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# Analysing seasonal differences between a soil water balance model and in-situ soil moisture measurements at nine locations across Europe

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In this study we compared soil moisture from the soil water balance model for European Water Accounting (swbEWA) with in-situ observations from nine locations in three European climatic zones (continental, Mediterranean and Maritime temperate), for different periods between 2003 and 2011.

Results show that the swbEWA model, despite its simplicity, simulates temporal changes in soil moisture with a high level of accuracy. Annual averages show that the model overestimates the soil moisture content, and that overestimations are the smallest when measurements are obtained from more than one depth. These results suggest that the relation between simulated and observed soil moisture also depends on the number of measurements and the depth over which they are taken. In the continental climate, where snow cover and frozen soil influence soil moisture, we observe higher root mean square error values in winter months. However, in the Mediterranean and Maritime temperate climates, we do not observe clear common seasonal patterns in the soil moisture profile, which makes it difficult to relate the model's accuracy to climate.
With the percentage of correctness and probability of detection measures we tested the model performance in simulating dry versus non-dry events. The percentage of the correctly classified dry and non-dry events is higher than 84 % at all locations, whereas the probability to detect dry events is significantly lower, exceeding 50 % at only four out of nine stations. The frequency distribution of consecutive days with dry soil (CDDS) confirms the model performance: higher number of short dry periods (with less than 20 days of soil moisture near wilting point) are reproduced and observed in continental climates, whereas long dry periods (longer than 50 days) are noted in the Mediterranean climate.
Overall, the statistical measures suggest that the model produces the highest accuracy in summer months at the stations in continental climates, whereas in the Mediterranean climate, the accuracy is slightly higher in the colder seasons.