD, PFT, etc.) be used?

The sentence on line 10 of page 1581 is subjective. By what metrics is it comparable?

(Griffin Forest should be capitalized in the last sentence of page 1581. On that note, did it only take a year for Griffin Forest to recover following the harvest?)

Sentence fragments are also present in the Acnowledgements.

In Table 3, is NEE in umol C or umol CO2? Either one is ok as long as it's consistent, the flux literature usually uses umol CO2, but that's just convention.

Grassland is one word in Figure 1.

Interactive comment on Geosci. Model Dev. Discuss., 6, 1559, 2013.