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Thesis Defense Report

Name of the author: Jana Minářová

Title of the thesis: „Extreme precipitation in low mountain ranges in Central Europe:

a comparative study between the Vosges and the Ore mountains (Fortes précipitations en moyenne montagne en Europe Centrale : Étude de comparaison des Vosges et Monts Métallifères; Silné srážky ve středně vysokých pohořích střední Evropy: Porovnávací studie Vogéz a Krušných hor

1. Structure of the thesis

The submitted doctoral thesis contains 139 pages including five research articles that have been submitted accepted and published in peer-review papers. These five articles constitute the main part of the thesis (over 90 pages in total).

Aside from this part the thesis contains the introductory part describing the thesis motivation followed by description of the state of the art. In this part the author deals with the description of extreme precipitations, trend analysis, temporal-spatial aspects and the orographic influence of mountains to precipitation. An overview of mean and extreme precipitation is provided as well for both researched mountain areas. In this part I am somewhat missing the daily precipitation extreme totals in the Vosgez (while they are presented in the part about on Ore mountains). The next chapter defines work objectives. Chapter 4 deals with data and methods for the studied areas (I have just one comment regarding the Fig. 1 – may be another raingauge symbol could be chosen to make it more visible in the maps). The next part of the thesis consists of the above mentioned research articles (with a brief overview given in chapter 5 followed by chapters 6 to 10 with individual articles). Finally, chapter 11 provides some conclusions and future perspectives. References can be found in chapter 12 (a fairly extensive and impressive list, 17 pages). I have just one comment regarding references – the author cited Pechala and Böhme publication about Krusne hory climate number of time but this publication was written in 1975 so are there no newer publications dealing with climate in this part of the Central Europe?

2. Work objectives and their fulfilment

Work objectives are clearly defined in the chapter 3 of the thesis with the main objective being the study the temporal, causal (synoptic) and spatial characteristics of extreme precipitation in the Ore Mountains and the Vosges Mountains and to compare the results

between these regions. I can state here that the objectives were fulfilled with main results (the summary) given in chapter 11.

3. Methods used

The author has used the daily precipitation totals from studied areas. The climatology of precipitation was studied with the help of ombic degree of continentality indices but main attention was given to precipitation extremes analysis using methods such as POT, BM, RP or and WEI. Extreme precipitation events were also compared based on synoptic characteristics in both studied areas. I found the results very interesting. As expected very dominant synoptic features were cut-off lows over Central Europe sometimes even with Vb cyclone.

4. Thesis results and author's contribution

The results of the thesis and doctoral study are presented in 5 articles that are included in the thesis and a brief summary of results and conclusion are attached as well. Based on these articles it can be stated that the co-authorship of graduate was crucial in all papers. Also that the quality and scientific level of her work is very good. I would like to accentuate the massive work that she had to do in order to get more knowledge about climatology of these two European mountains.

5. Practical contribution of thesis and the science field development

Extreme precipitation events leading to (catastrophic) floods remain a very important topic in the Central Europe because of its high frequency and economic loses they may cause. The wide analysis provided by the thesis can be very useful for a deeper understanding of characteristics of the extreme precipitation episodes. It has a potential to be useful for example for engineers dealing with the risk of extreme precipitation and subsequent floods occurrence and related modelling. Therefore I think the thesis can help a further development of this field of climatology and connected domains areas.

6. Suggestion for discussion - questions

The doctoral thesis is of a very good quality – this was actually confirmed by the publication of the results in multiple journals with impact factor.

Regarding the discussion I would have following questions or comments:

- 1) Did the author make any quality check of the precipitation totals she received from meteorological services (meaning the check of the values)?
- 2) The author has mentioned the possible influence of the Vb cyclone track on the Vosges can she present in more detail any example and the track of it?
- 3) In one of the papers it is stated that the authors are currently investigating selected EPEs via the event-adjusted method in other low mountains in Central Europe. Which regions have been selected and have the author already found any results?
- 4) Have the author found any situation with (at least partly) extreme precipitation on the SE side of the Ore mountains?
- 5) Apart from the specific moisture flux have the author also investigated the air parcel trajectories for selected extreme precipitation events?

- 6) Finally I am interested in the situation on August 12th when Zinnwald stations received the highest precipitation total ever measured in Germany. Could the author provide a brief summary of this episode from various aspects – extremity of EPE, synoptic description (e.g. fluxes of specific humidity field)?

7. General evaluation

The doctoral thesis of Ms. Jana Minářová makes a sufficient contribution to this field of research and based on my comparison to other doctoral theses I have defended (both at our faculty and other universities) I can state that this thesis deserves to be defended for the title of PhD.

In Prague, 17th August 2017

Mgr. Michal Žák, Ph.D.