

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

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Received and published: 23 September 2016

Active layer thickness (ALT) is a fundamental variable in permafrost studies. I believe that this study is a useful contribution to the body of literature on ALT mapping from aerial/satellite data. However, the manuscript seems to require some conceptual-logical reworking. This seems not to have been highlighted by the two referees that posted their reviews prior to this short comment. Please consider the following.

For example, the abstract states: “This study shows that the mutual dependency of ALT and TerraSAR-X backscatter on land cover types induces a connection of both parameters.” This reads as a conclusion, but arguably is the rationale for your study. That active layer thickness depends on land cover type, and that backscatter intensity varies with land cover, is well known. The key question thus may be related to: are

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spatial variations in x-band backscatter intensity related to land cover differences useful for estimating active layer thickness? Better: are land cover classes derived from x-band backscatter intensity useful for estimating active layer thickness? In this sense, the title and the conceptual-logical structure of the manuscript may not be adequate. To finalize my comment, consider the first sentences of the Introduction's last paragraph: "SAR backscatter intensity has so far not been investigated for ALT estimation. Radar backscatter at X-band is also related to vegetation coverage, especially shrubs (Duguay et al., 2015, similarly to the NDVI)." The second sentence implies that x-band backscatter depends not only on land cover but also, directly, on ALT. This is at odds with the methodology, etc.

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[Interactive comment on The Cryosphere Discuss.](#), doi:10.5194/tc-2016-177, 2016.

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