

## ***Interactive comment on “Estimation of forest structure metrics relevant to hydrologic modeling using coordinate transformation of airborne laser scanning data” by A. Varhola et al.***

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### General Comments

The paper proposes a method of determination of gap fraction from ALS data in a form analogous to that derived from hemispherical photographs. The purpose is to use information derived from ALS data as inputs to hydrological models, specifically for the study of forest structure effects on snow deposition and melt. While the paper does not extend to the actual use of these data in a hydrological model, it does fall within the wider scope of HESS in that it provides data for the parameterization of such a model.

I agree with the authors' claim that theirs is the first study to use ALS data in this way and thus their work is novel.

The paper has a clear statement of purpose and presents relevant prior work and background material. It is well structured and the presentation and language are clear. The stated scope of the paper is to 'obtain HP-equivalent forest canopy . . . metrics at any location within a discrete ALS cloud of points.' The validation of the gap fractions against HP shows generally good agreement, but some differences in the nature of the canopy gaps and characterization are noted. There is no indication of the effect of propagating these differences through a hydrological model. In this sense, it is difficult to assess the success of the method to achieve it's goal.

### Specific Comments

In the discussion of figure 3, the authors note some structural differences in between the actual and synthetic hemispherical images. They note that the large continuous gaps in the taller canopies are present in both images, however fail to observe that these are absent in the last two sets of images. In these cases the gaps in the ALS images are discontinuous and the gap size distribution would be quite different for the two methods. Is it possible to comment on the effect this might have in the context of the hydrological models?

P.5548-L2 states that the synthetic images underestimate gap fraction. This is presumably a dilation effect due to the use of opaque spheres to represent all targets – as you discuss later.

Voxelization of the points is not a difficult task, it would be possible to test the proposition that this would minimize the effect of point density variation. P5554-L12 states that separation of ALS points into ground and non-ground classes is not necessary in this method. This is not strictly true as the methodology states the use of a DEM.

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