

This study describes the change in surface energy balance associated with a 10 year manipulation of water table depth in an arctic wetland. They show that vegetation community shifts to greater shrub cover results in altered surface energy balance in terms of albedo and the partitioning of latent and sensible heat flux. The authors also show that the reduced heat conductivity in dry organic soils can create shallower thaw depths and stabilize the permafrost. This study is very interesting, and contributes to our understanding of how shrub cover can impact surface energy balance, but also how changes in the water table depth can promote shrub establishment. This can certainly support other studies that examine the mechanisms of shrub establishment in the arctic. This study also contributes more to our understanding of how prolonged dry soils can impact the surface energy balance through changes in soil heat flux. Thus, this study should be published in this journal.

The only issue I have with this paper is the writing. I recognize that English may not be the first language of some of the authors, so I have made many suggestions to improve the text.

Throughout the text, remove all the “e.g.” or “i.e.” (like on Page 2, Line 22 and many other locations in the text) because they are being used incorrectly. Whenever possible, I include suggestions for what to use instead.

Page 2

Line 17: change “has be accumulated” to “has accumulated”

Line 20: change “hydrology can vary at smallest spatial..” to “hydrology can vary at small spatial...”

Line 28: Change to “so that drier conditions can also be expected over large areas.”

Line 33: change “extend” to “extent”

Page 3

Line 5: change to “only a few”

Line 9: change to “energy exchange patterns based on Bowen Ratio results”

Line 13: Change “use” to “used”

Line 16: change “In a second step,” to “Our second objective was”

Line 19: change to “mostly in the form...”

Page 4

Line 4: change to “(Section 3.1), ...”

Line 7: change to “in the fall”

Line 10: remove “thus”

Line 25: remove “i.e.”

Line 30: what do you mean “irregular” time intervals? Can you provide some more information?

Page 5

Line 12: change to “for the period of 1950...”

Line 13 - 16: unclear sentence, change to “No precipitation records were available for the Chersky station from 2000-2009. Thus, we analyzed long-term trends from Ambarchik station situated 100km north of Chersky with nearly identical mean annual precipitation sums.”

Line 26: change to “sections, and follow..”

Line 27: change to “tend to be positive, ...”

Line 30: change to “months, ..”

Page 6

Line 3: change to “Total precipitation in 2015 was ~71% of the long-term trend (154 mm)”

Line 28: remove "also" and place it after "sums"

Line 31: remove “also”

Line 32: remove comma after “microrelief”

Page 7

Line 12: change “input” to “inputs”

Line 17: change to “with tussock forming sedges () as the second most abundant species.”

Line 22: “birch” not “birches”

Line 23: Rather than “close to zero” can you provide actual percentages?

Line 23: use the % symbol rather than “percent”

Line 27: change to “same size near the control tower.”

Page 8

Line 1: there is a mistake with the Sections; it’s shown as “Sections 0 and 0”

Line 5: change to “allow us...”

Line 5-6: I don’t understand this statement: allow to structure the ‘light season’ into seven distinct sections

Line 9: Change to “that is decreased by..”

Line 8-10: This is a run-on sentence. Please split it up in a logical way.

Line 19: remove comma after “areas”

Page 9

Line 31: change to “(... Table 3). The winter results are presented after the summer results in the following section.”

Page 10

Line 21: change “in contrast to that” to “conversely, during the...”

Line 26: add “the” after “from”

Line 26: remove “the” after “of” so it reads “after drainage”

Line 30: change “in contrast to that” to “conversely, in 2015...”

Page 11

Line 5: I don’t know what this means “Smoothed offsets between drainage and control are positive throughout the summer months”

Line 9 - 12: try something like this to increase clarity: “Shortwave energy input is extremely low during the polar winter and outgoing longwave radiation usually exceeds incoming radiation; values are slightly lower (-1.6 Wm⁻²) in the drainage area.”

Page 12

Line 9: change to “...regime for a couple of reasons. The first is.... The second is.....”

Line 12: change “contribute” to “contributing”

Line 13: change to “during the summer”

Line 19: change to “during the summer”

Page 13

Line 5: change to “..domains. Onshore winds...”

Line 7: comma after “also”

Line 10: change dampened to slight

Line 12: remove the “ie” and change the text after it to “, wherein the overall reductions in the flux rates were of equal magnitude, and “

Line 15: change “in accordance with the results presented by Boike et al. (2008) our results indicate” to “, similar to Boike et al. (), we found that...”

Line 20: put a comma after “flux”

Line 21: change derived to observed

Line 22: change to “areas, wherein compared to 2014, in 2015....”

Line 28: change to “interannual variability. In particular, the slightly warmer..”

Line 31: change to “did not have a strong effect...”

Page 14

Line 21: Change to “in the current study”

Line 31: change to “and also alter thaw depth and the net ecosystem – atmosphere heat exchange”

Page 15

Line 30: please clarify ...”unclear the level of detail about?? these models need to accurately represent what ??”

Page 16

Line 8: change to “disturbance (the lowering of the water table) impacts...”

Line 17: change to “.. and multiple links with factors such as snow cover....”

Line 21: change to “details like shrub density, which complicates the evaluation of this”

Line 22: change to “Further, including a drainage effect increases the complexity. For example, during the winter.....”

Line 32: change to “ecosystems. However, ...”

Page 17

Line 5: change to “non-linearly transitions from one state to another”

Line 7: I don’t know what a “superposition” is

Line 9 - 11: change to “While the primary disturbance immediately affected the water table, other key components like the vegetation community structure take longer to change.”

Line 11: this sentence is confusing. It sounds like you're trying to say that until the changes in snow cover have occurred, the full effect of the manipulation cannot be observed. Please clarify.

Line 15: change to “and further shifts in factors like shrub coverage and canopy height...”

Line 24: change to “over the summertime cooling and impact thaw depth cannot be...”

Page 18

Line 14: change to “changing the disturbance..”

Line 18: change to “conditions (e.g., the heat flows.....) may increase under..”

Paragraph 4.3 is not needed.

Page 19

Line 12: change to “during the summer”

Line 15: Change to “Since dry organic soils are efficient insulators, drainage can reduce thaw depth, and can initially protect, . However, the net.....”