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Precipitation and evapotranspiration at the mountain lysimeter station Stoderzinken

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Alpine water resources are highly important for the Austrian drinking water supply. In particular, the Northern Calcareous Alps contribute substantially to both the regional and the national drinking water supply. To analyse water balance, runoff and recharge in a representative mountain pasture area in the Northern Calcareous Alps a lysimeter station was established at the mountain Stoderzinken (1830 m a.s.l.) in 2005. This work examines the water balance at the lysimeter station during one summer period. Precipitation and evapotranspiration are determined using various approaches in order to identify potential errors in the measurement or interpretation of the data and thus to assess the uncertainties in the water balance components. For this purpose, data of rain gauges and a distrometer was compared with the precipitation calculated from the water balance of the lysimeter. Furthermore evapotranspiration was calculated using the HAUDE and PENMAN-MONTEITH equations for comparison. Already in previous seasons the distrometer was found to be prone to errors, which was confirmed when compared to the rain gauge data. In contrast, precipitation rates calculated from the lysimeter data were found to agree better with the rain gauge data but showed a trend to higher values. However, the approach to calculate precipitation from the lysimeter data turned out to be unsuitable for time periods with significant contribution of snow melt. Evapotranspiration calculated from lysimeter data are in good agreement with the results from the above-mentioned (semi-)empirical equations during dry periods. Furthermore the differences to the evapotranspiration calculated from the climate data correlate with the amount of precipitation. These results suggest that in alpine catchments the uncertainty in the precipitation data constitutes the major source of error in the calculation of evapotranspiration from the water balance of the lysimeter. However, it should be noted that these findings are based on a short observation period of one year only. The new installation of additional precipitation measuring devices and the enhancement of the data collection during the next years will permit a more precise quantification of the water balance components and allow a better assessment of the associated uncertainties.