Hydrol. Earth Syst. Sci. Discuss., 6, C2380–C2383, 2009
www.hydrol-earth-syst-sci-discuss.net/6/C2380/2009/

Hydrology and Earth System Sciences Discussions

Interactive comment on "Improved spatial mapping of leaf area index using hyperspectral remote sensing for hydrological applications with a particular focus on canopy interception" *by* H. H. Bulcock and G. P. W. Jewitt

M. Gerrits (Referee)

a.m.j.gerrits@tudelft.nl

Received and published: 16 October 2009

General comments:
The paper describes the comparison of three different vegetation indices: NDVI, SAVI, and the Vogelmann Index 1 derived from the Hyperion hyperspectral imagery to estimate Leaf Area Index (LAI). The authors compare the relation between the vegetation indices from remote sensing to ground observations of LAI for four different vegetation types. They conclude that LAI can be estimated from the Hyperion hyperspectral

imagery, especially when the Vogelmann Index 1 is used.

The applied method is straightforward and the results are clearly presented. However, the title is a bit misleading. The current title seems to suggest that the authors will show that the hyperspectral imagery gives better results than the 'conventional' satellite data. However, the authors only show that it is possible to derive reasonable estimates for LAI with the new remote sensing data. I think that the authors mean that the new data has a higher spatial and temporal resolution and therefore they conclude that the Hyperion data is an improvement. However, then they neglect that the absolute estimates can be worse compared to the conventional methods. Hence, the authors can not conclude from the current research study that it is an improvement. Either the title has to be changed, or a comparison between new and conventional method should be included.

Overall, the paper is of good quality, concise, and deals about a relevant topic especially for data scarce regions. Therefore, I recommend accepting the paper with minor revision.

Specific comments:

P5784 L1-2: "The use. . .in this paper". I would describe this sentence later in the abstract and start with "The establishment. . .."

P5785 L12-13: Better: "LAI is related to processes such as canopy interception, evaporation, transpiration, photosynthesis. . ."

P5785 L14: More references would be recommended when the authors state that LAI is used as an input in various hydrological models.

HESSD

6, C2380–C2383, 2009

P5786 L5: providing => provide

P5786 L11: Please be clear on what you mean with 'evapotranspiration'. Do the authors mean evaporation (i.e. interception evaporation, open water evaporation, soil evaporation) or transpiration? As it is currently written you state that current studies focus on both transpiration and evaporation (thus also including canopy interception evaporation), but not on interception evaporation, while you just wrote that it was included. This is not consistent. Please rephrase.

P5787 L4: Savenjie => Savenije.

P5879 Eq1: Add unit of 'S'.

P5787 L21: Better ". . . a measure which is determined by the LAI (Davies, 2003)".

P5788 L4: co-efficient => coefficient

P5788 Eq3: And what is the equation if the LAI is smaller than 2.7? In the study of the authors also leaf area indices of lower than 2.7 occur.

P5788 L16: Unit of evaporation is 'mm' per time. Please add second, hour or day.

P5788 L22: Remove the word 'Considering'; Add that interception is also dependent on rainfall pattern; Add dot after LAI.

P5788 Eq4: Although I understand that this is a purely empirical relation, it has an error. When this equation is used you accept that when there is no rainfall, you still have interception. Please comment on this. Furthermore, I wonder why the authors do not use a simple conceptual interception model like $I_i = min(P_g, S, E_r)$ with S the storage which is a function of LAI?

HESSD

6, C2380–C2383, 2009

P5789 L5-6: Why do you mention specifically the ACRU-model? What about other models?

P5789 L12: from 800, mm => from 800 mm (remove comma).

P5790 L10: This paragraph is a bit unclear. Please explain better what the 'remote mode' is.

P5792 Eq5: Add meaning of 'R'

P5792 Eq6: I think something went wrong with the editing of this equation.

P5793 Eq10: Add meaning of 'ρ'

P5794 Eq11: Add meaning of 'j' or skip

P5795 L17: "... could be estimated i if the daily..." => "... could be estimated if the daily..." (skip 'i')

P5796 L26: What do the authors mean by 'detrimental'?

P5797 L1-13: Would be nice, if something is added on the sensitivity of LAI in interception modeling.

P5801 T1: Maybe add hour of the day, when the LAI measurements were taken. Also the weather conditions during the measurement are relevant.

P5804 F2-4: It seems that both the NDVI and the Vogelmann Index show a clear linear relation with LAI. However, the offset of the trend line is different per tree species. The drawn trend line is also biased by fact that it seem that there are more measuring points for pine 12 years and wattle than for pine 15 years and eucalyptus. Please elaborate on this. Also elaborate on the fact that for SAVI both the slopes and the offset are different per tree specie.

HESSD

6, C2380–C2383, 2009

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 6, 5783, 2009.

HESSD

6, C2380–C2383, 2009

Interactive Comment