

Interactive comment on “Large-scale lysimeter site St. Arnold, Germany: analysis of 40 years of precipitation, leachate and evapotranspiration” by N. Harsch et al.

Anonymous Referee #1

Received and published: 16 October 2008

The paper by N. Harsch et al. presents data of precipitation, leachate, and evapotranspiration from a long-term survey at a study site in Northwest Germany, where lysimetrical-meteorological data series have been collected over a period of 40 years. Data were obtained from a grassland site, oak/beech forest and pine forest and thus are generally representative for typical landscape types of Europe and North America. The authors found highest rates of evapotranspiration under coniferous forest and highest leachate rates under grassland. Concerning the comparison of different vegetation types, the outcome of the study is not un-expected; higher leachate amounts under grassland compared to forest and higher evapotranspiration in coniferous forests have

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper



been reported several times before. However, in this study these site-dependent differences are documented on a long-term temporal scale, allowing the integration of forest development into the analysis of hydrological parameters. The value of the presented study clearly lies in the presentation of an uninterrupted series of measurements over a period of 40 years. Such long-term investigations are rare, and they provide important information about variation of meteorological and hydrological parameters and may help to distinguish between fluctuations and long-term tendencies. Moreover, they help to evaluate seasonal trends on the long term. In the given example, trends towards a milder and more humid regional climate were detected.

However, there are several aspects concerning the presentation and interpretation of data that need to be clarified or revised.

Structure of the paper. In its current version, the methods and the results section of the manuscript are not clearly separated. Most of the data that are now described and shown in the method section should be moved to the result section. Especially since all the different parameters measured are displayed in individual figures, the method section gets much too long. Trends deduced from these data should also rather be presented in the results section. In the current version of the manuscript, several aspects are referred to in both the methods section and the result section (i. e., p. 2632, l. 20-22). Here, a restructuring of the two sections could help to avoid redundancies and make the paper easier to read.

Number of figures: For some parameters the major outcome could maybe also be presented in combined figures such as 8, 9 and 10, or in a table.

Regression and correlation analysis. The regression analysis from which trends are de-duced forms one major aspect of the results and discussion. Therefore, results of regression analysis should be presented in the figures in a more pronounced way. Why is regression analysis only shown for the all-season-data and not also for summer and winter season separately? The authors mention that in the text (e. g., p. 2626, l.

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper



17-20), however, it is not indicated in the corresponding figures. Moreover, the authors should provide more information about the quality of the regressions (i. e., correlation coefficients), and which method was used to make the regressions. In addition, the authors refer to correlations between precipitation and leachate sums (p. 2633, l. 12; p. 2634, l. 15-16). Which method was used to calculate correlations, and why are results not shown?

Representativeness of the results. The authors should comment more on the representativeness of their study; in the current version, the discussion of the data primarily suggests a local interest in the study site, which is also reflected by the references (mostly German publications specifically related to the study site). Here, the paper would benefit from the incorporation of more international literature and a closer analysis of the results in the context of similar studies on a larger geographical scale. Moreover, the authors start the introduction by pointing out the relevance of this kind of studies for an efficient water resource management. Here, a few comments on this aspect should be added to the discussion.

Water balance. The authors state that there were two problems regarding available data sets and the location of the study site that may hamper the calculation of rates of evapotranspiration and the water balance. Data of stemflow and throughfall are not available for the forested study sites. The problem becomes obvious in the balance term (p. 2636, l. 26ff) especially when differentiating between summer and winter season, however, the discussion of this problem remains rather vague (p. 2637, l. 3-28). Here, authors should comment more on this potential problem, which values for the missing data (stemflow, throughfall) could be assumed based on other studies, how much these parameters contribute to the measured hydrological parameters, and how they might be affected by forest development over longer periods. Another problem mentioned is the site-specific wind speed, which is according to the authors too low due to local conditions and thus not representative for calculation of potential evapotranspiration. Here, authors should comment on how the use of data from ad-

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper



ja cent sites may affect their calculations. For example, fig. 3 clearly shows that the wind speed at the three reference sites shows a different long-term trend than the wind speed at St. Arnold, and peaks do not show up at the same time.

Specific comments: p. 2625, l. 8-14: The authors should provide more information about how the lysimeter is operated (zero-tension/suction)?

Fig. 9, fig. 11: Summing up precipitation from the summer and winter season, one gets the result that total precipitation was about 1400 mm in 2001. That seems quite high. The highest value mentioned in the paper is 1140 mm in 1966 (p. 2628, l. 21).

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 5, 2623, 2008.

HESSD

5, S1488–S1491, 2008

Interactive
Comment

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper

