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Hydrology and Earth System Sciences
Discussions

Interactive comment on "Why has catchment evaporation increased in the past 40 years? A data-based study in Austria" *by* Doris Duethmann and Günter Blöschl

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In my opinion this one of the few articles that try to look at evapotranspiration variability from various perspectives and therefore is a particularly valuable contribution. Thus said I regret very much to find a point that I would see as a quite fundamental flaw in the analysis.

There is a vast body of evidence (see in particular the review paper of McVicar et al. (2012, cited) that both radiation and aerodynamic terms are determining potential evapotranspiration (Ep). Depending on region wind may account for the major part of Ep variance. Even though the authors argue with a lack of spatial homogeneity of wind

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speeds in their study area their averaged wind speeds (Supplement Figure S2b) show quite well the general decrease of wind speeds that has been observed world-wide. The large variability is to be expected in largely mountainous Austria and disregarding this variability does introduce a major error into the analysis. In this respect it is most unfortunate to see that both calculation AND attribution analysis of Penman-Monteith Ep are based on spatially and temporally averaged wind data. Even using averaged wind data as additional variable in the attribution analysis would already show that both radiative and aerodynamic forcing largely explain most of the variance. In the present form – without a realistic inclusion of wind data – the results are misleading. I would propose to recalculate Ep with wind speed data that contains as much spatial and temporal variance as possible. In addition attribution itself is variable both in spatial and temporal terms (Fan and Thomas, https://doi.org/10.1016/j.jhydrol.2018.02.080) so an extended analysis taking into account attribution variability would offer the reader a considerably improved analysis of Ep dynamics.

There are two smaller points I would also like to mention: the authors rightly point out in their paper that temperature is not an important driver of Ep but at the same time begin their introduction with the much-too–often-heard statement that global warming (hence temperature) has increased regional evapotranspiration. Even the IPCC still voices this scientifically incorrect statement. I would propose to rephrase this sentence to clarify that in the context of global CLIMATIC change Ep also has seen changes.

Another point to clarify is the sometimes misleading way ‘evapotranspiration’ is used in this paper. Evapotranspiration is an umbrella term that has many definitions and can be estimated in different ways. In the Introduction most of the papers cited deal with actual evapotranspiration as do the authors when they use the abbreviation ‘E’ in their data analysis and results. On p 2/l 15 however they appear to mean potential evapotranspiration (at least most of the cited papers deal with Penman-Monteith potential evapotranspiration). On p 3/l 27 it is PET (again perhaps potential evapotranspiration) while reference evapotranspiration (E0, p 6/l 22) is actually crop reference evapotran-

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spiration as the method of Allen et al. 1998 is cited. 'potential evapotranspiration' is used twice in section headlines 2.3 and 2.3.2 but is not defined elsewhere; on p 7/l 23ff 'potential evapotranspiration' and 'reference evapotranspiration' are used almost synonymously. Perhaps the authors might consider adding a short section pointing out the differences between different measures and methods of evapotranspiration cited or used in their paper and then use the appropriate terms consistently throughout their paper.

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