

Opponent's review of the Doctoral Thesis

Candidate Nina Elizabeth Noreika, BSc., MSc.

Title of the doctoral thesis Modeling hydrological impacts of management practices in rural catchments using SWAT

Study Programme Civil Engineering

Tutor doc. Dr. Ing. Tomáš Dostál

Opponent prof. Ing. Martin Hanel, Ph.D.

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Topicality of the doctoral thesis theme

Commentary: The topic is highly relevant for catchment management in the Czech Republic. The management practices can strongly affect characteristics of hydrological regime, in particular extremes and have implications for water management, soil protection and other aspects of land management.

excellent above average average below average poor

Fulfilment of the doctoral thesis objectives

Commentary: The objectives were fully addressed

excellent above average average below average poor

Research methods and procedures

Commentary: The study uses rather standard approach to catchment scenario analysis using a hydrological model.

excellent above average average below average poor

Results of the doctoral thesis – dissertant's concrete achievements

Commentary: The doctoral study resulted in three first author journal publications, which is great. However, all publications are in MDPI journals which are recognized with some reservations in academic community.

excellent above average average below average poor

Importance for practice and for development within a branch of science

Commentary: The results clearly demonstrate the effect of land use and land management practices effects on various aspects of hydrological regime of a catchment. As such they are of high importance for practitioners, in particular since they not only state the effects but provide quantification as well. From scientific point of view, although the methods are not novel, their application in the Czech Republic was limited and the thesis thus brings new aspects to catchment management in the Czech Republic.

excellent

above average

average

below average

poor

Formal layout of the doctoral thesis and the level of language used

Commentary: The formal layout of the thesis is appropriate and consistent, there are only few elements that are not optimal, such as tables split between pages, below average quality/resolution of some figures etc.

excellent

above average

average

below average

poor

Statement on compliance with citation ethics

As far as I can judge, the thesis properly acknowledge all sources. The citing and reference style is consistent and the literature includes up to date and relevant sources.

Remarks

Questions/comments to the author:

1. You mention "small/local water cycle" reinforcement at many places throughout the thesis, often in the context of the SWAT model results. However, it is not clear, whether small water cycle can be effectively assessed using the SWAT model. Is there any feedback loop allowing for the transpired water to be condensed again at the catchment? What are the main processes in the model related to small water cycle?

2. The purpose of the second paper is to assess the effects of land use/management changes from 1852 to present. However, the study is somehow in between a hydrological regime reconstruction and scenario analysis, since in addition to land use changes it also considers physical changes in the catchment (such as construction of reservoirs and tile drainage). Designed as such it is difficult to distinguish the two effects. If the main purpose of the study would be to reconstruct the historical water regime then also historical meteorological/climate inputs should be considered (e.g. temperature is 1°C higher then it was in the 19th century). If the purpose would be to assess the effects of land use changes then it would be more reasonable to keep other factors fixed (or include their changes as part of the scenarios).

3. Maybe I overlooked something but the origin of the crop parameters related to transpiration is not clear to me. Could you please comment on this and related parameters controlling evapotranspiration in the model?

4. Large number of simulations/calibration attempts was conducted. While the most sensitive parameters were identified and are reported, it seems that those parameters were calibrated and the best performing set was considered for the results. It is well known that significantly different parameter sets could lead to similar simulation performance. Do you have any idea what is the sensitivity of your conclusions regarding land use/management changes regarding the different well performing calibration sets? Do all parameters have physical meaning and can be somehow related/checked against physical properties of the catchment?

5. It is noted that the calibration was done in monthly time scale, however, daily values are reported. How was the calibration done?

Final assessment of the doctoral thesis

The submitted thesis meets all standards for doctoral dissertation and I after successful defence I recommend to award the author the PhD degree.

Following a successful defence of the doctoral thesis I recommend the granting of the Ph.D. degree

yes no

Date: 14th June,
2022

Opponent's signature:.....