The Cryosphere

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Discussions

EGU

Interactive comment on "Determining the terrain characteristics related to the surface expression of subsurface water pressurization in permafrost landscapes using susceptibility modelling" *by* Jean E. Holloway et al.

Anonymous Referee #2

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The paper uses a general additive model and terrain characteristics derived from remote sensing to map susceptibility of permafrost disturbances (active layer detachment and mud ejection). The GIS-based analysis was successful at identifying important terrain controls at the study site, and the approach seems to have potential for application at other sites. The results are interesting and well executed and the topic is of interest to readers of The Cryosphere, but I'm not convinced The Cryosphere is the most appropriate journal. The paper is quite technical and might be appropriate for a remote sensing journal or for Permafrost and Periglacial Processes, which has a geomorphology focus. An indicator here is that not a single Cryosphere paper was cited. This

paper could be made more relevant to The Cryosphere by expanding the discussion to explore consequences for other sites, and by discussing in more depth the physical reasons for the observed explanatory power of the various terrain characteristics.

Specific comments

The title, abstract, and beginning of the paper focuses on pore water pressure, but the effect of interest is disturbance. High pore-water pressure is not observable directly, and it's possible to have high pore-water pressure without an ALD or ME. The title and the introduction should be revised to better reflect the topic of the paper - susceptibility to disturbance, not pore-water pressure.

Some of the observed relationships between the terrain variables make sense physically and some are counterintuitive. For example, why would ALD be more likely in areas of low PISR? Why would ME's be more likely in drier locations and higher elevations? Physical reasons for all the observed relationships and especially the counterintuitive ones should be explained to convince the reader that those relationships are real and not spurious correlations.

The probability of observing an ALD approaches 100% for low PISR. This is clearly site-specific and raises concerns about the transferability of the results. Please explain.

Rainfall is likely to be an important controlling variable. This needs to be discussed, since it is not addressed.

Pg 4 Line 24: what's the basis for the constraints >10 m from water source and > 20m from an ALD?

Pg 5 Line 4-7: The description of the declustering process is difficult to follow and should be explained more clearly. As I understand it, because closely located features carry redundant information, spatial clusters of features are replaced by representative features.

Pg 5. Line 4-7. The declustering algorithm seems arbitrary. Are the results sensitive to

how that is done?

Pg 6. Line 21. How were the features partitioned between the calibration and validation subsets? Random?

Pg 26. Line 1. What is an "explained deviance"?

Final sentence: The phrase "incentive and potential to move towards. . ." makes for a weak conclusion. Is it not possible to say something more definitive?

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Interactive comment on The Cryosphere Discuss., doi:10.5194/tc-2016-183, 2016.