

Review of Mgr. Jakub Kašpar PhD thesis:

The influence of wind on treeline position – the question of summit syndrome

The thesis is based on Introduction, 3 published papers, one submitted manuscript. Jakub is the first author of two published papers, submitted manuscript and second author of the third paper, which documents his scientific skills and team work abilities. Overall, thesis will deserve a little bit more work (time) of proper formatting. However, such formal things are present in basically every thesis and in this particular case do not affect the overall quality, which is very high due to high scientific standards of published papers, but also not-published parts. Most of the thesis has already passed the strict international peer review in high quality journals and thus it does not make much sense to comment in detail these published papers (more importantly, in general I found all of them well written, with clear take home message and this is what I do expect from research papers). I concentrate especially on not-published parts of thesis, which are also of very high quality; I list some minor comments that author may think about in both defending his PhD and in his future work on the topic (the one which starts in bolt will be nice to discuss during defence; I have also few questions which I decided to not reveal in the review, but save for the defence).

Abstract

Abstract is appropriate and really summarize the thesis, which is not so easy. There is basically one thing which I would change (e.g. “there was NO correlation”, there is always some correlation, but can be insignificant).

Introduction and literature review

First of all, I have to say that this part contains basically everything what is generally expected from it and it is not just obligatory part made by compilation of “randomly” selected paragraphs from presented papers. Author made really nice job here and there is not much what I can suggest or criticise, so I have only few comments here:

p. 3 I miss there mentioning of pasture as one of the factors modifying treeline position.

p. 8-9 I think there some sentences in Literature review will deserve reference at the end as e.g. the last one of the second paragraph or whole second paragraph of part 2.3.2. (I am not writing here all places where will be appropriate to add reference).

p. 9 Author introduced the abbreviations CZ, EN, WT and MC. However, these are not used further (at least I did not see it) and thus is meaningless.

p. 11 One thing which can be a little bit more developed in Literature review is definition of growing season. This is quite important and it is crucial for such type of research. It is not space for this in papers, but dissertation provide nice opportunity to write a little bit more on this topic and place to present own ideas without restriction of sometimes strange review process.

p. 12 the upper paragraph “Snow supplies the majority.... krummholz (Cairns 2001).” I found these sentences not well organized and without really clear link.

p. 12 author wrote that “Since wind speed generally increase with elevation (Barry 2008), treeline trees are significantly affected by wind.” However, there is different opinion of Korner (2007: TRENDS in Ecology and Evolution Vol.22 No.11,569-574) who wrote: “Contrary to popular belief, mountains, as a whole, are among the less windy places on Earth, owing to the topographic shelter between or within mountain ranges, except for exposed crests, summits and isolated mountains on islands [46,57].... The few high-altitude meteorological stations are commonly built in rather exposed places. In fact, all of the high-altitude stations in the European Alps are on such ‘extreme’ sites (Jungfrau- and Weissfluh-Joch in Switzerland, Zugspitze in Germany and Sonnblick in Austria).... Hence, there is no general altitudinal pattern of ecologically relevant wind velocity that one could refer to [6].” Can author say a little bit more about this topic and his own opinion?

p. 12 one of the errors (does not make sense to list them, authors surely found some of them by himself later, I did not consider this as something serious and I marked some in the copy which I got) “...intense *winds wind* action”...

p. 13 Author describe that narrower rings in older trees are caused by later wood production compare to younger trees. However, I think there is other reason why older trees have narrower rings.

p.14 “Most conifer species require suitable establishment microsites...” I think that this is valid for all species and not only most conifers.

p. 15 Title of 2.4.3 should also include effect of continentality

Last think which will be nice to have here will be the kind of list with extremes in elevation of tree-lines worldwide (i.e. lowest and highest tree-line).

Study area

I am not very sure importance of this chapter as details are presented clearly in individual studies. However, it is not disturbing and author actually summarize this part in a nice way and really provide useful overview for purpose of thesis.

p. 21 “High-elevation tree stands are influenced by high wind speeds (Table 1).” I did not find such information in that Table, but it will be really nice to have them.

p. 22 “In the majority of the mountains under study, the protected areas were established....” In fact, all your research areas are protected areas, not the majority, according the Table 1.

Material and methods

The same as previous part, I do not think it is really needed, but provides shortly some overview.

p. 24 Author wrote here that they collected one core at 50 cm and other on 200 cm. Why the lower core was not collected even lower to get most precise information about age? I can hardly

imagine to core in 200 cm without ladder, how exactly author made this? Why did not author rather core in standard breast height?

p. 25 “altitudinal gradient between” I would replace “gradient” by “difference”

Papers and manuscript

I really appreciate table with the list of papers, which provide the overview of author contribution (the first and last columns of the table can be joined to the one columns with full citation, including author names).

