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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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The manuscript by Duetchmann and Blöschl discusses recent trends in estimates of evapotranspiration in Austria. The analysis is mostly observation-based, and makes use of a range of long-term observations ranging from station- to satellite-data. The work is important because it is one of the first thorough and detailed investigations on trends in ET in a region that has been identified by other studies as a region where trends in global radiation have been significant, and where they would likely have impacted ET. This study partly confirms these previous findings, but also shows that other factors such as vegetation might also affect ET trends. In general the findings are ro-

bust and well-presented. My main concerns, partly in line with the comments by the first referee, lies with the interpretation and quantification of the contributions to the ET trend (Figures 7c and 9).

Concerning the effect of wind: the potential impact should be discussed in more detail. Wind speed is known to have seen significant trends in many regions (Vautard et al., Nature Geosci. 3, 756-761), and this could have impacted ET trends also in this study. According to the offline PM-equation used by the authors, the impact of wind is direct. It should be noted, however, that when coupled to an atmospheric model, the sensitivity of PM ET for wind becomes much smaller (see e.g. Van Heerwaarden et al., Geophys. Res. Lett. 37, L21401). So I consider it unlikely that wind is a strong driver of ET trends locally, but I agree with the other referee that this warrants an in-depth discussion.

My main concern related to the interpretation of Figure 8c. This figure shows the relation between inferred trends in P and ET. It suggests a very strong control of P on ET trends, which seems somewhat suspicious given the general humid climate conditions in Austria. In my view, two possible explanations exist. It might be that in general, soil moisture constraints on ET have weakened because of increased P. In this case, one would expect inferred actual ET to be significantly lower than potential ET. This relation between actual and potential ET, however, is not explored in the manuscript. I believe such an analysis should be included in a revised version, as it provides important insight into the possible background of the drivers of ET trends. It should be noted that trends in soil moisture and vegetation might possibly be related. This needs to be discussed, along with the implications for the results shown in Figure 9 which assumes soil moisture/P and vegetation effects to be independent. A second explanation for the relation in Fig. 8c could be that trends in ET are induced by overestimation of trends in P, for instance due to a too strong correction for undercatch. This possibility needs to be explored and discussed. So in summary, if the correlation is physical/causal, the authors should provide additional evidence for the underlying process, for instance by showing increasing ET/PET ratios. In addition, the dependency of trends in vegeta-

tion and soil moisture needs to be explored. Fig 9 is interesting, but these results are currently not sufficiently robust to be published.

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