Hydrology and Earth System Sciences Discussions

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Reply on RC3

Chaogui Lei et al.

Author comment on "Influences of land use changes on the dynamics of water quantity and quality in the German lowland catchment of the Stör" by Chaogui Lei et al., Hydrol. Earth Syst. Sci. Discuss., https://doi.org/10.5194/hess-2021-476-AC3, 2021

- Thank you very much for reviewing this manuscript and providing constructive comments. We should highlight that the model accurately simulated daily long-term streamflow at the available three gauges in the catchment. We are therefore confident that the model is capable of representing spatio-temporal water fluxes in the catchment. Moreover, we agree with the reviewer that long-term measurements of water quality on a daily time step are rather scarce. However, for the study area observations for three time periods in three decades were available, which is a comparatively good data basis. We will gladly address the points raised by the reviewer to improve the manuscript and provide further details on the used methods.

Introduction

- Thank you very much for the constructive comment. We will revise and improve parts of the introduction to better highlight the scientific challenge and frame the scientific question of this study. Particularly, we will rewrite or improve the sentences as suggested by the reviewer.
- Thank you for his very helpful suggestion. We will describe the key information on L86-89 with more details, and meanwhile briefly summarize what previous scientific studies found using PLSR for land use change and hydrology.
- We will add some more recent references.

Terminology

- This is indeed a key term and we will provide a description of “landscape metric” and examples of explaining its meaning where it first appears (Line 63).
- Thank you very much. We will add an explanation of the term “patch”.
- Thank you for spotting this. This is a typo. We will take care of this and also check the rest of the manuscript carefully.

PLSR

- Thank you very much. We will work on this section. Specifically, we will explain more about how land use changes are employed as predictors and how modeled dynamics in water quality and quantity are incorporated as response variables for PLSR. In addition, we will provide some necessary details on calibration, cross-validation and performance assessment of PLSR in the supplementary material.
- Thank you. Actually, it is correct that we had only three available land use maps (1987, 2010, and 2019). We analyzed three time intervals, by analyzing the change in land use from 1987 to 2010, the change in land use from 2010 to 2019, and the land use change between 1987 and 2019. We will make that clearer in the revision.
- Yes, we can provide an example to explain the method of 50 random repetitions on 10 equal segments.
- Yes, the sentence will be rephrased to "According to Wold's assessment criterion, the predictor …".
- Thank you. We will define this difference on L 64-65 properly. Landscape metric is a quantitative indicator that describes specific spatial characteristics (i.e., spatial fragmentation or structure) of land patches, e.g., the connectedness degree or shape complexity of the land patches of one class or the entire landscape. A composition metric normally refers to the abundance of patches belonging to one class within the landscape, without considering the spatial character, placement, or location of patches, e.g., areal percent of a land use class.
- We will provide a brief description.
- Yes, we will rephrase and improve the sentence.
- Thank you very much. We agree that this will help and we will try to work out a sketch to visualize the meaning.