Article I-III.

All three papers represent nice contribution to the general knowledge about treeline ecotones. Papers cover quite large variety of topics and altogether provide essential information to science. I appreciate that papers are covering various disciplines and thus they altogether represent findings important for broader audience and have potential for interdisciplinary implication. All three papers are published in top journal in the field, I found all of them nicely written, based on large dataset, results are clearly presented and I also appreciate modern and straightforward graphical presentation. Used methodology of all papers is suitable and author showed that he is able to analyse data by various approaches. Overall, presented papers represent significant contribution to research and will be important source of information for other studies.

Article IV.

p. 72 Latin names should be always in italic.

p. 73 not sure what is “minimum canopy 0.1”

p. 73 I think that there is sentence which can be deleted concerning the higher trees from Harz and Velka Fatra. It will be easier to write that you investigated trees from uppermost position which reach at least 3m.

p. 73 I would like to know how easy is to recognize clonal tree islands from the one which is not clonal. I personally did not investigated such stuff, but I can imagine that it can be sometimes quite difficult.

p.73 “distance to the nearest barrier” I am just curious how you made this in reality, i.e. how you determined that it is really barrier. Also, how was selected the direction (and why there were three directions)where you were looking for such a barrier.

p. 74 the average height increment above 2m: number of rings from which core was used in this calculation?

p. 74 Why proportion of reaction wood was determined in first 15 rings?

p. 74 It will help if individual temperature metrics will be numbered.

p. 74 Description of first temperature metric “mean growing season temperature” is rather complicated and should be defined in easier way. I really did not get if e.g. there was a day in July with mean temperature below 0.9°C, you include such day to the final calculation of the mean or not. As well, if you get just a little bit of snow which melted quickly, you excluded such day and how you actually discover that there was some snow which remained for only few hours.

p. 74 Was not be better to determine slope in the field?

p. 74 It is always difficult to decide if variables should be transformed or not, however, authors should directly write which variables were transformed and how. Can author explain which variables were transformed and which method was used for transformation (logarithmic or square root) and why? I.e. basically say in higher detail what means “transformed if necessary”.

p.74 “At first step, we looked for the basic pattern in data.” This is something what I guess everybody always do, not sure if needs to be really mentioned (and if yes, it should be mentioned in which data and especially why).

p. 75 should be R^2 (not R^2)

p. 75 *p-value* is never 0

p. 75 “Average height increment below 2 m was 7.0 cm.” Was it per year?

p. 75 and figures I am confused with the level of significance. Mostly you use 0.05, but in second paragraph in methods (Figure 3) is 0.1. Should not be selected level rather uniform? Or what was the reason for selecting of two different levels? Also, it is common to use values <0.1 and >0.05 as marginally significant and avoid not-commonly used two levels of significance.

p. 76 Authors mention that June-July temperatures are the most important for radial growth. Did you try to perform the analyses with such data?

p. 77 I do not understand what do you mean by: “High entire growing season remperature...”

p.77 I think few more details with some directly mentioned results about reaction wood can be useful, i.e. what your findings really mean. At the moment, the last paragraph (p. 77) is mostly somehow introduction with no clear connection to results and last sentence of this paragraph is difficult to interpret without more explanation to reader (I believe that it is clear to authors, but it does not need to be so clear to the reader what exactly is in the line with your findings as you did not directly investigated change in allocation of carbon).

p. 78 should be probably “proportion OF (not OR) reaction wood”

Figure 2: It will be really useful to have there more precise description of such figures, e.g. to add “Boxes represent 25–75% of values, black strips medians, whiskers 1.5 interquartile ranges.” Also, it will be nice to add above each box letter which will indicate if individual boxes were statistically different or not.

VI. Conclusions

Nice summary of thesis.

Review conclusion

After studying Jakub Kašpar's dissertation I have no doubts that he demonstrated very high skills in scientific work. He is the main author of 2 publications and one manuscript, he was responsible for the data collection, all consecutive steps of experiments and writing. Jakub showed a high competence to analyse data, to present results on very high scientific level and to lead essential discussion. Finally, his work was evaluated positively and accepted by the excellent international journals. It should be also highlighted that all papers had a small author collective and thus the amount of work was higher compare to large teams. Jakub's dissertation represents a significant and high-quality contribution to the science.

I am happy to recommend Jakub Kašpar's Ph.D. dissertation to the further stages of defence as it fulfils all the requirements.

In České Budějovice, 13.9. 2017

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