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Hydrology and Earth System Sciences
Discussions

# *Interactive comment on* "Uncovering the shortcomings of a weather typing based statistical downscaling method" *by* Els Van Uytven et al.

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HESS-2019-40 Title: Uncovering shortcomings of a weather typing method statistical downscaling method Authors: Els Van Uytven, Jan De Niel and Patrick Willems

We would like to thank the reviewer for the constructive feedback and comments. Answers to the comments have been made (see below) and the manuscript has been changed accordingly (supplement to the comment, blue font). We would like to note that the manuscript has changed significantly to address the comments of all reviewers and to improve the readability.

Response to reviewer comments (Anonymous Referee #2) The study aims to evaluate different common assumptions inherent statistical downscaling methods (SDMs). The



overarching goal of this study is certainly an important one. However more needs to be done to increase the scientific significance of this study. My few main comments are below: (1) Why focus on WT based SDM only? Why not choose at least one more type of statistical downscaling method such as Bias-correction and Spatial downscaling method, which is a widely used SDM. I think inclusion of at least one more SDM would allow the study to more appropriately address the overarching goal.

REPLY: The main objective of this study is to verify and evaluate the general and structural statistical downscaling assumptions in order to develop a statistical downscaling ensemble tailored to the case study and thus end-user needs. Most studies address the general and structural statistical downscaling assumptions independently. This results in studies addressing one or some of general statistical downscaling assumptions (Dixon et al., 2016; Fu et al., 2018; Haberlandt et al., 2015; Hertig et al., 2017; Mendoza et al., 2016; Merkenschlager et al., 2017; Salvi et al., 2016; Tabari et al., 2016) and other studies addressing the structural assumptions by statistical downscaling of surrogate climate model runs (Bürger et al., 2012; Gutmann et al., 2014; Hertig et al., 2018; Maraun et al., 2018; Roberts et al., 2019; Werner and Cannon, 2016; Widmann et al., 2019; Yang et al., 2019) or by statistical downscaling of the projected climate model output (Li et al., 2017; Sørup et al., 2018; Sunyer et al., 2015; Vaittinada Ayar et al., 2016; Wang et al., 2016; Wootten et al., 2017). However, to objectively identify shortcomings of statistical downscaling methods, the verification and evaluation of the general and structural assumptions should be carried out simultaneously. To the authors knowledge, there are yet no papers which simultaneously address the verification of both types of assumptions.

We agree that verifying the general and structural assumptions for another SDM can be of interest, but such investigation is not performed in the considered study for sake of brevity.

âĂČ (2) The SDM method needs to be described better. Please consider including the section S1 into the main script.

REPLY: The supplementary information on the methodology of the weather typing method has been placed into the main script.

(3) Please also clarify in greater details the novelty of this study and implications beyond the study domain.

REPLY: We refer the reviewer to the modified introduction and conclusions.

(4) I also think the manuscript can benefit from a thorough copy editing.

REPLY: The quality of the manuscript has been improved.

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Please also note the supplement to this comment:
https://www.hydrol-earth-syst-sci-discuss.net/hess-2019-40/hess-2019-40-AC2-supplement.pdf

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