The Cryosphere Discuss.,
doi:10.5194/tc-2016-177-RC2, 2016

The Cryosphere Discussions
Open Access
EGU

Interactive comment on "Active Layer Thickness Estimation from X-Band SAR Backscatter Intensity" *by* Barbara Widhalm et al.

Anonymous Referee #2

Received and published: 21 September 2016

This paper explores the relationship between X-band SAR backscatter and active layer thickness, on the premise that the amount of vegetation exerts control over both the thawing depth of the ground and SAR backscatter values; the SAR backscatter values being driven by volume scattering which is controlled by the height and structure of the vegetation. The relationship has some merit and the authors demonstrate a reasonable relationship over areas with ALT thicker than 70 cm. In areas with ALT less than this there are other land-cover types that produce similar backscatter values to the shrub cover, making the relationship unreliable.

I found the paper to be quite thorough and well presented. While the results are not a 'silver bullet' answer to SAR remote sensing of ALT, they make a contribution to the layers of science from which more complex, but more reliable, models might evolve.

I have only minor suggestions for the authors, the English is generally good but should be reviewed in a few places, as included in the points below:

Pg 2: Line 11 'a great potential' -> 'great potential' Pg 5:10 'is resulting' -> 'results' Pg 6:23: stating the strip length is confusing since it is not the same as the full scene size that is actually analysed. Pg 6:24 maybe say how many scenes rather than just 'all'. Pg 7:8-9 'to the in this study' clarify Pg 7: 12-19. I would have thought that vegetation water content and hence dielectric properties would also influence backscatter values, but this is not mentioned at all. Only vegetation structure is mentioned. An expanded discussion of the interaction of vegetation and backscatter would be good. Pg 7:23 'in the surrounding.' Do you mean 'in the surrounding area'? Pg 7:30 It was not clear to me if the radiometric normalization applied was to normalize radiometry between images, or to remove terrain related (incidence angle) radiometric effects within images. Clarify. Pg 8:1 suggest replacing 'account' with 'subdue' Pg 8:19 replace 'like' with 'as' Pg 13:9 'can be however not used' -> 'cannot however, be used'.

Figure 1. The location map annotation needs to be enlarged. It was not readable. Figure 2. 'Flat slope' seems a strange and contradictory name

Interactive comment on The Cryosphere Discuss., doi:10.5194/tc-2016-177, 2016.